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Adoption of Water Conservation Practices in Irrigation Management: An Application of the Theory of Planned Behavior in the Texas High Plains

Libby Durst, Texas Tech University
Dr. Courtney Meyers, Texas Tech University
Dr. Erica Irlbeck, Texas Tech University
Dr. Rudy Ritz, Texas Tech University

A vital part of the Texas High Plains economy, agricultural production in this region is sustained by using the Ogallala aquifer as a source of irrigation water, but the aquifer is in decline. It is imperative for agricultural producers to continually improve their irrigation management strategies for water conservation, but without their support, water conservation technologies and strategies will not make a difference. This study applied the theory of planned behavior to explore Texas High Plains producers' adoption of water conservation practices. Following the Tailored Design Method, a mail survey was distributed to a sample of agricultural producers. Findings indicated producers had positive attitudes toward utilizing advanced irrigation application technologies, monitoring soil moisture, and evaluating crop water demand, and they perceived to have control over performing these water conservation behaviors. Subjective norms for each of the behaviors reflected a neutral stance, negating both strong feelings of social pressure and denial of any social pressure at all. While the theory's constructs provided insight into producers' adoption behavior, the theory models were unable to predict producers' adoption intentions. Additional research is necessary to further explore how various water conservation strategies are used collaboratively and identify barriers to adopting these strategies.

Introduction/Literature Review

Water management is one of the world's most important challenges (Flint, 2004). Every aspect of our lives illustrates the need for water (Adler, 2002). Water provides nourishment for our bodies in its original form and in the form of foods we consume, as it supports plant and animal life. Without water, we would not have building materials, natural fabrics, paper, and other goods obtained from trees and plants. Water's natural cycles play a role in maintaining stable weather patterns, which allow for a sustainable economy and lifestyle and even protection from flooding, drought, and other impacts of climate (Adler, 2002). Simply stated, all life depends on and is shaped by water (Palmer, 2010).

Despite the value of freshwater sources, human societies worldwide have not always appreciated the need to protect and maintain this resource (Adler, 2002). Whether it manifests as the absence of quality drinking water or economic declines from losses in industries dependent on water, the effects of losing this precious resource are far reaching (Flint, 2004). The region of the Texas High Plains in the northwest part of the state has felt the pangs of the latter deficit through the agricultural industry. The Texas High Plains is comprised of 39 counties in the Texas Northern High Plains and Southern High Plains (Colaizzi, Gowda, Marek, & Porter, 2009). Like many other regions situated above the Ogallala aquifer, the Texas High Plains sustains agricultural production by using the Ogallala as a source of irrigation water.

Spanning beneath eight states from South Dakota to Texas, the Ogallala aquifer is one of the world's largest underground sources of freshwater (Colaizzi, 2009). Following World War II, innovations in groundwater extraction enabled an increase in the use of groundwater irrigation (Hornbeck & Keskin, 2014). This newly-gained access to the aquifer transformed the land above into one of the most agriculturally productive regions in the world (Peterson, Marsh, & Williams, 2003). Supplementing with irrigation has allowed producers in the area to substantially increase yields and produce crops that would not usually be as economical in a drier climate (Almas, Colette, & Wu, 2004). In addition, feed grains from the irrigated corn and grain sorghum contributed to the popularity of the region as a cattle feeding area (Terrell, 1998). As a result, agriculture has become a vital part of the Texas High Plains economy. According to the Texas Alliance for Water Conservation (TAWC), the region generates a combined annual economic value of crops and livestock exceeding $9.9 billion (TAWC, 2013). The vitality of the aquifer has a substantial effect on irrigated agriculture's $1.6 billion gross output for the Texas High Plains economy (Wagner, 2012).

Unfortunately, the Texas High Plains is experiencing declines in groundwater availability from the Ogallala aquifer (Texas Water Development Board, 2016). It is imperative for agricultural producers to continually improve their irrigation management strategies for water conservation when considering the future prospects of agricultural productivity enhancements through technology development (Bian, 2015). Without agricultural producers' support, water conservation technologies and strategies will not make a difference. According to Texas A&M AgriLife Extension (n.d.), advanced irrigation application technologies, monitoring soil moisture, and evaluating crop water demand are important behaviors for improving irrigation efficiency, which helps conserve water. Therefore, this study sought to identify to what extent agricultural producers in the Texas High Plains region are currently using these water conservation strategies as well as determine their intentions for adopting the practices in the future.

Theoretical Framework

The theory of planned behavior served as the theoretical framework for this study. As an extension of the theory of reasoned action, the theory of planned behavior provides a model for predicting human action by evaluating one's behavioral intention though the study of a subject's behavioral beliefs, normative beliefs, and control beliefs (Ajzen, 2002). The combination of these three constructs leads to the formation of a behavioral intention, which is the immediate antecedent of behavior. In general, the more favorable the attitudes and subjective norms and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior (Ajzen, 1988). The theory of planned behavior has been applied across disciplines to investigate diverse behaviors such as leisure participation (Ajzen & Driver, 1991), alcohol consumption (Hagger et al., 2012), healthy eating (Fila & Smith, 2006), social network website use (Pelling & White, 2009), and unsafe driving (Parker, Manstead, Stradling, Reason, & Baxter, 1992). It also has been used to explore pro-environmental and conservation behaviors (Beedell & Rehman, 2000; Hoag, Luloff, & Osmond, 2012; Taylor & Todd, 1997). Considering water conservation behavior, the theory has been used to study rural and urban residents' intentions to conserve water (Trumbo & O'Keefe, 2001) and adopt water conservation technologies (Lam, 2006).

More specifically, the theory of planned behavior has been used to research agricultural producers' water conservation intentions (Lynne, Casey, Hodges, & Rahmani, 1995; Yazdanpanah, Hayati, Hochrainer-Stigler, & Zamani, 2014). Lynne et al. (1995) administered a questionnaire via telephone interviews to 44 commercial strawberry farmers in Florida. The study sought to examine the producers' decisions to adopt or not adopt drip irrigation systems and subsequently how much money to invest in conservation technology. Findings indicated perceived behavioral control was important for explaining producers' decisions, which suggests that farmers did not have complete control in the decision to invest in the drip irrigation systems. In another application of the theory of planned behavior, Yazdanpanah et al. (2014) studied water conservation behaviors of 330 farmers in the semi-arid, drought-prone Boushehr province of southern Iran via face-to-face interviews. The researchers found farmers' risk perception of a water crisis was high as well as their intentions and moral norms regarding water conservation. The farmers' subjective norms and attitudes toward water conservation were also positive.

Purpose and Research Questions

The *American Association for Agricultural Education's National Research Agenda 2016-2020* described a need for research to better understand how farmers make decisions related to the adoption of new technologies and practices (Lindner, Rodriguez, Strong, Jones, & Layfield, 2016). The purpose of this research was to explore Texas High Plains agricultural producers' adoption of water conservation practices, specifically advanced irrigation application technologies, monitoring soil moisture, and evaluating crop water demand. Five research questions guided this study:

1. What water conservation practices were producers using?
2. What were Texas High Plains agricultural producers' attitudes toward the water conservation practices?
3. What were producers' perceptions of subjective norms regarding the water conservation practices?
4. How did producers perceive their behavioral control in regard to adopting the water conservation practices?
5. What were producers' behavioral intentions regarding the water conservation practices?
6. To what extent did producers' behavioral beliefs, normative beliefs, and control beliefs influence their intentions to adopt the water conservation practices?

Methods

To address the research questions, this study used descriptive survey research methodology with a questionnaire mailed to agricultural producers in the Texas High Plains. The target population for this study was agricultural producers in the Texas High Plains encompassing a 39-county area (Colaizzi et al., 2009). According to the 2012 USDA Census of Agriculture, there were 17,709 principal operators in the study area. The minimum sample size required for a 5% margin of error at the .95 confidence level with a *p* value of .10 or .90 is 139 (Ary, Jacobs, & Sorensen, 2010). Using SurveyMonkey's® online Sample Size Calculator with the population of 17,709, a confidence interval of 95 percent, and a 5% margin of error the researcher determined the optimum sample size for this study is 377. Considering the availability of research funds and the effects of a larger sample size on sampling error, the researcher selected a sample size of 1,000 producers. Selecting 1,000 addressed for the sample size also served to account for the typical response rate for mail survey research. In their analysis of 309 mail surveys published in 2000 and 2005, Baruch and Holton (2008) calculated a 44.7% average response rate. Furthermore, Graber's (2011) study of Texas agricultural producers' traditional and social media use had a 26.8% response rate using a mail survey research design.

The sample frame for this study was a list of about 1,500 agricultural producers' mailing addresses in the study area purchased from U.S. Farm Data, a database marketing service. Members of the TAWC were excluded from the study population because their membership created unique circumstances for adopting water conservation practices that differ from other agricultural producers in the study area. After the list was prepared, simple random sampling was used to select 1,000 producers to contact. The list was sent to a printing company that provided the printing and mailing services.

Questionnaire

Following Dillman's Tailored Design Method (2007), the researcher-developed instrument contained four parts. For the purpose of this paper, relevant sections pertain to the constructs of the theory of planned behavior, the producers' current water conservation behavior, and selected personal characteristics. Questions were asked to ascertain producers' attitudes, perceptions of subjective norms, and perceived behavioral control regarding three water conservation practices: utilizing advanced irrigation application technologies, monitoring soil moisture, and evaluating crop water demand. The items in these three categories were provided by Texas A&M AgriLife Extension (n.d.) and verified by this study's panel of experts.

Attitude items. Semantic differential scales assessed producers' attitudes toward each of the three water conservation behaviors. The 7-point scales had six pairs of bipolar adjectives: *Pleasant/Unpleasant, Good/Bad, Economically Beneficial/Economically Harmful, Socially Beneficial/Socially Harmful, Worthwhile/Not Worthwhile,* and *Environmentally Beneficial/Environmentally Harmful.*

Perceived Behavioral Control items. Four items were used to measure this construct. Two items used a semantic differential scale: *1 = No Control* to *7 = Complete Control* and *1 = Impossible* to *7 = Possible*. Two other questions were presented using 7- point Likert-type scales with the endpoints *1 = Strongly Disagree* and *7 = Strongly Agree* as response choices ("If I wanted to I could…" and "It is mostly up to me whether or not I…"). These items were based on prior research (Lynne et al., 1995; McCullough, 2011).

Subjective Norm items. Four questions, using a 7-point Likert-type scale (*1 = Strongly Disagree* to 7 = *Strongly Agree*) were asked regarding subjective norms: (a) *Most people who are important to me think I should…*; (b) *It is expected of me to…*; (c) *The people whose opinions I value would approve of me…*; (d) *Many agriculture producers like me…*

Intention items. To measure intention, three items were assessed on a 7-point Likert-type scale: *1 = Strongly Disagree* to *7 = Strongly Agree*. We adopted this portion of the instrument from previous studies (Ajzen, 2013; Cunningham & Kwon, 2003; Francis et al., 2004; McCullough, 2011; Shrestha, 2013) that used “I *intend* to. . .,” “ I *will try* to. . .,” and “I *am planning* to. . .” However, when reviewing the instrument, the expert panel members were concerned this language was not pointed enough to differentiate levels of intention. The wording, therefore, was changed to “I *intend to*. . .,” “I *have firm plans in place to*. . .,” and “I *am making preliminary plans to*. . .”

Behavior items. Producers indicated the water conservation technologies and practices they currently used with *yes* or *no* responses. These items were divided into the three areas of utilizing advanced irrigation management, monitoring soil moisture, and evaluating crop water demand. An area was provided for each of the items to write in additional options, if desired.

A panel of experts (*n* = 10) reviewed the instrument before data collection began. The panel was comprised of agricultural producers, various affiliates of the TAWC, and agricultural education and communications faculty members at Texas Tech University. Panelists were selected based on their level of knowledge regarding the questionnaire subject matter and the overall survey research process. Following the review, the panel’s suggestions were used to modify the instrument prior to mailing.

After data collection, *post hoc* analyses were conducted to determine reliability. We chose to forgo a pilot test in favor of the panel of experts’ review and *post hoc* analysis to preserve as many names in the sampling frame as possible. The cost of materials and postage for a pilot study was prohibitive as well. However, as previously stated, the items used in this study had been used in other studies to measure the same constructs of interest with acceptable reliability estimates. Table 1 displays the Cronbach’s alpha reliability scores for the respondents’ attitudes toward the behaviors, subjective norms, perceived behavioral control, and intentions to perform the behaviors. Reliability estimates ranged from .74 to .94, which indicated all were acceptable. According to Fields (2013), a Cronbach’s alpha reliability score of .70 or higher is acceptable.

Table 1
Reliability of Instrument’s Constructs as Measured by Cronbach’s Alpha

Conservation Practice	Utilize Irrigation Application Technologies		Monitor Soil Moisture		Evaluate Crop Water Demand	
	n	α	*n*	*α*	*n*	*α*
Intentions to perform behavior (3 items)	94	.91	90	.94	91	.92
Attitudes toward behavior (6 items)	88	.87	88	.90	90	.90
Perceived behavioral control (4 items)	90	.83	92	.77	91	.85
Subjective norms (4 items)	93	.74	93	.87	94	.91

Data Collection

The Institutional Review Board at Texas Tech approved this study before data collection began. The data collection process had three points of contact with members of the sample. First, 1,000 members of the sample received a cover letter describing the study, an information sheet, the survey instrument, and a return envelope. This was mailed September 18, 2015. Approximately two weeks after the first mailing of the instrument, on October 1, 2015, a reminder postcard was mailed to all sample members. Following the postcard, on November 5, another complete mailing with a new cover letter, an information sheet, the survey instrument, and return envelope was mailed only to those who had not responded. Data collection ceased on November 30. A lottery-type incentive was offered on a voluntary basis for respondents. Participants had the chance to enter a drawing for one of two $50 gift cards by providing their name and preferred contact information on a tear-away portion of the back cover of the survey instrument.

Data Analysis

Despite efforts to encourage participation in the study, the survey garnered a low response rate; 183 responses were received for an overall response rate of 18.3%. This issue does present a limitation of the study. The researcher used SPSS® v. 22 for Windows™ to calculate statistics. 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. Chi-square statistics and independent samples *t*-tests compared early and late respondents in terms of selected characteristics. Multiple linear regressions were computed to identify the amount of variance in behavioral intention to adopt water conservation practices explained by the theory of planned behavior constructs.

In an effort to reduce non-response error, we conducted analysis to compare early versus late responders. Lindner, Murphy, and Briers (2001) recommended identifying late respondents based on responses generated by a stimulus such as a reminder postcard or second complete mailing. In the case of this study, the last stimulus was a second complete mailing of the survey materials. No statistically significant ($p < .05$) differences were found between early and late responders in regard to age, years farming/ranching, acres farmed, or familiarity with the TAWC.

Description of Respondents

After data collection we used descriptive statistics to analyze characteristics of the respondents. Demographics collected in this survey were age, gender, number of years farming or ranching, total number of acres operated, location of farm by county, and type of crops produced. Some questions have missing responses because they were included at the end of the instrument and several respondents did not complete the survey instrument in its entirety. The majority of respondents were male (n = 108, 94.7%); six females (5.3%) responded. Respondents' ages ranged from 28 to 86 years old with a mean of 58.40 (SD = 11.65) and mode of 59. The mean number of years farming/ranching was 34.7 years (SD = 13.43), with a minimum of one and a maximum of 70. Thirty-five and 40 years were the modes indicated by 11 respondents each.

The total number of acres in operation ranged from less than 500 acres (n = 17, 15.6%) to 5,000 or more acres (n = 8, 7.3%). The mean for total acreage was 2,049.7 (SD = 2002.44). The respondents represented 42 counties with five counties in the 39-county study area not represented and eight counties outside of the area represented. The most frequently reported crop produced was cotton (*n* = 69, 67.0%) followed by wheat (*n* = 66, 64.1%) and grain sorghum (*n* = 63, 61.1%). Other crops included corn, hay, and peanuts. Eighty-five respondents (84.2%) indicated producing multiple crop species.

Results

RQ1: What water conservation practices were producers using?

Table 2 displays respondents' current use of water conservation practices. LEPA was the most commonly reported irrigation application technology (*n* = 61) followed by SDI (*n* = 35). Hand sampling was the most frequently reported method for monitoring soil moisture (*n* = 80, 82.5%) followed by capacitance probes (*n* = 31, 34.8%). Plant water potential was the most frequently identified method for evaluating crop water demand (n = 50, 53.8%) followed by estimating evapotranspiration (*n* = 43, 46.7%).

Table 2
Respondents' Current Use of Advanced Irrigation Application Technologies, Soil Moisture Monitoring Methods, and Crop Water Demand Evaluation Methods

Behavior Category		*n*	*f*	%
Irrigation Application Technologies	Low Energy Precision Application (LEPA)	95	61	64.2
	Subsurface Drip Irrigation (SDI)	88	35	39.8
	Low Elevation Spray Application (LESA)	91	34	37.4
	Low Pressure In-Canopy (LPIC)	89	18	20.2
	Mid-Elevation Spray Application (MESA)	86	7	8.1
	Precision Mobile Drip Irrigation (PMDI)	82	4	4.9
Soil Moisture Monitoring Methods	Hand sampling	97	80	82.5
	Capacitance probes	89	31	34.8
	Tensiometers	89	5	5.6
	Gypsum resistance blocks	90	5	5.6
Crop Water Evaluation Methods	Plant water potential	93	50	53.8
	Estimating evapotranspiration	92	43	46.7
	Time-temperature threshold	89	12	13.5
	Measuring canopy temperature	90	11	12.2

RQ2: What were Texas High Plains agricultural producers' respondents' attitudes toward the water conservation practices?

Table 3 displays the summated attitude means toward utilizing advanced irrigation application technology, monitoring soil moisture, and evaluating crop water demand. Because this construct was measured using 7-point semantic differential scales where 1= *Good* and 7= *Bad* – the lower the mean score, the more positive the attitude. Utilizing advanced irrigation application technology had the lowest mean score of 1.87 (*SD* = 0.96). The largest mean score was for monitoring soil moisture (*M* = 2.03, *SD*= 1.08).

Table 3
Summated Attitudes Toward Water Conservation Practices

Conservation Practice	*n*	*M*	*SD*	*Mode*	*Range*
Monitor Soil Moisture	93	2.03	1.08	1.00	6.00
Evaluate Crop Water Demand	95	1.97	1.02	1.00	4.50
Utilize Irrigation Application Technology	93	1.87	0.96	1.00	4.00

Note. Scores based on semantic differential scale: *1 = Good* to *7 = Bad*.

RQ3: What were producers' subjective norms regarding the water conservation practices?

Table 4 displays summated subjective norms for each of the water conservation practices. This construct was measured using a 4-item, 7-point Likert-type scale (*1 = Strongly Disagree* to *7 = Strongly Agree)* so the higher the mean score, the stronger the subjective norms. Utilizing advanced irrigation application technologies had the highest mean score of 5.09 (*SD* = 1.03). The lowest mean score was reported for monitoring soil moisture (*M* = 4.65, *SD* = 1.31).

Table 4
Summated Subjective Norms for Respondents Regarding Water Conservation Practices

Conservation Practice	*n*	*M*	*SD*	*Mode*	*Range*
Utilize Irrigation Application Technology	99	5.09	1.03	5.50	5.50
Evaluate Crop Water Demand	99	4.79	1.46	4.00	6.00
Monitor Soil Moisture	98	4.65	1.31	5.50	6.00

Note. Scores based on a Likert-type scale: *1 = Strongly Disagree to 7 = Strongly Agree*

RQ4: How did producers perceive their behavioral control in regard to adopting the water conservation practices?

Table 5 displays respondents' summated mean scores for perceived behavioral control over performing water saving behaviors. Evaluating crop water demand had the highest mean score of 5.84 (*SD* = 1.21). Utilizing irrigation application technologies had the lowest mean score of 5.43 (*SD* = 1.35).

Table 5
Summated Perceived Behavioral Control over Water Conservation Practices

Conservation Practice	*n*	*M*	*SD*	*Mode*	*Range*
Evaluate Crop Water Demand	97	5.84	1.21	7.00	5.25
Monitor Soil Moisture	98	5.80	1.12	7.00	5.25
Utilize Irrigation Application Technology	94	5.43	1.35	6.50	6.00

Note. Scores based on a Likert-type scale: *1 = Strongly Disagree* to *7 = Strongly Agree*.

RQ5: What were producers' behavioral intentions regarding the water conservation practices?

Table 6 displays the summated intentions to utilize advanced irrigation application technology, monitor monitoring soil, and evaluate crop water demand. This construct was measured using three items measured on a 7-point Likert-type scale: *1 = Strongly Disagree* to *7 = Strongly Agree*. The higher the mean score, the stronger the intent to perform the behavior. Utilizing advanced irrigation application technologies had the highest mean score of 5.11 (SD = 1.42). The lowest mean score was for monitoring soil moisture (M = 4.54, SD = 1.54).

Table 6
Summated Intentions to Perform Water Conservation Practices

Conservation Practice	*n*	*M*	*SD*	*Mode*	*Range*
Utilize Irrigation Application Technology	101	5.11	1.42	5.33	6.00
Evaluate Crop Water Demand	98	4.89	1.48	6.00	6.00
Monitor Soil Moisture	97	4.54	1.54	6.00	6.00

Note. Scores based on Likert-type scale: *1 = Strongly Disagree* to *7 = Strongly Agree*.

RQ6: To what extent did producers' behavioral beliefs, normative beliefs, and control beliefs influence their intentions to adopt the water conservation practices?

The attitude construct was reverse coded so all constructs were based on the same directional scales where lower values indicate more negative attitudes or less agreement and higher values denote more positive attitudes or more agreement. First, a multiple linear regression model was used to examine if respondents' attitudes, subjective norms, and perceived behavioral control predicted their intentions to utilize advanced irrigation application technologies (see Table 7). The model was not significant (R^2 = .61, $F(87)$ = 44.83, p > .05); attitude (p > .05), subjective norms (p < .05), and perceived behavioral control (p < .05).

Table 7
Multiple Linear Regression Analysis for Variables Predicting Intention to Utilize Advanced Irrigation Application Technologies

Variable	*B*	*t*	*p*	*F*	R^2
(Constant)	-.99	-1.46	.15	44.83	.61
Attitude toward behavior	.05	0.41	.68		
Subjective norms*	.62	5.70	.00		
Perceived behavioral control*	.49	5.65	.00		

*Indicates significance at p < 0.05.

A multiple linear regression model was used to examine if respondents' attitudes, subjective norms, and perceived behavioral control predicted their intentions to monitor soil moisture (see Table 8). This model was not significant (R^2 = .51, $F(83)$ = 28.52, p > .05); attitude (p > .05), subjective norms (p < .05), and perceived behavioral control (p < .05).

Table 8
Multiple Linear Regression Analysis for Variables Predicting Intention to Monitor Soil Moisture

Variable	*B*	*t*	*p*	*F*	R^2
(Constant)	-.84	-1.01	.31	28.52	.51
Attitude toward behavior	.11	0.78	.44		
Perceived behavioral control*	.33	2.47	.02		
Subjective norms*	.61	5.02	.00		

*Indicates significance at $p < 0.05$.

A multiple linear regression model was used to determine if respondents' attitude, subjective norms, and perceived behavioral control predicted their intentions to evaluate crop water demand (see Table 9). This model was not significant ($R^2 = .62$, $F(86) = 46.37$, $p > .05$); attitude ($p > .05$), subjective norms ($p < .05$), and perceived behavioral control ($p < .05$).

Table 9
Multiple Linear Regression Analysis for Variables Predicting Intention to Evaluate Crop Water Demand

Variable	*B*	*T*	*p*	*F*	R^2
(Constant)	-.19	-0.29	.77	46.37	.62
Attitude toward behavior	-.03	-0.21	.84		
Perceived behavioral control*	.30	2.60	.01		
Subjective norms*	.66	8.10	.00		

*Indicates significance at $p < 0.05$.

Conclusions, Implications, and Recommendations

Each of the examples of water conservation behavior methods from utilizing advanced irrigation application technologies with LEPA to monitoring soil moisture by hand sampling to evaluating crop water demand by estimating evapotranspiration had at least four respondents who indicated their use of the practice. The use of different methods for irrigating, monitoring soil moisture, and evaluating crop water demand implied that producers in the Texas High Plains have diverse technical and educational needs.

Studying producers' attitudes, subjective norms, and perceived behavioral control regarding water conservation practices using the theory of planned behavior as a lens provided valuable insight that can help explain why some producers have adopted these behaviors and others have not and why producers have adopted some methods more than other methods. Respondents had favorable attitudes toward the three water conservation practices. Similarly, Yazdanpanah et al. (2014) found farmers' attitudes toward water conservation to be relatively favorable in their case study of Iranian farmers. When comparing producers' attitudes toward each of the water conservation behaviors based on their overall mean scores, respondents had the most favorable attitudes about evaluating crop water demand followed by utilizing advanced irrigation application technologies and monitoring soil moisture.

Although previous studies found subjective norms can present barriers to adopting new technology (Hoag et al., 2012), respondents in this study indicated strong subjective norms were not at play because the mean scores were more neutral. Summated mean scores for each of the subjective norms measured showed the greatest social pressure was for utilizing advanced irrigation application technologies followed by evaluating crop water demand and monitoring soil moisture. The agricultural producers' subjective norms or social pressure for performing water conservation behaviors reflected a neutral stance. This implies respondents did not perceive firm expectations being placed on the respondents to perform these behaviors.

For perceived behavioral control, producers had the highest perceptions of control on evaluating crop water demand followed by monitoring soil moisture and utilizing advanced irrigation application technologies. However, the differences in mean scores for perceptions of control were small. One possible implication for that is producers perceived being somewhat in control over implementing each of these water conservation practices, which insinuates the practices have an almost equal opportunity of adoption based on perceived behavioral control alone. Lynne et al. (1995) said farmers need to perceive at least some control for them to move forward with technology decisions. In fact, with a perception of personal control, farmers are more likely to take action and invest more intensely (Lynne et al., 1995). The summated mean scores for intention to adopt each of the water conservation behaviors showed respondents had the strongest agreement with intentions to utilize advanced irrigation application technologies followed by intentions to evaluate crop water demand and monitoring soil moisture.

Multiple linear regression models examined if respondents' attitudes, subjective norms, and perceived behavioral control predicted intentions to utilize advanced irrigation application technologies, monitor soil moisture, and evaluate crop water demand. Even though the subjective norms and perceived behavioral control constructs of the theory of planned behavior were statistically significant for each of the three water conservation behaviors' multiple linear regression models, the overall models were not statistically significant. Similar to Lam's (2006) study, the theory of planned behavior alone did not capture respondents' intentions to adopt new technology. However, in Lam's (2006) model and the Yazdanpanah et al. (2013) model, it was the perceived behavioral control construct that was insignificant. In this study, it was the attitude construct.

Both perceived behavioral control and subjective norms were significant in the multiple linear regression models. Perceived behavioral control was positively related to behavioral intention. For Taylor and Todd (1997) and Lynne et al. (1995), perceived behavioral control also played a significant role in predicting intentions for pro-environmental behaviors. Because respondents did not perceive they had complete volitional control over performing the water conservation practices (Lynne et al. 1995; Taylor & Todd, 1997), the behavior must not be under full volitional control. Similar to other studies (Lynne et al., 1995; Yazdanpanah et al., 2014), the subjective norms construct was statistically significant ($p < .05$) in predicting intentions to adopt. The subjective norms were positively related to behavioral intention, which suggests that social pressure to adopt these water conservation practices is beneficial. As in the Lynne et al. (1995) study, the findings imply that farmers can be influenced by subjective norms in regard to water conservation. However, the actual mean scores calculated for the respondents' subjective norms may limit interpretation of this finding. The scores ranged from 4.65 to 5.09 representing a more neutral stance when it came to social pressure.

Because this study quantitatively captures a broad view of the advanced irrigation application technologies, soil moisture monitoring methods, and crop water evaluation techniques agricultural producers were using for irrigation management, a qualitative study that provides information rich, detailed data could be an insightful complement to this study. Although this study gained information about the number of technologies and methods used to manage irrigation for conservative water use, it did not divulge the complementary interplay of these tools and techniques. The effectiveness of these practices is improved with the integration of multiple practices in an irrigation management strategy (Texas A&M AgriLife Extension Services, n.d.). A qualitative approach could more deeply explore the extent to which producers are using these water conservation practices together.

In addition, further research is needed to explain the factors that influence producers' adoption of water conservation practices. Although the theory of planned behavior can be useful in predicting behavioral intention to adopt, in this study it did not fully explain all of these factors. Other barriers to adoption and factors influencing producers' decisions should be identified to help determine whether Texas High Plains producers are unable and/or unwilling to adopt these water conservation practices. Messages can be created that address producers' attitudes, subjective norms, and perceived behavioral control regarding water conservation behavior. These messages should be tested using an experimental design to determine the messages that truly resonate with agricultural producers and lead to change in behavior.

For those who are working to help farmers implement water conservation techniques, this study provides several practical recommendations. Lynn et al. (1995) explained it is important for farmers to perceive they have some control over adopting a conservation technology. It affects not only their decision to take action, but also the intensity of investments. Strategies for enhancing producers' perceptions of their control over adopting these water conservation practices should be explored and considered. Furthermore, the subjective norms construct served as a significant factor in accounting for variance in predicting adoption of water conservation practices implies perceived behavioral control is not the only variable that helps explain behavior. Producers reported approval from those who are important to them and those whose opinions they value in regard to performing the water conservation behaviors. Strategies for promoting the social approval of utilizing advanced irrigation application technologies, monitoring soil moisture, and evaluating crop water demand should be used. This could be done by identifying and building rapport with opinion leaders viewed as having significant influences in the Texas High Plains social system in regard to crop irrigation.

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Exploring How Extension can build Trust to Encourage Engagement in Water Conservation Practices

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Abstract

Extension educators seek to provide scientific research and perspective to farmers and the public. The connection that extension educators foster between farmers and consumers can be capitalized upon to build trust and ultimately encourage behavior change through social capital. Agricultural educators have recognized the need for consumers and farmers to develop trust and mutuality in order to combat complex issues such as water usage. Agriculture is the greatest user of water in the United States; therefore efforts to encourage agricultural water conservation have been explored. Unfortunately, they are largely unsuccessful because of the increased production cost associated with conservation passed on to consumers. This study explored how U.S. consumers' related their willingness to pay for products conserving water with their level of trust that farmers are good conservationists. The findings revealed that trust that farmers will conserve water is predicted by the degree of positive and negative relationships that consumers identify. The findings imply that by developing relationships between consumers' trust and their willingness to pay, extension educators can encourage engagement in agricultural water conservation practices.

Introduction

Extensive educational programs are provided by extension educators and promoted through collaborative efforts made between the local, state, and federal government (Terry & Osborne, 2015). Extension educators strive to provide the public with quality research to assist in developing informed decisions on critical issues at all levels. The types of relationships extension educators create between the public and the agricultural, food, fiber, and natural resource industries are significant to combatting the fragmented communication between the groups (Duffy, Fearne, & Healing, 2005). In order to be successful in this endeavor, mutual trust must exist between leaders, followers, consumers, and farmers alike (Mwangi, 1998). These integral relationships develop social capital, which can be used to address complex environmental issues, and has shown to be an underappreciated tool for conservation (Pretty & Ward, 2001).

Water scarcity is an ever-growing global issue that must be addressed directly and thoughtfully. While water may encompass 66% of the Earth's surface, freshwater makes up only 2.5% of which 69% of the freshwater is captured in the polar ice caps (Engelman et al., 1993). Of the small percentage of freshwater that is available for use, 8% is used in households and 23% is used by industry; leaving agriculture as the greatest drain on the water supply (69%; Engelman et al., 1993). Further, water extraction for domestic, food, and industrial uses has had a major impact on ecosystems and this affect will only be exacerbated by the growing demand for water (Rijsberman, 2006). While many believe the issue of water scarcity will create international conflicts, it has been recognized that the larger risks are the conflicts within countries (Ohlsson, 2000). These conflicts will stem from the institutional changes required to adapt to water scarcity (Ohlsson, 2000). Additionally, consumers are sensitive and resistant to higher water prices (Olmstead & Stavins, 2009). However, a possible solution to water scarcity is reducing demand of water by changing consumer preferences for water use ("Shift in Demand Curve: When Price Doesn't Matter", n.d.). Consumer preferences can be reformed through educational programs, such as those Extension provides. In addition, the literature is clear that extension educators must address the complex issue of water scarcity in the near future if it wants to remain relevant (Huang & Lamm, 2015a; Huang & Lamm, 2015b; Huang, Lamm & Dukes, 2016; Lamm, Lamm, & Carter, 2015).

Arlen Etling cited R.J. Kleis defining non-formal education as "any intentional and systematic education enterprise in which content is adapted to the unique needs of the students in order to maximize learning" (Etling, 1993, p.73). The connection extension educators build between consumers and the farmer is typically through non-formal education programs and can be used as effective avenues for creating trust between the parties ("Extension", n.d.). Non-formal education creates collective actions and experiences that work to meet needs and solve issues (Kindervatter, 1979). Users of non-formal education programs have developed improvements to social, economic, and political standings. Thus by understanding the function of Extension and how Extension educates the public, initiatives can be taken to develop desirable traits within the consumers.

According to Rogers, Silva, and Bhatia (2001), water is an economic good and the way to promote equity, efficiency, and sustainability of water is addressed conceptually through water pricing. However, Martinex-Espineira and Nauges (2006) identified water consumption as an elastic and inelastic good, making the issue of water conservation more difficult to regulate. While water pricing alone is not a valid means of encouraging water conservation, it can be used in conjunction with consumer trust to resolve water scarcity (Yang, Zhang, & Zehnder, 2003). The greatest issue facing agricultural water conservation is the cost of water efficient technologies. The high entry cost of water conservation technology discourages many farmers from participating because of profitability (Seo, Segarra, Mitchell, & Leatham, 2007). Seo et al. (2007) stated that in order to save water, current farmers need to be convinced to replace old irrigation systems with new ones (2007). The cost of innovation is reliant upon consumers' willingness to pay for conservation practices. This study focuses on encouraging farmers to implement water-conserving practices by knowing why consumers are more willing to pay for the cost of these practices.

Many studies have tested the validity of increasing water prices to encourage water conservation and the findings have shown hesitation and dissatisfaction among consumers and farmers (Olmstead & Stavins, 2009; Seo et al., 2007; Yang et al., 2003). While farmers may be hesitant to switch to water efficient practices (Seo et al., 2007), they can find solace in consumer support that will allow for higher prices for the sake of water conservation. Extension, as a non-formal education program, can be used as an effective tool for trust development between the two groups ("Extension", n.d.) serving as a natural bridge between farmers and consumers (Duffy et al., 2005). Ultimately, this study sought to address two priorities from the national research agenda for agricultural education (Roberts, Harder, & Brashears, 2016). Those priorities include “public and policy maker understanding of agriculture and natural resources” (p. 13) and “addressing complex problems” (p. 57).

Theoretical Framework

This study applied social capital theory (Lin, 2001) as a means of identifying solutions to the growing concern of water scarcity. Social capital theory illustrates the notion that an investment in social relations will bring an expected return in the marketplace (Lin, 2001). Lin (2001) explained there are four main ways social capital brings about change, including (a) the reduction of transaction costs and stronger rewards, (b) the exertion of influence on agents, (c) the accreditation of actors, and (d) the reinforcement of identity and recognition (Lin, 2001). While consumers are hesitant to accept increasing water prices (Olmstead & Stavins, 2009; Seo et al., 2007; Yang et al., 2003) they could be more inclined to pay for water conservation practices if they have developed social capital with farmers.

Several studies have used social capital theory to investigate different phenomenon within the agricultural and natural resource realm. Cramb (2005) found significant support for the concept that social relations and ties could encourage soil conservation (Cramb, 2005). The study focused on the establishment of a Landcare Program. The Landcare groups were composed of farmers and community members alike and were used to construct bridges of social capital to identify and improve issues regarding soil conservation. The study concluded that the success of the Landcare groups did not lie within the multitude of farmer trainings, cross-farm visits, or information sessions, but in the community social ties that were developed and the creation of social capital (Cramb, 2005).

A study that examined citizens’ perception of water conservation policies, and the influence of social capital on these perceptions, concluded that where social capital was low, citizens perceived the price of water as high (Jones, Evangelinos, Gaganis, & Polyzou, 2011). Social trust was found to be a noteworthy factor when determining the perception of costs to consumers. In addition, an increase in social collaboration was found to be an explanatory variable in perceived low costs and also created policy support. While water consumption policies are often observed as ineffective measures toward conservation, the policies can gain traction through social capital, which can be used as a tool for confronting issues. This study recommended that if prior to policy implementation there was a social capital assessment than many ineffective elements in the policy could be addressed (Jones et al., 2011).

Another study addressed how source credibility affected attitude formation and perceptions of the public regarding agricultural water use (Lamm, Owens, Telg, & Lamm, 2016). The study showed four identical videos of a speaker explaining how farmers can use best management practices to reduce water consumption; the only differing factor was the source treatment given to each video. The study revealed the public was generally open to agriculture taking the necessary water conservation steps, regardless of increased food prices. In fact, when the source treatment was a farmer, which was deemed as more trustworthy, there was a statistically significant higher score associated with the impacts farms have on the environment. Lamm et al. (2016) accredited this to the farmer being an individual with expertise in their domain but trust also played a significant role and needed to be explored further.

Social capital theory could provide a solution to water scarcity that is outside of the ineffective, redundant initiatives that have used public financial responsibility as a driver. While past efforts mentioned by Olmstead and Stavins (2009), Seo et al. (2007), and Yang et al. (2003) have shown to be feeble, social capital theory provides a new frame for this complex issue (Lin, 2001). Extension educators are an established group of professionals ready to address water issues by building social capital between farmers and consumers (Duffy et al., 2005).

Purpose and Objectives

The purpose of this study was to determine if the degree of trust consumers have in farmers being conservationists' impacts a consumer's willingness to pay for water conservation. The following research objectives guided this study:

1. Describe consumers' trust in farmers as conservationist.
2. Describe consumers' perceptions of farmers being conservationists.
3. Describe consumers' willingness to pay for water conservation.
4. Determine if perceptions of farmers being conservationists predicts trust in farmers.
5. Determine if consumer trust in farmers and their perceptions of farmers being conservationists predicts willingness to pay.

Methodology

A survey distributed online was used to reach the research objectives. The survey was based upon the 2012 RBC Canadian Water Attitudes Study (Patterson, 2012) and the Government Style Questionnaire (Green-Demer, Blanchard, Pelletier, & Béland, 1994). While part of a larger study, four sets of questions were specifically used in this study to measure the following indices: perception of farmers as conservationists, trust in farmers, and willingness to pay for conservation practices. In order to uphold the survey's integrity and validity, a panel of experts specializing in public opinion research, water issues, and survey design reviewed the survey prior to distribution. Panel members included the Director of the UF Water Institute, the Chief Executive Officer of Florida Nursery, Growers and Landscape Association, an extension specialist in water economics and policy, the Director of the UF/IFAS Center for Landscape Conservation and Ecology, the associate director of the UF/IFAS Center for Public Issues Education, and an assistant professor specializing in agricultural communication.

The target population of interest was US residents aged 18 or older. After expert panel review and revision, a pilot test was conducted with 50 respondents representing the target population to approve the validity of the constructs. The Cronbach alpha levels for each of the constructs were greater than .80 in the pilot study so they were deemed appropriate measures. Using a non-probability opt-in sampling technique, a survey research company distributed the finalized survey nationally. A total of 2,704 individuals were invited to complete the survey. Quotas for the study were established *a priori* to ensure the sample would be representative of the US population and attention filters were integrated. Respondents had to fill the required quota and pass the attention filters for their responses to be accepted as complete. The data collection methods utilized resulted in 1,050 complete surveys, equating to a 42% participation rate.

Recognizing the potential for selection, exclusion, and non-participation biases due to using a non-probability sampling method, a post-stratification weighting method was applied to ensure the analyzed data properly represented the population of interest (Baker et al., 2013; Kalton & Flores-Cervantes, 2003). Data was weighted using the 2010 US Census data ensuring residential state, age, gender, and race/ethnicity matched the national population.

Respondents were asked to indicate their perception of farmers being and not being conservationists, their trust in farmers as conservationists, and their willingness to pay for conservation practices each on a five-point Likert-type scale. The scale had ranges including: 1= *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither agree nor disagree,* 4 = *Agree,* or 5 = *Strongly Agree.* In addition, respondents were able to identify *Does Not Apply*. These responses were considered missing values for the study. The perception that farmers are/are not conservationists indices were both created with five questions, trust in farmers had three questions, and the willingness to pay construct had three questions. The indices were created by calculating the average of the scores that could range from one to five. Each of the indices had reliable Cronbach's alpha coeffecients with a .84 for farmers are conservationists, .86 for farmers are not conservationists, .74 for respondents' trusting farmers as conservationists, and .84 for respondents' willingness to pay for conservation practices. Lastly, respondents were asked to answer several questions based upon their demographics. Descriptive statistics were used to achieve the first three objectives and multiple linear regression was used for objectives four and five.

Table 1
Demographics of Respondents (*N* = 1,050)

	n	%
Gender		
Female	538	51
Male	512	49
Ethnicity		
White	703	67
Black	122	12
Asian/Pacific Islander	52	5
Native American	7	1
Multiracial	15	1
Other	151	14
Age		
20 - 39	370	35
40 - 59	383	37
60 or older	296	28
Education Level		
Some high school	18	2
High School degree/ GED	227	22
Some college	261	25
2-year degree	139	13
4-year degree	275	26

Graduate/ Professional degree	130	13
Political Affiliation		
Democrats	274	38
Republicans	400	26
Independents	266	25
Non-affiliated	104	10
Other	5	1
Income Level		
Less than $24,999	228	22
$25,000 - $49,999	300	29
$50,000 - $74,999	254	24
$75,000 - $149,999	223	21
More than $150,000	45	4

Results

Objective 1: Trust in Farmers as Conservationists

Respondents were asked to indicate their trust in farmers as conservationists using three statements (Table 2). Most of the respondents' agreed or strongly agreed farmers were concerned about water when they were making important decisions about farming (86%). Only 3.5% disagreed or strongly disagreed with the statement. The three statements were averaged to create the trust in farmers index (α = .74). The trust in farmers index had a mean of 3.83 (*SD* = .72).

Table 2
Trust in Farmers

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	N			*%*		
I know farmers will be concerned about water resources when they make important decisions about farming	1019	.7	2.8	10.3	37.3	48.8
Sound principles seem to guide farmers' behavior when it comes to water use	998	1.7	6.8	29.1	44.5	17.9
Farmers can be relied upon to keep their promises when it comes to water use	989	2.7	10.6	35.8	35.7	15.2

Note. *N* for each item varies based on the option to select does not apply that was coded as missing data.

Objective 2: Perceptions of Farmers being Conservationists

Respondents were asked to identify how well farmers conserve water by responding to ten statements. The first five statements were positive and written as farmers being conservationists (Table 3). The last five questions were negative and written as farmers being non-conservationists (Table 4).
Within the farmers being conservationist set, the statement that farming protects our natural environment was the one statement most strongly agreed upon (18.7%). However, the second statement that farm lands or privately owned agricultural lands allow water to return to and recharge groundwater resources had the highest amount of agreeance, a combination of agree and strongly agree percentages, with 60.2%. An index was created by taking the average of the five statements (α = .84). The mean score of the index was 3.50 (*SD* = .77).

Table 3
Perceptions of Farmers as Conservationists

	N	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
		%				
Farming protects our natural environment	1005	2.3	9.2	29.3	40.5	18.7
Farm lands or privately owned agricultural lands allow water to return to and recharge groundwater resources	911	1.4	5.6	32.8	41.7	18.5
Farmers only use as much fertilizer as necessary on their fields and crops	957	5.6	12.4	38.0	29.1	14.9
Farmers only use as much pesticides as necessary on their fields and crops	953	6.1	14.2	35.1	30.9	13.7
Farmers conserve water	967	2.6	10.7	40.2	34.2	12.2

Note. *N* for each item varies based on the option to select does not apply that was coded as missing data.

When asked to respond to negatively framed statements that imply farmers are not conservationists, the majority of respondents indicated they believed farmers use pesticides on farms that pollute natural water sources. Only 8% disagreed or strongly disagreed with the statement (Table 4). The farmers are not conservationists index was created by taking the average of the five statements (α = .86). The mean of the index was 3.49 (*SD* = .79).

Table 4
Perceptions of Farmers as not Conservationists

	N	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
		%				

Pesticides used on farms pollute natural water sources	994	2.1	5.7	23.5	41.4	27.3
Fertilizers used on farms pollute natural water sources	982	2.5	7.1	29.0	37.7	23.7
Animal waste produced on farms pollutes natural water sources	979	3.1	12.5	30.3	32.9	21.2
Farming causes water runoff	947	3.9	15.6	36.3	35.9	8.3
Farming causes soil erosion	942	4.8	23.8	33.8	29.7	8.0

Note. *N* for each item varies based on the option to select does not apply that was coded as missing data.

Objective 3: Willingness to Pay for Conservation

Respondents most strongly agreed with the statement that farmers should use fewer pesticides even if the consumer would have to pay more for food. Thirty-nine percent of the respondents strongly agreed with the statement and only 3% strongly disagreed with paying more for food in order for farmers to use fewer pesticides in production (Table 5). The willingness to pay index was the average of the responses to the three statements (α = .84) and had a mean of 3.82 (*SD* = .92).

Table 5
Willingness to Pay for Conservation

	N	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
		%				
Farmers should use as little pesticides as absolutely necessary even is it means I have to pay more for the food I purchase	1024	2.8	6.3	22.0	29.7	39.3
Farmers should use as little fertilizer as absolutely necessary even if it means I have to pay more for the food I purchase	1024	3.1	8.1	28.0	29.9	30.9
Farmers should save as much water as possible when irrigating crops even if it means I have to pay more for the food I purchase	1023	3.3	7.0	30.6	31.6	27.5

Note. *N* for each item varies based on the option to select does not apply that was coded as missing data.

Objective 4: Predicting Trust in Farmers

A linear regression model was used to determine if perceptions (both positive and negative) of farmers as conservationists could predict trust. The farmers are conservationists construct was a significant predictor of consumers' trust (*b* = .63, *p* = .00). The farmers are not conservationists construct was not a significant predictor. The model explained 40% of the variance in trust (Table 6).

Table 6
Predicting Trust in Farmers as Conservationists

	Trust	
Variable	*b*	*p*
Farmers are conservationists	.63	.00
Farmers are not conservationists	-.01	.83

Note. R^2 = .40.

Objective 5: Trust in Farmers and their Willingness to Pay

Trust in farmers (*b* = .22, *p* = .00) and farmers are not conservationists (*b* = .41, *p* = .00) were significant predictors of willingness to pay. The belief that farmers are conservationists was not a significant predictor. Twenty-one percent of the variance in consumers' willingness to pay was attributed to these predictors.

Table 7
Predicting Willingness to Pay

	Willingness to Pay	
Variable	*b*	*p*
Farmers are not conservationists	.41	.00
Trust in farmers	.22	.00
Farmers are conservationists	.05	.20

Note. R^2 = .21.

Conclusion and Implications

Previous literature by Pretty and Ward (2001) may have identified social capital as a forgotten tool for conservation, but this study identified increasing social capital as an effective avenue for engaging the public in water conservation. These key findings revealed consumers' trust and willingness to pay could be predicted by their respective constructs. Forty percent of the variance in respondents' trust in farmers as conservationists can be determined by knowing the respondents perception of farmers as conservationists. In addition, an increase in consumers' perception of farmers as conservationists was found to result in an increase in consumers' trust.

Consumers' willingness to pay for conservation practices can also be determined through significant predictors such as consumers' trust in farmers and the belief that farmers are not conservationists. Therefore consumers were more likely to be open to paying for conservation practices if they trusted farmers as conservationists, as well as if they identified farmers as poor conservationists. This study indicated the more consumers know about farming practices, the more likely they are going to be willing to pay for stronger conservation practices, regardless if the farmer was perceived to be a poor or a strong conservationists of water resources.

The social capital ideology that social relations will bring an expected return in the marketplace (Lin, 2001) is supported by this study where the key findings reflected an increased willingness to pay from consumers despite perception of farmers. A poor perception on farmers as conservationists would create a natural assumption that consumers are unwilling to pay for increases in food. However, this study found that a growing negative perception of farmers as conservationists positively incentivizes consumers to pay more for food in turn for seeing stronger conservation practices. Previous literature conducted by Lamm et al. (2016) supported the notion that the public is in favor of agriculture increasing conservation efforts, despite increasing food prices. Further, Lin (2001) described the main ways that social capital creates change should be considered. Lin stated that upon developing social capital, agents of change may begin experiencing influence. Agents of change, such as extension educators, can develop social capital with consumers by exerting influence on consumers' spending habits.

Farmers may be hesitant to switch to water efficient practices because of high start-up costs, but they may be convinced to update practices with the right incentives (Seo et al., 2007). Likewise consumers are unlikely to change their water consumption due to water pricing alone (Yang et al., 2003) because of water's complex elasticity model (Martinez-Espineira et al., 2006). Prior literature agreed with the results from this study, implying the influence of social capital on willingness to pay. Studies conducted by Jones et al. (2011) and Hoyman, McCall, Paarlberg, & Brennan (2016) supported social capital as an avenue for developing economic shifts in consumption of resources. This study supported the creation of social capital as an effective method of encouraging water conservation.

The findings imply extension educators can foster consumers' willingness to pay by developing mutual trust between respondents and farmers (Mwangi, 1998). Non-formal education develops social relations between parties, which can be used to solve problems (Kindervatter, 1979). Extension educators' ability to share information and build connections can serve as an invaluable asset for increasing consumers' willingness to pay for conservation practices. As consumers are taught about agricultural water practices their perception of farmers being or not being conservationists will change (Table 8). Regardless, if their views on farmers' conservation practices are positive, consumers' willingness to pay will increase.

Recommendation

Water consumption will only grow and be exacerbated in the future due to the increasing population (Rijsberman, 2006). Conflict both internationally and domestically are sure to arise (Ohlsson, 2000), therefore agriculture, as the number one user of freshwater, must be proactive in conservation efforts. However the cost of implementing water conservation practices is a natural deterrent for farmers, therefore the need for incentives and support of farming efforts is key to creating change. Extension clearly has a role to play in creating support for farmers through collaborations with consumers and farmers (Duffy et al., 2005). Based on the results of this study, it is evident that social capital is created through consumers' trust in farmers and their perceptions of farmers as conservationists.

Extension educators should work with consumers and farmers to create mutual trust and understanding (Mwangi, 1998). For example, extension educators creating a water-care program, such as the Landcare program, would encourage water conservation through an increase in social relations (Cramb, 2005). While a water-care program would be an effective avenue for sharing information and for trainings, Cramb (2005) found these to be of less importance when compared to the real catalyst of change, social capital. This study supports work conducted by Cramb (2005) because the key findings indicated that regardless of positive or negative perceptions on farmer's conservation habits, consumers would be more willing to pay for water conservation practices. Since water conservation is a universal issue, which will require curbed habits from consumers and farmers alike, a water-care program would provide initiative to all groups.

It would also be recommended that extension educators increase their influence on policy development with water conservation through social capital investments (Jones et al., 2011). Since extension educators are already building social capital within their respective communities they should be used as assessors of the public that in turn advocate their findings to policymakers. Having messages delivered to policymakers, consumers, and farmers from an accredited source is an effective strategy for proper policy development (Lamm et al., 2016). The collaboration between groups (extension educators and consumers) would add validity when encouraging decision makers' adoption of effective water policy (Lamm et al., 2016). These social capital assessments should be comprehensive to help identify limiting factors that later can be addressed in policy. Policy implementation in the future will be a significant influencer on water consumption and it is imperative social capital has a role to play in its creation (Jones et al., 2011).

Future studies should be conducted based upon these findings. Research should be conducted on the best environments for developing social capital through the proposed water-care programs. This study could include collecting information on offering education in formal versus non-formal group settings and the purpose of the group (Hoyman et al., 2016). Understanding the purpose of the group, whether created for social or economic interests, may change the effectiveness of water conservation behavior change and acceptance of sustainable practices. Therefore, extension educators should be aware of such information as they develop programs of this type. Researchers should also evaluate the amount of social capital created through already existing water protection policies and programs. This future study could apply the research conducted by Lamm et al. (2016) in order to develop messages from accredited sources and develop as much social capital as possible.

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Using the Six Americas to Communicate about Climate Change in a State being Severely Impacted

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Abstract

Scientists have repeatedly shown human activity is directly impacting the Earth's climate. Despite this, a segment of the U.S. population, including politicians with a large amount of influence, are very vocal about their mistrust of science and lack of belief in global warming, an aspect of climate change. Some states are impacted more by climate change than others – those located on the coasts that experience hurricanes, storm surges, flooding and rapid changes in precipitation patterns. These extreme weather events impact the safety of residents and have a huge impact on agricultural production. Agricultural educators and communicators need to assist in making scientific information about climate change more salient to the general public but views on climate change and global warming are diverse. This research used the Six Americas framework to understand the diverse segments of believers/nonbelievers in Florida, a state being severely impacted by climate change. Findings revealed 87% believed in climate change but are not actively engaged in its mitigation. Recommendations are offered on how to communicate with different segments of the population and the role extension educators should play in their communities to turn difficult to understand science into something residents can understand and get behind.

Introduction

Most major science organizations and communities' agree human activities are changing the Earth's climate (Pew Research Center, 2015). Agricultural and natural resource (ANR) scientists have confirmed climate change and global warming is real and happening now and more importantly, humans are mainly to blame (Liu, Vedlitz, Stoutenborough, & Robinson, 2015). Global warming and climate change, both critical, inter-related issues facing the agricultural sector, are an environmental, cultural, and political phenomenon that is contentious by nature (Hulme, 2005;Hertel & Lobell, 2014). Global warming and climate change will have an impact on the agriculture industry, and to what extent that impact will be depends on the ability of farmers, agri-businesses, and agricultural educators to adapt to these changes (Hertel & Lobell, 2014). Understanding, how the agricultural industry can adapt to climate change is critical to determine how these changes will affect the industry for decades to come.

Broadly speaking, these issues are considered a partisan issues in the United States (U.S.) with two sides: those that believe in its existence and those that are cautious, if not fully denying the scientific communities findings (Hart, Nisbet, & Myers, 2015). Given the scientific studies documenting human impact on the Earth's climate, it is difficult for those in the scientific field to understand such a distinct and strong partisan divide (Paulson, 2016). In addition, the group who does not believe in the human influence on climate change is increasing. In 2016, only 42% of Republican's in the U.S. believed climate change was human caused, compared to 53% in 2001 (Energy Policy Institue at the University of Chicago, 2016).

Global warming, a specific part of the climate change conversation, has a different semantic context, but the two words are often used simultaneously due to the ambiguity in their definitions (Lineman, Do, Kim, & Joo, 2015). Global warming is defined as "the unusually rapid increase in Earth's average surface temperature over the past century primarily due to the greenhouse gases released by human activities" (NASA, 2017, pg. 1). Climate change is defined as a "change in global or regional climate patterns" (Lineman et al., 2015, pg. 1). Although the two phrases are different in their meaning, the public is often exposed to them under the same context, without a thought to their actual meaning (Weingart, Engals, & Pansegrau, 2000). This framing technique helped the conservative movement create an opposition to calls for global warming intervention (McCright & Dunlap, 2000). While ANR educators, scientists and policy makers have successfully brought environmental problems to the public's attention, those who oppose climate change have challenged the legitimacy of the problems by asserting that the science of global warming appears to be uncertain and that the policies being created because of this uncertain science have harmful effects (McCright & Dunlap, 2000).

Public understanding of climate change is largely driven by media coverage developed by those who do and do not understand natural resources or the impact of climate change on agriculture (Brulle, Carmichael, & Jenkins, 2012). For "most Americans, exposure to 'climate change' has been almost entirely indirect, mediated by news coverage, Internet postings, informal conversations, and documentaries and video footage of events in distant regions" (Weber & Stern, 2011, p. 320). It has been hypothesized that Americans living in more climate change stricken areas would be more concerned. However, studies have indicated extreme weather events have minimal effect on public concerns about climate change (Brulle et al., 2012).

Florida is heavily impacted by extreme weather events and changes to the natural resource landscape that impacts agricultural production. This includes sea level rise, intense hurricanes, dangerous storm surges, and changes in precipitation patterns leading to flooding (Bloetscher, Heimlich, & Meeroff, 2011). The rapid warming over the past decade is expected to cause more intense rainfall events, including more severe thunderstorms, and tropical cyclones (IPCC, 2014). Since the state is surrounded by water on three sides, there are a variety of scenarios that could have drastic effects. According to the Federal Emergency Management Agency (FEMA; 2016), since 1995 Florida has had to declare a state of emergency 68 times due to severe storms (severe thunderstorms, tropical storms, and hurricanes) with 50% of those happening in the last decade. Additionally, the number of hurricanes and their intensity level are expected to rise because of global warming (Elsner, Kossin & Jagger, 2008; Knutson et al. 2010).

The current Governor of Florida, a Republican, views climate change as a variable. In 2015 he questioned the cause and extent of climate change (Schollsberg, 2016). Additionally, an influential Republican Senator from the state, has said "that while there is a consensus among scientists about humans contributing to what's happening, there's no consensus on how much of these changes are due to human activity…and that proposed climate change policies will do absolutely nothing to improve the environment and will make America a harder place to create jobs" (Zaru, 2016, pg. 1). Elected officials leading and representing the state are skeptical at best of climate change and how it will affect Florida. When public officials are hesitant, it becomes even more difficult for agricultural communicators to speak about climate science, especially when the topic is so polarized (Hart & Feldman, 2016). Therefore, a study exploring how to communicate about climate science in a state being severely impacted by global warming is an important step in assisting agricultural communicators enhance "public and policy maker understanding of agriculture and natural resources" (Roberts, Harder, & Brashears, 2016, p. 13) and "addressing complex problems" (p. 57).

Conceptual Framework

A group at Yale University and George Mason University introduced the concept of the Six Americas (Maibach et al., 2009; Roser-Renouf et al., 2014) which serves as the conceptual framework for this study. The research that was used to guide the development of the concept found the American public can be divided into six unique segments based on their beliefs, attitudes, policy preferences, and behaviors associated with global warming: Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive. These groups are analyzed in Table 1.

Table 1
Descriptions of the Six America Segments

Six Americas	Traits
Alarmed	The most convinced, most involved, and most worried about global warming. These individuals side with the scientific community both in regard to the idea of it being real and human involvement. The Alarmed are most likely to view global warming as a personal threat (Roser-Renouf et al., 2014).
Concerned	The largest segment group, the Concerned are convinced global warming is happening but are less concerned than the Alarmed. They agree with the scientific community and believe human activities are the cause. They are less likely to feel threated by it happening now compared to the Alarmed and are significantly less involved (Roser-Renouf et al., 2014).
Cautious	The Cautious group "believe that global warming is occurring, but this belief is relatively weak, with the majority saying they could easily change their minds" (Roser-Renouf et al., 2014, p. 45). The Cautious mostly view it as personally unimportant. Global warming is not viewed as dangerous to the Cautious segment group, and they do not expect it to harm future generations (Roser-Renouf et al., 2014).
Disengaged	The Disengaged segment group do not respond when asked questions about global warming because they do not know how they feel. They do not know if climate change is happening, what the scientific community agrees on, or if it will harm them. They also rarely think about global warming (Roser-Renouf et al., 2014).
Doubtful	Members of the Doubtful segment group do not see the relevance of global warming. While many are doubtful global warming is real, the members of the Doubtful group that do believe global warming is real feel it is caused by natural changes in the environment (Roser-Renouf et al., 2014).

Dismissive	Members of the Dismissive segment group are very certain global warming is not real. This group is very involved in the conversation around global warming and considers themselves well informed. They believe scientific findings disagree, that if global warming is happening it is not caused by human activities, and believe that no one is in danger of being harmed. This is the only group that believes global warming is not occurring (Roser-Renouf et al., 2014).

Of the different segments, the Cautious and Disengaged segment group members are the most easily persuaded to become Concerned (Roser-Renouf et al., 2014). Additionally, the Doubtful segment group has been found to be the one most easily persuaded by communication efforts coming from the Dismissive segment group that are vocal about their views (Roser-Renouf et al., 2014). The Dismissive and the Alarmed cannot be swayed (Roser-Renouf et al., 2014).

The Six Americas concept introduces a vast range of beliefs regarding climate change, which is represented by only two bipartisan categories in the policy realm (Hart et al., 2015). The discrepancy between the public, elected officials, and scientific evidence has generated concern given the public makes decisions everyday regarding their use of natural resources (Guy, Kashima, Walker, & O'Neill, 2014). If agricultural educators are going work with the community to understand the effects of climate change, communicate about climate change and inform the public on how their personal behaviors can be altered to mitigate its effects, it is critical to recognize the spectrum of public views on the topic (Roser-Renouf et al., 2014).

Purposes and Objectives

The purpose of this study was to identify how Florida residents fall into the Six Americas segments to provide direction for how agricultural educators and communicators can most effectively reach those most willing to change their views. The study was guided by the following objectives (a) Identify how many Florida residents belong to each of the Six Americas segment groups, (b) Describe what members of each Six Americas segment group think about global warming, (c) Describe the demographics of the members within each segment group, and (d) Determine where members of each segment group get their information.

Methods

The research presented here was part of a larger research project that used an online survey to capture the public opinions of Florida residents about climate change. Therefore, the target population for this study was Florida residents age 18 or older. Two sections of the survey were germane to this study. Those sections were adapted from existing tools from the Global Warming's Six Americas scale (Maibach et al., 2011; Roser-Renouf et al., 2014). An expert panel specializing in public opinion research, climate science, and survey design reviewed the survey prior to distribution to ensure content validity and approval was obtained from the Internal Review Board at University of Florida.

A pilot test was conducted with 50 respondents representing the target population to ensure the validity of the scales. Using a non-probability opt-in sampling technique, the finalized survey was distributed. Respondent quotas were established *a priori* to ensure the sample would be representative and attention filters were integrated. Respondents had to fill the required quotas and pass the attention filters for their responses to considered complete. The data collection methods resulted in 500 complete surveys. Selection, exclusion, and non-participation biases are threats when using a non-probability sampling method, therefore a post-stratification weighting method was applied (Baker et al., 2013; Kalton & Flores-Cervantes, 2003). Data were weighted using the 2010 US Census data ensuring geographic location in the state, age, and gender matched the state demographics.

A series of 15 questions were used to determine which of the Six America's categories respondents belonged (Maibach et al., 2011). The questions can be broken into four categories: beliefs, issue involvement, behavior, and preferred societal response. The belief category was comprised of six questions. The first question was "do you think global warming is happening"? Nine response options were offered. The second question was "assuming global warming is happening, do you think it is" (a) Caused mostly by human activities, (b) Caused mostly by natural changes in the environment, (c) Other, and (d) None of the above because climate change isn't happening. Responses to this question were recoded into three dummy variables with "other" being omitted. The next two questions "how much do you think global warming will harm you personally?" and "how much do you think global warming will harm future generations of people?" had the following response options: (a) Not at all, (b) Only a little, (c) A moderate amount, (d) A great deal, and (e) Don't know. These two questions were first recoded to exclude "don't know" responses and then recoded again as dummy variables with "only a little" as the omitted response category. Next, respondents were asked "when do you think global warming will start to harm people in the United States?" Six response options were offered. The final question was "which of the following statements comes closest to your view?" with five response options offered.

Issue Involvement included five questions. The questions were (a) How worried are you about global warming? (b) How much had you thought about global warming before today? (c) How important is the issue of global warming to you personally? (d) How much do you agree or disagree with the following statement "I could easily change my mind about global warming?", and (e) How many of your friends share your views about global warming?

The Behavior category had only one question: Over the past 12 months, how often have you punished companies that are opposing steps to reduce global warming by NOT buying their products? Response options included *Never*, *Once*, *A few times (2-3)*, *Several times (4-5)*, *Many times (6+),* and *Don't know*. Responses were first recoded to omit the "don't know" category with the mean substituted for the missing data. Responses were then recoded into dummy variables for discriminant analysis with "once" as the omitted response option.

Finally, the last category Preferred Societal Response was comprised of three questions. The first question was "do you think global warming should be a low, medium, high or very high priority, for the next president and congress?" The next question was "do you think citizens themselves should be doing more or less to address global warming?" The last question was "the United

States should reduce its greenhouse gas emissions with the following response options: (a) Regardless of what other countries do, (b) Only if other industrialized countries (such as England, Germany, and Japan) reduce their emissions, (c) Only if other industrialized countries and developing countries (such as China), reduce their emissions, (d) The U.S. should not reduce its emissions, and (e) Don't know". This question was first recoded to omit the "don't know" category with the mean substituted for the missing data. It was then recoded into dummy variables for analysis; "only if other countries reduce" was the omitted response option.

In some cases, respondents answering with a "don't know" or "not applicable" were excluded from analysis however some variables were dummy-coded for discriminate analysis with these responses included (Roser-Renouf et al., 2014). Using the manual provided by Roser-Renouf et al. (2014) the 15-item instrument identified the Six Americas in six independent segments. These tools used linear discriminant functions (Hair, Anderson, Tatham & Black, 1992; Tabachnik & Fiddell, 1989). Respondents were also presented with a list of possible sources for climate change information and asked to identify the ones that he or she used. They were also asked a series of demographic questions. Descriptive statistics were used to reach the study objectives.

Results

Breakdown of Six Americas

The segments were broken down as follows: Alarmed (23.4%), Concerned (46.0%), Cautious (17.2%), Disengaged (3.4%), Doubtful (6.0%), and Dismissive (4.0%). A majority of the respondents agreed global warming was happening with 87% falling into the Alarmed, Concerned, or Cautious segments. Only 10% of the respondents (n = 500) did not believe that it is happening; those that belonged to the Doubtful and Dismissive segments.

Demographics of the Six Americas Segment Groups

Examining demographic differences within the segment groups, sex was evenly split in every category except for Disengaged and Doubtful (See Table 2). A much higher percentage of females (64.7%) were identified as disengaged whereas a much higher percentage of males (63.3%) belonged to the Doubtful segment. A much higher percentage of Doubtful and Dismissive respondents were aged 60+, 60% and 80%, respectively. No one in the 20-49 age range were Dismissive. The segments were split when it came to political parties. Most respondents identified as Democrat or Republican from Alarmed, Concerned, Cautious, and Disengaged segments, whereas a majority of Doubtful and Dismissive persons were Republican. Finally, a much higher percentage of Alarmed respondents had a post graduate or professional degree compared to other segments.

Table 2
Demographic Breakdown by Six Americas Segment

	Alarmed n = 117 %	Concerned n = 230 %	Cautious n = 86 %	Disengaged n = 17 %	Doubtful n = 30 %	Dismissive n = 20 %
Sex						

Male	50.4	46.1	52.3	35.3	63.3	50.0
Female	49.6	53.9	47.7	64.7	36.7	50.0
Race						
Caucasian/White	68.4	63.0	69.8	52.9	86.7	85.0
Black	8.5	15.7	16.3	23.5	6.7	5.0
Native American	3.4	0.4	1.2	11.8	3.3	0.0
Asian	0.0	0.0	2.3	0.0	0.0	0.0
Multiracial	19.6	17.0	10.5	11.8	3.3	10.0
Hispanic	25.6	23.5	16.3	17.6	3.3	5.0
Age						
18-19	0.0	0.4	0.0	0.0	3.3	4.0
20-29	13.7	20.4	16.3	29.4	6.7	0.0
30-39	37.6	35.7	20.9	11.8	10.0	0.0
40-49	8.5	11.7	16.3	5.9	6.7	0.0
50-59	10.3	13.0	15.1	29.4	13.3	15.0
60-69	23.1	10.9	16.3	17.6	36.7	50.0
70-79	6.0	7.4	12.8	5.9	20.0	30.0
80 and older	0.9	0.4	2.3	0.0	3.3	0.0
Political Affiliation						
Republican	16.2	22.2	40.7	23.5	46.7	70.0
Democrat	56.4	49.6	32.6	35.3	16.7	5.0
Independent	21.3	21.7	22.1	29.4	30.0	25.0
No Preference	5.1	5.7	3.5	5.9	6.7	0.0
Other	0..9	0.9	1.2	5.9	0.0	0.0
Education						
Some HS or less	2.6	0.9	3.5	11.8	0.0	0.0
HS graduate	12.8	23.0	20.9	17.6	30.0	15.0
Some college	14.5	22.6	23.3	41.2	26.7	35.0
Associates	11.1	10.0	16.3	5.9	10.0	10.0
Bachelor’s	30.8	27.4	20.9	23.5	16.7	30.0
Post degree	17.9	12.2	14.0	0.0	16.7	5.0
Prof. degree	10.3	3.9	1.2	0.0	0.0	5.0

Segment Group Thoughts on Global Warming

Beliefs. The degree of beliefs followed a linear pattern with Alarmed respondents on the high end being very certain that global warming is happening and Dismissive respondents very certain it is not happening, representing the low end (See Table 3). When it came to what is causing global warming the majority of Alarmed and Concerned believed it was caused by human activities. The Doubtful and the Dismissive believe it is caused by natural changes in the environment.

Table 3
Beliefs by Six Americas Segment

	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive

	n = 117 %	*n* = 230 %	*n* = 86 %	*n* = 17 %	*n* = 30 %	*n* = 20 %
Do you think global warming (GW) is happening? And how sure are you that GW is happening?						
Extremely sure; is happening	71.8	30.9	11.6	5.9	3.3	5.0
Very sure; is happening	18.8	39.6	24.4	5.9	13.3	0
Somewhat sure; is happening	7.7	21.3	26.7	23.5	16.7	5.0
Not sure; is happening	0.9	7.4	25.6	17.6	16.7	10.0
I don't know	0	0.4	7.0	35.3	16.7	5.0
Not sure; is NOT happening	0	0.4	2.3	0	13.3	10.0
Somewhat sure; is not happening	0.9	0	0	0	13.3	15.0
Very sure; is not happening	0	0	0	5.9	6.7	25.0
Extremely sure; is not happening	0	0	2.3	5.9	0	25.0
Assuming global warming is happening do you think it is caused by						
Caused mostly by human activities	94.0	79.6	47.7	47.1	10.0	0
Caused mostly by natural changes	3.4	12.2	44.2	47.1	90.0	70.0
Other	2.6	7.4	8.1	5.9	0	15.0
None of the above because it isn't happening	0	0.9	0	0	0	15.0
How much do you think global warming will harm you personally?						
Not at all	1.7	3.9	17.4	11.8	70.0	100
Only a little	12.0	22.2	36.0	11.8	10.0	0
A moderate amount	21.4	46.1	31.4	5.9	3.3	0
A great deal	63.2	23.9	14.0	0	6.7	0
Don't Know	1.7	3.9	1.2	70.6	10.0	0
How much do you think global warming will harm future generations?						
Not at all	0	0.4	2.3	0	13.3	100
Only a little	0	2.2	19.8	0	36.7	0
A moderate amount	5.1	23.9	64.0	5.9	16.7	0
A great deal	94	72.6	11.6	0	10.0	0
Don't Know	0.9	0.9	2.3	94.1	23.3	0
When do you think global warming will start to harm people in the US						
Never	0	0.9	3.5	11.8	33.3	95.0
100 years	1.7	4.8	16.3	11.8	26.7	5
50 years	3.4	7.8	15.1	11.8	16.7	0
25 years	11.1	24.3	20.9	11.8	3.3	0
10 years	11.1	18.3	22.1	11.8	10	0
They are being harmed now	72.6	43.9	22.1	41.2	10	0
Which of the following statements comes closest to your view?						
Global warming isn't happening	0.9	5.7	5.8	5.9	16.7	60.0
Humans can't reduce it, even if it is happening	7.7	9.1	27.9	29.4	73.3	30.0

Humans could reduce global warming, but people aren't willing to change their behavior	17.9	29.6	29.1	5.9	10.0	0
Humans can reduce global warming, but it's unclear whether we will do what's needed	49.6	44.3	34.9	47.1	0	5.0
Humans can reduce global warming, and we are going to do so successfully	23.1	10.9	2.3	11.8	0	5.0

Note. Frequencies by column may not add up to 100% due to missing values and rounding.

The Dismissive believed global warming was not harming themselves or others. Most Alarmed and Concerned reported global warming was harming them and others a 'great deal' to a 'moderate amount.' Additionally, the majority of these two groups reported being harmed now. Overall, the Alarmed, Concerned, Cautious, and Disengaged believed that 'humans can reduce global warming, but it's unclear at this point whether we will do what's needed.' However, 73.3% of Doubtful reported that Humans can not reduce global warming even if it is real and 60% of Dismissive viewed Global Warming as not happening.

Issue Involvement. The Alarmed were very worried about global warming (80.3%), whereas 95% of Dismissive and 60% of Doubtful respondents were not at all worried. Sixty-three percent of Concerned respondents were somewhat worried, along with 45% of the Cautious. The Disengaged segment were not very worried or not at all worried (See Table 4).

Table 4

Issue Involvement by Six Americas Segment

	Alarmed *n* = 117 %	Concerned *n* = 230 %	Cautious *n* = 86 %	Disengaged *n* = 17 %	Doubtful *n* = 30 %	Dismissive *n* = 20 %
How worried are you about global warming?						
Very worried	80.3	27.8	5.8	0	0	0
Somewhat worried	19.7	63.9	45.3	17.6	6.7	0
Not very worried	0	7.4	41.9	41.2	33.3	5.0
Not at all worried	0	.9	7.0	41.2	60.3	95.0
How much had you thought about global warming before today?						
A lot	76.1	18.3	10.5		26.7	30.0
Some	22.2	58.7	47.7	17.6	33.3	35.0
A little	1.7	20.0	32.6	53.9	33.3	5.0
Not at all	0	3.0	9.3	29.4	6.7	30.0
How important is the issue of global warming to you personally?						
Extremely Important	70.9	18.7	7.0	11.8	3.3	0
Very important	27.4	49.6	31.4	17.6	3.3	0
Somewhat important	1.7	29.1	34.9	5.9	13.3	5.0
Slightly important	0	2.6	24.4	41.2	40.0	10.0

Not at all important	0	0	2.3	23.5	40.0	85.0
How much do you agree or disagree with the statement? "I could easily change my mind about climate change?"						
Strongly agree	12.0	19.1	11.6	17.6	3.3	5.0
Somewhat agree	8.5	29.1	62.8	41.2	33.3	20.0
Somewhat disagree	18.8	35.2	24.4	41.2	33.3	25.0
Strongly disagree	60.7	16.1	1.2	0	30.0	50.0
How many of your friends share your views on global warming?						
All	17.1	2.6	0	0	0	20.0
Most	43.6	19.1	9.3	5.9	23.3	45.0
Some	23.1	44.8	46.5	58.8	60.0	30.0
A few	16.2	27.4	31.4	5.9	10.0	0
None	0	6.1	12.8	29.4	6.7	5.0

Note. Frequencies by column may not add up to 100% due to missing values and rounding.

Behaviors. The segments that are prone to believe global warming does not exists never punished companies for not taking steps to reduce global warming. Additionally, Concerned and Cautious respondents did not typically boycott companies although, 25.2% of concerned and 19.8% of Cautious reported they had a few times. Finally, the Alarmed were more likely to boycott with 25.6% reporting they had a few times, 18.8% several times, and 19.7% boycotting many times (See Table 5).

Table 5
Purchasing Behaviors by Six Americas Segment

	Alarmed *n* = 117 %	Concerned *n* = 230 %	Cautious *n* = 86 %	Disengaged *n* = 17 %	Doubtful *n* = 30 %	Dismissive *n* = 20 %
Over the past 12 months, how often have you punished companies that are opposing steps to reduce global warming by NOT buying their products						
Never	15.4	41.3	44.2	52.9	90.0	95.0
Once	2.6	8.7	12.8	0.0	0.0	0.0
A few times	25.6	25.2	19.8	0.0	3.3	0.0
Several times	18.8	7.8	8.1	0.0	0.0	0.0
Many times	19.7	3.5	0.0	0.0	0.0	0.0
Don't Know	17.9	13.5	15.1	47.1	6.7	5.0

Note. Frequencies by column may not add up to 100% due to missing values and rounding.

Preferred Societal Response. The Alarmed felt global warming should be a very high priority for our next president and congress and felt citizens should be doing more. Both the Alarmed and Concerned felt the U.S. should reduce our greenhouse emissions regardless of what other countries do. On the opposite spectrum, 66.7% of Doubtful and 100% of Dismissive said global warming should be a low priority for congress and 73.3% of Doubtful felt people were doing the right amount to combat climate change. Fifty percent of dismissive felt that the U.S. should not do anything to reduce its emissions (See Table 6).

Table 6

Preferred Societal Responses toward Global Warming by Six Americas Segment

	Alarmed n = 117 %	Concerned n = 230 %	Cautious n = 86 %	Disengaged n = 17 %	Doubtful n = 30 %	Dismissive n = 20 %
[Should] global warming be a high, low, medium, high, or very high priority for our next president and Congress?						
Very High	73.5	17.8	0	5.9	0	0
High	25.6	46.1	30.2	23.5	10.0	0
Medium	0	32.2	58.1	64.7	23.3	0
Low	.9	3.9	11.6	5.9	66.7	100.0
Do you think citizens themselves should be doing more or less to address global warming?						
Much More	71.8	19.6	3.5	52.9	0	0
More	26.5	57.4	43	35.3	3.3	5.0
Doing the right amount now	0	8.7	38.4	0	73.3	45.0
Less	0.9	6.5	10.5	5.9	16.7	25.0
Much less	0.9	7.8	4.7	5.9	6.7	25.0
The US should reduce its greenhouse gas emissions…						
Regardless of others	86.3	67.8	43	52.9	30.0	15.0
If other industrialized nations do	1.7	11.3	22.1	5.9	0	5.0
If other industrialized countries and developing countries do	4.3	8.3	17.4	5.9	23.3	30.0
The US should not reduce its emissions	5.1	3.5	4.7	0	20.0	50.0

Note. Frequencies by column may not add up to 100% due to missing values and rounding.

Sources Used to get Information about Climate Change

Respondents were asked where they get information about climate change (See Table 7). Every segment identified as local weather forecasts as a likely source, followed closely by television programs. Radio programs, museums, and schools were listed as least likely sources. The Dismissive segment did not use schools, colleges, and universities as a source. Overall, respondents in the dismissive segment used relatively few sources (an average of 2.8) as compared to those in the alarmed segment (who used an average of 7.0 sources).

Table 7
Sources Six Americas Segments use to get Information on Climate Change

	Alarmed n = 117 %	Concerned n = 230 %	Cautious n = 86 %	Disengaged n = 17 %	Doubtful n = 30 %	Dismissive n = 20 %
Local weather forecasts	69.8	71.1	74.1	70.6	63.3	47.4
Television programs	80.3	76.2	64.0	41.2	44.8	65.0

Environmental Organizations	74.1	55.9	28.2	23.5	24.1	5.3
Family and Friends	67.2	63.3	50.0	43.8	46.7	36.8
Newspapers	73.0	62.9	52.9	29.4	30.0	31.6
Social Media	64.7	62.0	40.0	52.9	33.3	15.8
Nongovernment Websites	51.3	42.1	38.1	18.8	26.7	21.1
Magazines	50.0	44.8	27.4	6.3	20.0	10.5
Government Agencies (ex. NASA)	53.8	49.3	32.9	11.8	27.6	5.3
Radio programs	38.6	33.3	34.1	25.0	10.3	36.8
Museums, zoos, or aquariums	32.7	26.6	12.9	17.6	3.3	5.3
Schools, Colleges, and Universities	40.5	37.6	24.7	6.3	6.9	0.0

Note. Percentages by column add up to over 100% due to multiple sources being selected.

Conclusions, Implications and Recommendations

This study sought to identify how the Six Americas segments were represented within the state of Florida and how to best communicate with each segment. Overall, the results from this study were comparable to earlier studies (Maibach et al., 2009; Roser-Renouf et al., 2014). It is important to acknowledge the limitations of the research prior to making implications and recommendations. In this case, the data were not weightable based on the way the race and ethnicity variable was collected. Typically, weighting techniques are used to alleviate concerns about racial differences (Baker et al., 2013) but in this case, it is unclear how representative the sample was of the population from a race/ethnicity perspective. This limitation being acknowledged, there are significant implications found through this data that can inform agricultural educators and communicators. Overall, 86% of the respondents acknowledged global warming was real and happening. Given this, it is interesting that several leaders of the state, those that should represent the will of the people, are vocal about being indifferent about climate change and hesitant to acknowledge its existence. Policy concerns should be understood by both the public and decision makers (Roberts et al., 2016) and previous research has recommended that agricultural educators and communicators should use interventions to improve both groups understanding of ANR issues (Taylor & Lamm, 2016).

As Roser-Renouf et al. (2014) described, Dismissive and Doubtful segments were the most likely to deny global warming existed, or that government should make the issue a priority. These two groups are the least likely to take action to mitigate the effects of climate change. Fortunately, they also made up the smallest number of respondents (10%). While it may seem like a lost cause, it is important agricultural educators and communicators continue to reach out to climate change deniers to engage them in conversations in order to change the narrative since they are the loudest voice working against climate change believers. It may be difficult for formal agricultural educators to reach out to these segments, as schools and universities were the lowest reported group they used as a source of information. This implies extension educators have work to do within their communities as non-formal educators if they want to be a resource for informing the community about climate science.

Across the board, local weather forecasts and television programs were identified as the greatest source of information on climate change. It is worth noting that Doubtful and Dismissive respondents reported low levels on most sources and this low level is hypothesized to be a result of the lack of interest in climate change from these two groups. A possible solution to reach all groups and to inform them of climate science would be to partner with local weather forecasters. Bloodhart, Maibach, Myers, and Zhao (2015) found routine exposure to local TV weather forecasts influenced viewers understanding and perception of extreme weather forecasts. Additionally, routine exposure was found to result in stronger beliefs and concerns about climate change, indicating TV weather forecasters play an important role in educating the public.

Additional research should be done examining how climate change communication campaigns resonate with different Six Americas segments to further target agricultural education and communication initiatives. Specifically, those groups within the agricultural and natural resource groups. Focus groups could be conducted targeting different segments where communication efforts are presented and feedback received. The discussion could assist in informing the most effective communication techniques qualitatively.

This study should also be repeated in other states where climate change is not having as much of a direct effect. Perhaps residents of states that are less directly affected separate themselves differently across the segments. The results could then be compared to those collected in this study to determine differences and how direct effect of weather on the state you live within impacts perceptions of climate change.

Finally, it is also recommended a content analysis be conducted examining the media surrounding climate change, global warming and climate science in the state of Florida. Based on the literature, it is expected media has a large influence, however it is difficult to ascertain how often it is mentioned, and whether or not it is positive or negative media attention that elicits in responses without knowing what is be presented. The media could also be used in a focus group format to elucidate reactions and determine its effect on public perceptions of climate change.

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U.S. Adults with Agriculture Experience Are Likely More Familiar with Genetic Engineering than Those Without

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Abstract

Researchers and pollsters still debate the acceptance of genetic engineering technology among U.S. adults, and continue to assess their knowledge as part of this research. While decision-making may not rely entirely on knowledge, querying opinions and perceptions relies on public understanding of genetic engineering terms. Experience with agriculture may increase familiarity with genetic engineering terms. We conducted a national survey of 429 United States adults through Qualtrics and found two-thirds lack any formal, nonformal, or informal agriculture experience. More than half of participants knew "a little" or less for 13 of the 17 terms presented, especially those directly related to genetic engineering or breeding technology for food, such as "genetically modified organism" and "crossbred organism." Consumers with experience in agriculture were more familiar with the terms than those without experience. More than half also felt they did not know the difference between traditional selective breeding, DNA-directed breeding, and genetic engineering, but they still felt both human health and environmental risks should be considered before creating new animal or plant varieties. We must consider the lack of familiarity of genetic related terms and experience in agriculture when researching or creating educational programming around genetic engineering for food.

Introduction

Consumers are more aware of and interested in the agricultural industry as agriculturalists meet new demands of feeding a growing population (Anderson, Ruth, & Rumble, 2014). At the same time, only 2% of Americans live on farms and directly experience agriculture, a rate much lower than in the mid-20th century (Environmental Protection Agency, 2013). By another measure, if involvement in high school agriculture is the standard for agricultural experience (Duncan, Carter, Fuhrman, & Rucker, 2015; Dyer, Breja, & Wittler, 2002; Esters, 2007), then only 6% of younger adults in the U.S. are likely to have any direct agricultural experience. Estimates suggest at most one million high school students are involved in FFA (National FFA Organization, 2013) out of over 15 million public high school students in the U.S. (National Center for Education Statistics, n.d.).

Agriculturalists and scientists work together to determine agricultural needs and potential scientific solutions, pairing the scientific and agricultural communities and industries. Overall, science as a field enjoys broad support from adults in the United States (Pew Research Center, 2015), while support for agriculture may be much lower (Lundy, Ruth, Telg, & Irani, 2006; Pilger, 2015; Wachenheim & Rathge, 2000). Americans may also see agriculture and science differently than scientists do, as more separate than intrinsically linked (Stofer & Newberry III, 2017). Particularly for agribiotechnology, Americans may not trust the underlying science as much as they do in other domains (Blaine, Kamaldeen, & Powell, 2002; McHughen, 2007; Moon & Balasubramanian, 2004).

One such agribiotechnology which scientists support (Chassy, 2007) but the public may not is genetic modification and genetic engineering (GE). Such technology allows for the manipulation of genes to produce a desired trait, creating improvements in growth rate, disease and insect resistance, and nutritional value. Although genetic engineering has been around for several decades, national polls and evaluation studies of United States adults indicate many may still be unsure of the risks and benefits of genetic engineering specifically for food production and may not accept the use of this agricultural technology (Evans & Ballen, 2016; Hallman, Cuite, & Morin, 2013; Traill et al., 2006). Indeed U.S. adults may be far apart from scientific consensus on the issue of safety for human consumption (Pew Research Center, 2015). However, these national studies also treat GE technology as a single issue, rather than a set of related cases for individual crops and the improvements targeted. For example, perceptions of risks and benefits of GE to save a rapidly declining citrus crop in the exigent case may be different from a discussion of fortifying rice with beta-carotene for better nutrition in under-resourced areas.

However, other reports suggest that genetically engineered foods are not controversial in the United States, both because the aforementioned surveys are invalid and because consumers buy GE foods despite their poll answers (Kahan, 2015). None of these non-peer-reviewed data sources actually considers whether consumers know what GE involves for food, nor specifically examine human health versus environmental risk perception (Stofer & Schiebel, 2017). As people may prefer phenomena with which they are familiar (Zajonc, 2001), lack of exposure to these terms may be another reason people indicate low acceptance of a technology when asked. If research participants lack familiarity with specialized terminology used to determine opinions, researchers will not be able to determine consumers' true feelings toward the technology (Sturgis & Allum, 2004; Sturgis, Brunton-Smith, & Fife-Schaw, 2010; Wynne, 2006).

We have few recent, national peer-reviewed studies suggesting consumers actually know what genetic engineering technology for food involves, the differences in human health and environmental risks, let alone whether they support its use in general or specific cases (Stofer & Schiebel, 2017). Indeed, a single national evaluation report (Hallman et al., 2013) and one peer-reviewed study (Abrams, McBride, Hooker, Cappella, & Koehly, 2015) suggest U.S. adults may not be completely aware of or clear on the meaning of genetic engineering technology, and thus they are unable to validly respond to research soliciting opinions on whether to support the use of the technology. Related research on consumer opinions of another emerging technology, nanotechnology, suggests that once consumers do become more informed, they may become polarized on the issues of risk based on cultural associations, rather than knowledge (Kahan, Braman, Slovic, Gastil, & Cohen, 2009).

Genetic engineering brings a new list of associated vocabulary and jargon that researchers have used without definitions in surveys and focus groups when studying GE technology and food (Stofer & Schiebel, 2017). Determining the public's awareness of terms frequently used with the technology and determining their experience in agriculture can help GE researchers and marketers understand consumers' concerns about the technology especially as it relates to food production. Understanding the public's broader literacy about genetics also interests the American Association for Agricultural Education (AAAE). Priority 1 of the National Research Agenda focuses on public and policy maker understanding of agriculture and natural resources (Enns, Martin, & Spielmaker, 2016). Combining understanding of the public's term familiarity, true perceptions of genetic engineering, and experience in agriculture can guide researchers and practitioners in designing information and outreach programming aimed at building understanding and acceptance of GE technology in food.

The purpose of this study was first to determine the United States adult population's level of term familiarity about genetics specifically related to plants and livestock, genetically modified organisms, genetic engineering, and the context of food. Next, we sought to determine the U.S. adult population's self-perceptions of genetic engineering through a series of questions on risk, regulation and the differences between production techniques. Finally, we determined participants' experience in agriculture and considered whether term familiarity, perceptions of GE technology, and experience in agriculture are related.

Conceptual Framework

Understanding familiarity is an essential step to determining overall literacy about and acceptance of a particular subject for an individual or group. E.M. Rogers' (2003) Diffusion of Innovation model offers a process for adopting new information with a hierarchy of knowledge encompassing a three-step process to understanding information. The three steps to increasingly complex knowledge are *awareness knowledge*, *how-to knowledge*, and *principles knowledge*. Abrams et al. (2015) recommended that researchers using Roger's hierarchy of knowledge measure these types of knowledge independent of each other, analyzing each component on its own. In this study, we chose to assess awareness knowledge through term familiarity. Term familiarity shows understanding of a particular concept. Researching awareness through familiarity is a critical first step before researching opinion and perception. If a participant is unfamiliar with a term, they will be unable to give their informed opinion of that concept.

Term familiarity also indicates an individual's exposure to a particular item. Researchers studying a variety of contexts, stimuli, and audiences have found people prefer the familiar (Zajonc, 2001). Exposure to a specific phenomenon and frequency of exposure creates a comfort level and stronger preference as well as a higher familiarity rating. Term familiarity in the area of genetics and GE technology may relate to an individual's experience with the particular term or subject, and may influence preference for a new technology such as lab-based genetic engineering. Understanding terminology and establishing awareness is a critical first step before researchers can accurately determine consumer preferences without having to define terms in each research instrument. Therefore, we undertook this study in the context of assessing awareness knowledge and term familiarity.

Purpose and Objectives

The purpose of this study was to understand U.S. adults' familiarity with terms related to genetic engineering for food and traditional and DNA-directed selective breeding technologies and the influence of experience in agriculture on term familiarity and perceptions of these technologies in order to inform future surveys and research on consumer preferences. Specifically, our objectives were to:

1. Determine the United States adult population's level of term familiarity in the realm of genetics, specifically related to genetically modified organisms and genetic engineering in the context of food.
2. Determine the United States adult population's perceptions of GE technology for food., specifically including perceptions of health and environmental risk.
3. Assess adult public experience with agriculture.
4. Compare relationships among term familiarity, perceptions of GE technology for food and experience in agriculture.

Methods

We surveyed a national sample of United States adults through Qualtrics, a survey software company, in August 2016. Qualtrics gathered responses through an opt-in panel, meaning not everyone in the population having an equal chance of selection. A large sample size, however, is intended to compensate for non-probability research (Ary, Jacobs, Sorensen, & Walker, 2014). We used a gender and age quota to ensure demographic breakdown reflected the latest Census population distribution (U.S. Census Bureau, 2014). See Table 1. Matching the

Table 1

Age, gender and experience in agriculture of respondents

	Gender				Experience in agriculture	
Age	Male *n* (%)	Female *n* (%)	Other *n* (%)	Prefer not to answer *n* (%)	No Experience *n* (%)	Experience *n* (%)
18-24 years	18 (4%)	28 (7%)	5 (1%)	0 (0%)	35 (8%)	16 (4%)
25-44 years	66 (15%)	76 (18%)	4 (1%)	1 (0%)	86 (20%)	61 (14%)
45-64 years	75 (17%)	77 (18%)	3 (1%)	0 (0%)	107 (25%)	48 (11%)
65 years +	39 (9%)	36 (8%)	0 (0%)	1 (0%)	54 (13%)	22 (5%)
Total	198 (46%)	217 (51%)	12 (3%)	2 (0%)	282 (66%)	147 (34%)

U.S. census allowed us to be confident that the sample is representative of the population by gender and age. Therefore, we did not conduct explicit non-response bias testing. Qualtrics offered the participants compensation for completing the 30-minute survey of which these questions were part. The University of Florida IRB approved this study.

We determined term familiarity relating to genetic literacy using a self-report on a seven-point Likert-type scale, with labels ranging from *1- I've never heard of this,* to *4 – I know a little about this,* to *7 – I am an expert in this and can teach others.* See full set of labels in Table 2. Defining each number on the scale allowed participants to appropriately rank their familiarity and understand the meaning of each scale point. Participants responded to 17 terms, the first eight of them matching the terms asked previously in the one national peer-reviewed study we found (Abrams et al., 2015): *genetic, chromosome, susceptibility, mutation, variation, abnormality, heredity* and *sporadic*. The Abrams et al. scale did not include genetic engineering or plant- or livestock-breeding terms.

Table 2

Level of familiarity with terms related to genetic engineering

Term	1 – I've never heard of this *n* (%)	2 – I've heard of this, but don't really know what it is *n* (%)	3 – I know basically what this is but not much about it *n* (%)	4 – I know a little about this *n* (%)	5 – I know a fair amount about this *n* (%)	6 – I know a lot about this *n* (%)	7 – I am an expert in this and can teach others *n* (%)
Genetic	4 (.9%)	21 (4.9%)	78 (18.2%)	93 (21.7%)	141 (32.9%)	79 (18.4%)	13 (3%)
Chromosome	12 (2.8%)	25 (5.8%)	75 (17.5%)	104 (24.2%)	141 (32.9%)	63 (14.7%)	9 (2.1%)
Susceptibility	37 (8.6%)	52 (12.1%)	73 (17.0%)	95 (22.1%)	104 (24.2%)	62 (14.5%)	6 (1.4%)
Mutation	5 (1.2%)	28 (6.5%)	65 (15.2%)	108 (25.2%)	138 (32.2%)	72 (16.8%)	13 (3.0%)
Variation	18 (4.2%)	28 (6.5%)	74 (17.2%)	107 (24.9%)	118 (27.5%)	69 (16.1%)	15 (3.5%)
Abnormality	8 (1.9%)	14 (3.3%)	63 (14.7%)	99 (23.1%)	136 (31.7%)	92 (21.4%)	17 (4.0%)
Heredity	9 (2.1%)	10 (2.3%)	50 (11.7%)	80 (18.6%)	151 (35.2%)	99 (23.1%)	30 (7.0%)
Sporadic	41 (9.6%)	39 (9.1%)	76 (17.7%)	96 (22.4%)	100 (23.3%)	67 (15.6%)	10 (2.3%)
Genetically engineered organism[1]	24 (5.6%)	51 (11.9%)	78 (18.2%)	95 (22.1%)	114 (26.6%)	59 (13.8%)	8 (1.9%)
Genetically engineered food	24 (5.6%)	44 (10.3%)	71 (16.6%)	103 (24.0%)	114 (26.6%)	66 (15.4%)	7 (1.6%)
Crossbred food	67 (15.6%)	51 (11.9%)	83 (19.3%)	99 (23.1%)	76 (17.7%)	47 (11.0%)	6 (1.4%)
Genetically modified organism	23 (5.4%)	42 (9.8%)	86 (20.0%)	108 (25.2%)	101 (23.5%)	61 (14.2%)	8 (1.9%)
Genetically modified food	20 (4.7%)	44 (10.3%)	79 (18.4%)	106 (24.7%)	115 (26.8%)	54 (12.6%)	11 (2.6%)
Crossbred organism	59 (13.8%)	45 (10.5%)	81 (18.9%)	101 (23.5%)	89 (20.7%)	46 (10.7%)	8 (1.9%)
Hybrid organism	56 (13.1%)	57 (13.3%)	79 (18.4%)	96 (22.4%)	80 (18.6%)	49 (11.4%)	11 (2.6%)
Hybrid food	52 (12.1%)	68 (15.9%)	73 (17.0%)	99 (23.1%)	76 (17.7%)	52 (12.1%)	9 (2.1%)
Selective plant breeding	54 (12.6%)	49 (11.4%)	78 (18.2%)	110 (25.6%)	47 (17.2%)	55 (12.8%)	9 (2.1%)

1 – Starting with *genetically engineered organism*, terms in the lower part of the table are the researcher-driven terms.

Therefore, the authors in consultation with an expert panel for construct validity, added nine additional terms specifically related to genetic engineering, genetically modified organisms, and selective breeding. Table 2 lists all the terms used for the study.

The next set of questions asked the participants if they knew the difference between breeding and GE techniques, and their perceptions of the risks to health and environment for genetic engineering. Participants responded to six statements using a five-point Likert-type scale ranging from strongly disagree through strongly agree; see Table 3. Finally, to determine experience in agriculture, we asked participants to self-report aspects of their previous or current experience in agriculture. We listed several components of agriculture experience including taking classes in agriculture, having plant or animal experience, and production agriculture experience, to cover both formal and non-formal or free-choice learning experience (Stofer, 2015). See Table 4. Each of these sets of questions were in the first part of a larger survey including science literacy items, worldview items, and free-response items about definitions of GE terms. These later literacy, worldview, and definitions items were not used in this paper.

Analysis

We averaged term familiarity for individual items and averaged those item scores into a total familiarity score for each participant (“all familiarity terms”), as well as sub-scores for the terms previously studied by Abrams et al. (2015) (“Abrams terms”), and the new terms chosen for this study (“researcher-driven terms”). The Abrams terms scale had Cronbach’s alpha .86, while the researcher-driven terms scale had Cronbach’s alpha .98, and the combined scale of 17 terms had a Cronbach’s alpha of .93, indicating acceptable reliability (Ary et al., 2014).

We grouped participants who indicated any type of experience with agriculture (Table 4) and compared their term familiarity scores with those of participants who indicated no experience with agriculture using independent two-sample t-tests. We also compared familiarity with terms from Abrams et al. (2015) between participant groups, as well as familiarity with just the nine terms we prepared for our survey specifically related to genetic engineering. Finally, we conducted Pearson’s correlation analysis of familiarity scores averaged for the researcher-driven terms with self-perception of difference between GE technology and breeding techniques.

We calculated Cohen’s d for effect size for the overall familiarity scale versus groups with or without agriculture experience using an online effect-size calculator (Becker, 1999). Cohen’s d was 0.49, with an effect size of 0.24. An effect size of 0.2 is a small effect (Cohen, 1992). We used *GPower 3.1.9.2* software for Mac to compute power with this effect size. At alpha .05, our sample size gave us a power of 0.65, suggesting a 35% chance of missing an effect. Therefore we relaxed our alpha to .10, resulting in a power of 0.76 and only a 24% chance of missing an existing small effect size.

Results

We collected a total of 429 responses for familiarity and experience and 423 total responses for questions relating to GE technology perceptions, as we eliminated six participants who did not complete the full set of GE technology perceptions questions. Our respondents’

Table 3

Participant self report of understanding and perceptions of risk (n = 423)

Survey Statements	Strongly disagree *n* (%)	Disagree *n* (%)	Neither agree nor disagree *n* (%)	Agree *n* (%)	Strongly agree *n* (%)
I don't really know the difference among 1) traditional selective plant or animal breeding, 2) selective breeding supplemented with DNA test information to inform breeding choices, and 3) genetic engineering or transgenic programs.	30 (7.1)	101 (23.8)	89 (20.9)	141 (33.2)	64 (15.1)
I believe that traditional selective plant or animal breeding should be kept separate from the use of *any* modern technologies like DNA testing or genetic engineering/transgenics. These technologies increase the risk of ecological harm and give big companies too much control of food supplies and rural economies.	21 (5.0)	58 (13.7)	127 (30.0)	163 (38.5)	57 (13.5)
I believe that the use of DNA tests to help make decisions in selective breeding programs is very different from genetic engineering programs that directly manipulate/alter DNA of plants or animals. DNA test information can make breeding programs more effective without the risks involved with genetic engineering or transgenics.	9 (2.1)	30 (7.1)	152 (35.9)	183 (43.3)	52 (12.3)
I believe that all modern technologies like DNA testing within selective breeding programs or genetic engineering/transgenic programs are not meaningfully different from traditional selective plant breeding and are not more risky in any important way. We should use all tools at our disposal to try to improve the quantity and quality of plants and animals we use for food, fiber and fuel.	33 (7.8)	81 (19.1)	150 (35.5)	128 (30.3)	34 (8.0)
I believe that direct harm to human health is the main risk to consider when deciding whether to allow the creation of new varieties of plants or animals for human consumption. If these new varieties don't cause diseases in people who eat them, then there is no cause for alarm.	21 (5.0)	49 (11.6)	104 (24.6)	156 (36.9)	96 (22.7)
I believe that the risk of harm to ecosystems, the health of other species, and the relationships among species is important to consider when we think about creating new varieties of plants or animals; these issues are important on their own and also because of possible indirect effects on human health.	10 (2.4)	20 (4.7)	92 (21.7)	175 (41.4)	129 (30.5)

Table 4

Previous or current experience in agriculture

Answer choice	Participants
I have no experience in agriculture	282 (66%)
I have worked in food production and/or food processing	51 (12%)
I have taken classes in agriculture.	55 (13%)
I work/have worked in animal agriculture.	41 (10%)
I work/have worked in selective breeding.	14 (3.3%)
I have other agricultural experiences.	68 (16%)
I feel that I am an informed consumer of agriculture.	92 (21%)
I work/have worked in genetic engineering.	10 (2%)
I work/have worked in plant agriculture.	31 (7%)

highest level of educational attainment was somewhat higher than the nation as a whole. Almost all of our participants reported earning at least a high school diploma or equivalent (99.3%), compared to census reports of attainment at this level for 88% of U.S. adults over the age of 25 in 2015. However, rates of bachelor's- (30%) and higher-degree attainment (13%) were similar to census reports.

Our first goal was to determine the United States adult population's level of term familiarity in the realm of genetics, specifically related to genetically modified organisms and genetic engineering. Out of 17 terms, heredity (7%), followed by abnormality (4%) and variation (3.5%), had the most amount of responses *I am an expert in this and can teach others* (7), where participants felt that they knew the most about those genetic-related terms. All other terms had 3% or fewer respondents indicating expert-level knowledge of the term. Only four out of the 17 terms had more than half of the population responding that they know *a fair amount* (5) and above: genetic (54.3%), mutation (52%), abnormality (57.1%) and heredity (65.3%). None of the terms the researchers added for this survey scored 5 or more with a majority of respondents. Additionally, many of the terms in the survey were scored *I've never heard of this* (1) or *I've heard of this, but don't really know what it is* (2) by 15% or more of the respondents: susceptibility (20.7%) and sporadic (18.7%) from the Abrams terms and all of the researcher-driven terms except genetically modified organism (14.2%). Three researcher-driven terms were highly unfamiliar (scoring 1 or 2) to almost 30% of respondents: crossbred food (27.5%), hybrid organism (26.4%) and hybrid food (28%). See Table 2. Individual terms' average familiarity scores ranged from 3.54 out of 7 for crossbred food to 5.54 for heredity. The overall average term familiarity score was 4.5, fitting right between (4) *I know a little about this* and (5) *I know a fair amount about this.* See Table 5.

The second objective was to determine the United States adult population's perceptions of GE technology for food. When it came to knowing the difference among *1) traditional selective plant or animal breeding, 2) selective breeding supplemented with DNA test information to inform breeding choices*, and *3) genetic engineering or transgenic programs*, 48% of participants agreed or strongly agreed that they did not know the difference. See Table 3. Less than half (37.8%) of participants agreed or strongly agreed that they believe that modern

Table 5

Term familiarity average scores

Abrams Terms	M	SD	Researcher-driven terms	M	SD
Genetic	5.35	1.86	Genetically engineered organism	4.01	1.47
Chromosome	5.28	2.00	Genetically engineered food	4.08	1.45
Susceptibility	4.79	2.31	Crossbred food	3.54	1.62
Mutation	5.44	1.94	Genetically modified organism	4.02	1.43
Variation	5.27	2.11	Genetically modified food	4.07	1.42
Abnormality	5.52	1.84	Crossbred organism	3.67	1.60
Heredity	5.54	1.71	Hybrid organism	3.65	1.63
Sporadic	4.86	2.31	Hybrid food	3.63	1.62
			Selective plant breeding	3.70	1.60

technologies are *not meaningfully different* and *not more risky in any important way* than traditional selective breeding. More than half (59.6%) agreed or strongly agreed that *human health is the main risk to consider* when deciding on new varieties for human consumption and there is no cause for alarm if the varieties do not cause disease in people. However, nearly two-thirds of participants (71.4%) agreed or strongly agreed that environmental impacts are important to consider not only because they could impact human health but also because the environment is important on its own.

Next we investigated participants' experience with agriculture. Nearly two-thirds of participants (65.6%) reported no experience in agriculture. However, the percentage of participants reporting any experience with agriculture varied with age. The middle two age groups (25-44 and 45-64) had higher levels (14% and 11%) of participants with experience in agriculture than the youngest (18-24, 4%) and oldest (65+, 5%) participants. See Table 1. The 34% of participants with experience indicated varying types of experience in agriculture, including work, classes, and other agricultural experience. Only 2.3% reported work in genetic engineering specifically. See Table 4.

For Objective 4, we first investigated the relationship between term familiarity and agricultural experience. Averages for the overall term familiarity scale and both sub-scales were between 3.5 and 5.6 on the 1-7 scale for both experience groups. The group with agriculture experience consistently had a higher mean of familiarity than the group with no agriculture experience. The researcher-driven terms were less familiar than the Abrams terms for both experience groups. See Table 6.

The difference in average scores (0.64) between participants with experience and with no experience for all of the familiarity terms was significant ($p < .01$), and the difference between groups for Abrams' terms (0.46) was also significant ($p < .01$). Lastly, the researcher driven terms had a mean difference of .80 between groups, but this difference was not significant, even at an alpha of .1 suggested by our power calculations.

We also investigated the relationship between term familiarity for the researcher-driven, GE-specific terms with self-report of understanding GE technology and breeding techniques.

Table 6

Familiarity scores vs agriculture experience

Familiarity	Experience	*n*	Mean	SD	*p*-value
All Familiarity Terms	No experience	281	4.28	1.50	
All Familiarity Terms	Experience	147	4.92	1.08	.00
Abrams Familiarity Terms	No experience	281	5.10	1.50	
Abrams Familiarity Terms	Experience	147	5.56	1.26	.01
Researcher-Driven Terms	No experience	281	3.54	1.39	
Researcher-Driven Terms	Experience	147	4.35	1.33	.20

Note. Participants could select any or all choices that applied.

Overall term familiarity with researcher-driven terms was 3.84 (*SD* = 1.42, 1 to 7 scale) and self-report of GE technology understanding was 3.25 (*SD* = 1.18, 1 to 5 scale). Term familiarity and understanding of GE technology had a significant inverse relationship, with a Pearson correlation of -.49 ($p < .05$), just under the cutoff for a large effect size (Cohen, 1992).

Discussion, Conclusions, Implications and Recommendations

We first determined whether the U.S. public truly is familiar with GE technology terms in the context of food, due to conflicting results from polls and evaluations and a lack of peer-reviewed data. The current level of term familiarity with terms related to genetic engineering among United States adults in this study is low. When participants were asked to rate their level of familiarity of 17 terms, 13 terms had the majority of respondents knowing “little” or less (4 or lower on a 1 to 7 scale), including all nine of the researcher-driven terms relating to genetic engineering and plant breeding specifically. Overall, average scores of familiarity of all terms was also 4.50, with no term averaging more than 5.54, or just between knowing a fair amount and knowing a lot about the term. High percentages (15 -30%) of participant scores of 1 or 2 for many terms indicated a high degree of unfamiliarity for these terms, especially those on the researcher-driven subscale.

Next we assessed the perceptions of participants on their understanding of GE technology and its associated risks to both human and environmental health. Half of the participants were neutral or felt they did not know the difference between GE technology, laboratory-based selective breeding, and traditional selective breeding of plants and animals. Both low levels on term familiarity and understanding of GE versus breeding technologies are consistent with or higher than earlier evaluation and research (Abrams et al., 2015; Hallman et al., 2013). However, respondents agreed that human health risks were the most important to investigate when considering items for human consumption. They also felt environmental health was important, both for its indirect impacts on human health as well as direct risks to the environment. Since we did not use unfamiliar terms, we are confident in the validity of these perceptions.

Our third aim in this study was to determine how many U.S. adults have experience with agriculture including formal secondary school experience, work experience, and other informal and nonformal experience. Self-reports of agriculture experience in our study indicated a higher estimate of people with experience, 34% of our sample, than traditional census samples reporting only those who currently work with agriculture (2%) or those who currently study agriculture in formal secondary school programs (6%). We also found differences in experience by age, with younger and older groups reporting smaller numbers of people with experience in agriculture than groups of 25-44 and 45-64 year olds.

Finally, we explored the relationships among experience with agriculture, term familiarity for GE technology in the context of food, and self-perception of GE technology understanding. First we confirmed that people with low term familiarity also reported low understanding of the differences between GE technologies and breeding techniques. A significant negative correlation for the relationship based on the wording of the questions confirmed that participants who were more familiar with specific terminology reported they understand better the difference between GE and breeding technologies. This correlation was just below the threshold (.5) for a large effect size. We also investigated experience versus term familiarity. Experience seems to play a role in familiarity with GE technology terms, though the effect sizes were small. Participants with experience in agriculture had significantly higher average scores ($p < .05$) for both all terms and the Abrams terms than participants without experience. Average scores for participants with agriculture experience on researcher-driven terms were also higher than those without experience, though the difference was not significant.

This lack of significance could be due to a lack of statistical power, as we had a 24% chance of missing a small effect at an alpha level of .10. We did have a small number (n = 147) of participants with experience with agriculture. A lack of significant difference could also be a function of a problem with our researcher-driven terms scale. While reliability of the scales was above the acceptable levels, the reliability for the researcher-driven terms subscale bordered on too high (Cortina, 1993; Hulin et al., 2001), suggesting a great deal of overlap or a scale that is too long overall to measure this concept. For example, we asked participants about both crossbred *organism* and crossbred *food* as well as *hybrid* organism and *crossbred* organism. Some items may need to be dropped in future research or investigated further with item-response theory.

However, the lack of significant difference between groups based on agriculture experience could also be reflective of a true lack of difference in understanding on GE technology related terms in both groups, given low overall term familiarity in participants in our study. Previous evaluations such as Hallman et al. (2013) and peer-reviewed research from Abrams et al. (2015) support this conclusion that U.S. adults are not very knowledgeable about GE technology. Surveys from Kahan (2015) indicating a lack of U.S. adult polarization on genetic engineering, coupled with related research on nanotechnology that suggest polarization on emerging technology topics might result only after participants are knowledgeable on the subjects, also support our findings of low knowledge levels in this study.

Our results indicate several areas for future research and practice. For educators, the low familiarity of genetic related terms we found, especially in the population lacking experience in agriculture, supports the mere-exposure effect for genetic engineering technology (Zajonc, 2001). Term familiarity and therefore awareness knowledge in Rogers' hierarchy is lacking among U.S. adults on the subject of genetic engineering in the context of food. More formal, informal, and nonformal education programming on terms relating to genetic engineering will increase familiarity. Programs should also take into account dimensions of human health versus environmental risk, and they should not treat GE technology as a single issue but a series of related cases based on individual crops and their individual risks and benefit scenarios. However, given differences in familiarity based on agriculture experience, programs should look different for different audiences based on this dimension of participant background. As experience in agriculture is also low among our respondents, creating and bolstering avenues for education and exposure to more general genetic literacy as well as agriculture overall may also be helpful. Knowledge alone may not be the primary indicator of future decision-making. Therefore more overall experience in agriculture and relationships with people who support agriculture (Kahan, 2008) may increase support for agribiotechnologies.

For researchers, as participants in our study reported higher educational levels than reported by the U.S. Census, these low scores may actually overestimate knowledge on GE technology for the entire U.S. adult population. However, it is unclear how many participants would have learned terminology related to genetic engineering in formal school, given the recent emergence of the technology and general lack of agricultural or science education in schools. The same could be said of other demographic categories such as income. Future studies should examine the relationship of familiarity with educational attainment, as well as compare self-reports of education and other demographics with other valid and reliable scales about general science and agricultural literacy. Such support will address the AAAE Research Agenda Priority 1 on agricultural literacy (Enns et al., 2016). Further, researchers might expect experience in agriculture to be more common amongst older age groups based on demographic trends about the percentages of people living and working on farms declining at the end of the 20th century (Environmental Protection Agency, 2013). However, we found a smaller percentage of older Americans reported any experience with agriculture. The discrepancy between census figures and our results highlights a need to have better measures of agricultural experience for many studies of these populations and topics. Future research should formalize this scale and test the items for reliability and validity. We did not examine experience with genetics more broadly, such as in medical contexts. Determining the role of experience in genetics and medical genetic engineering may also help understand support for GE technology in food. These issues may all vary in current student populations as well, and this population therefore these same research questions should be asked of them.

Higher familiarity can increase our confidence in studies using terms without definitions, such as those examined here. This will allow us to obtain better pictures of public perceptions and beliefs on genetic engineering for food and other crops. Future research on public support for genetic engineering should take into account that the survey population may not have the foundational knowledge necessary for discussing these complex ideas, especially without establishing definitions in the course of the research. Providing researcher-generated definitions or asking participants to generate their own definitions for comparison to other answers may be necessary to ensure meaningful, quality data. At the least, research should include assessments of term familiarity when considering such jargon-heavy technology discussions. We know Americans are not a uniform public, and the better we understand their experiences with agriculture as a potential mediating factor on acceptance of and support for agriculture, the more effectively we can target messages or interventions for particular subgroups.

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A Motivating Force Behind Online Self-Regulated Learning

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Abstract

Success in online learning environments is dependent upon students' abilities to manage their own learning. The self-regulated learning practices of goal setting, environment structuring, task strategies, self-evaluation, time management, and help seeking are developed through experience and motivation. This study sought to determine the levels of self-regulated learning and identify the motivation components that correlated to the levels of self-regulated learning of students in an online agriculture dual enrollment course. Students had the highest self-regulation in the areas of goal setting and environment structuring. The lowest online learning self-regulation was in help seeking. Task value was the motivation component receiving the highest mean score, while test anxiety received the lowest score. Relationships between online self-regulated learning and motivation constructs were statistically significant. Faculty in online courses are encouraged to aid in the development of help seeking, time management, and meta-analysis strategies. Furthermore, faculty are encouraged to incorporate valuable tasks within the online curriculum to increase students' motivation to learn. Course developers are encouraged to incorporate problems-based learning, authentic assessments, and team-based learning approaches to better engage students. Research should continue to investigate these practices as they relate to increasing student motivation.

Introduction

Over the past 15 years, the importance of online programming to higher education has evolved. In 2002, less than 50% of all higher education institutions indicated online education was vital to their long-term strategy (Allen & Seaman, 2014). By 2014, nearly 70% of these institutions described online education as critical (Allen & Seaman). Similarly, the perceptions of online programming have increased. In 2012, 77%, of academic administrators, up from 57% in 2003, indicated learning outcomes in online education were at least the same as face-to-face instruction (Allen & Seaman). Over a similar period, student enrollment in online programs increased; in 2014, 28.5% of all postsecondary students were enrolled in at least one distance education course (U.S. Department of Education, 2016). Of the 20 million students registered in postsecondary education programs, 14% enrolled exclusively in online courses (U.S. Department of Education). These statistics, coupled with the suggestions found within the *American Association for Agricultural Education National Research Agenda: 2016-2020* (Edgar, Retallick, & Jones, 2016) to engage students in meaningful learning in all environments, indicate a need for further investigation of self-regulated learning in online environments.

Introducing students early to online courses through dual enrollment programs aid students in developing the necessary skills to be successful as a full-time college student (Chumbley, Hayes, & Hainline, 2015). Dual enrollment courses allow secondary students to earn high school and college credit while taking college courses via local community or 4-year colleges or universities (Estacion, Cotner, D'Souza, Smith, & Borman, 2011). Dual enrollment programs were developed as a response to the need to keep talented students challenged and ease the transition between high school and college (Bailey & Karp, 2003; Burns & Lewis, 2000). Anderson (2010) and Hughes (2010) found students felt better prepared for college after completing dual enrollment courses.

Students succeed in online courses by managing their own learning through self-regulated practices. Self-regulation is “an active, constructed process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, behavior, guided and constrained by their goals, and the contextual factors in the environment” (Pintrich, 2008, p. 453). Self-regulated learning refers to one’s ability to understand and control their learning environment (Schraw, Crippen, & Hartley, 2006), and must be developed over time (Chumbley, Haynes, & Hainline, 2015). Students will not be successful in online programs when expected to acquire self-regulated skills without preparation (Artino, 2009; Harrell, 2008).

Successful students in online courses manage their learner autonomy and practice individual responsibility (Andrade & Baker, 2009; Harrell, 2008). Among online students, Bell (2006) found a relationship between self-regulated learning skills and academic achievement in the online environment. Furthermore, Barnard, Paton, and Lan (2008) found self-regulated learning behaviors mediate the positive relationship between communication and collaboration in online courses and academic achievement. However, students who are not persistent toward achieving their goals, through irresponsibility, run the risk of attrition in this environment (Hart, 2012). Persistence in online courses, influenced by motivation (Hart, 2012) enable students to mitigate learning community isolation, which can lead to attrition. Along with persistence, perseverance is a predictor of academic achievement within the context of self-regulated learning (Wolters & Hussain, 2015).

Through experience (Chumbley, Haynes, & Hainline, 2015) and preparation, students who can regulate their learning know where and how to acquire the knowledge needed to be successful in the online environment (Cunningham & Billingsley, 2003). Furthermore, self-regulated learning and motivation mediate the effects of student emotions on academic achievement (Mega, Ronconi, & De Beni, 2014). Successful self-regulators employ critical thinking, take ownership in their learning, and actively participate in the learning process (Chung, 2000). Students who effectively regulate their learning are more likely to find academic success in online programs (Bell, 2006).

Researchers have investigated aspects of motivation of students in online programs. Barak, Watted, and Haick (2016) found students in massive open online courses (MOOCs) were motivated intrinsically to learn and participate in online study groups. Hew and Cheung (2014) identified four reasons why students enroll in MOOCs and included the desire to extend current knowledge, course intrigue, the challenging nature of the course, and to collect completion certificates. Within the context of learning, Chang et al. (2013) identified a relationship between students’ internet self-efficacy and motivation to learn.

Research focused on motivation of secondary students in online agriculture courses is limited. However, Swafford, Hagler, and Waller (2016) determined students enrolled in a hybrid/online dual enrollment agriculture course were more extrinsically motivated than intrinsically. Other studies focused on secondary students have explored the perceptions of motivation relating to participation in online discussions (Hobgood, 2007).

Pintrich, Marx, and Boyle (1993) posited the interaction between motivation and cognitive, behavioral, and contextual factors affects self-regulated learning. Pintrich and Zusho (2002) identified differences between good and poor self-regulators in several motivational processes. Good self-regulated learners are more likely to set hierarchical goals, while also holding process (e.g. strategies for solving problems) and product goals (e.g. making good grades; Zimmerman, 2000).

Goal orientation plays a key role in self-regulation (Pintrich, 2000a). Within goal orientation, a distinction is made between mastery and performance goals. Mastery goals reflect a focus on the acquisition of knowledge, skill, and competence, while performance goals involve demonstration of competence relative to peers (Elliot & Harackiewicz, 1996; Pintrich, 2000a). Within the goal orientation context, researchers (Pintrich, 2000a, 2000b, 2003; Linnenbrink & Pintrich, 2002) described the role of motivation in self-regulated learning with an approach-avoid dimension. Mastery-approach goals are focused on tasks to develop skills, while mastery-avoid goals involve avoiding the possibility of not meeting one's standards (Schunk, 2005). Outperforming one's contemporaries constitute performance-approach goals (Schunk). Conversely, "performance-avoid goals entail a concern with avoiding the demonstration of low ability" (Schunk, 2005, p 88).

Mastery-approach goals are beneficial to self-regulated learning. Students with goals focused on mastery demonstrated better cognitive monitoring and use of effective learning strategies (Pintrich, 2000b). Students who set mastery goals are more likely to monitor their learning and control their cognition through various learning and cognitive strategies (Pintrich, 2000b). Students who adopt mastery-approach goals are also more effective in managing their time and seeking help (Schunk, 2005).

Contrary to mastery goals, the adoption of performance goals and their relationship to self-regulated learning is mixed, at best. Wolters, Yu, and Pintrich (1996) found a performance goal approach to outperform others related positively to self-efficacy and use of cognitive and self-regulatory practices, among junior high students. Kaplan and Midgley (1997) found a positive relationship between performance goals and surface processing strategies. However, these same researchers also found no correlation between adaptive learning strategies and performance-approach goals. Similarly, Wolters (2004) found performance-approach goals did not relate to use of cognitive or metacognitive practices.

Theoretical Framework

Self-determination theory (SDT, Deci & Ryan, 1985) served as the framework for this study. SDT is a theory of situated motivation, which is built upon the premise of learner autonomy. SDT posits all humans desire to be autonomous, as well as to feel capable and connected to others in relation to their environment. Ryan and Deci (2000) stated more autonomous forms of motivation are promoted if environmental conditions support an individuals' autonomy.

Intrinsically motivated students are driven to perform as the reward lies in the activity (Deci, Koestner, & Ryan, 2001). Conversely, extrinsically motivated students undertake activities for reasons outside of the activity including, good grades, avoidance of negative consequences, or the perceived value of the task (Ryan & Deci, 2000). However, external factors of motivation can vary, and therefore different types of extrinsic motivations can exist. Conceptually, motivation is not dichotomous as SDT includes the idea of amotivation, or the lack of motivation or intention to act. According to SDT, amotivated individuals may not act due to low self-effiacy (Bandura, 1997), the belief that their actions will not affect the outcome (Peterson, Maier, & Seligman, 1993), or a perceived low value of the task to be undertaken.

Within the continuum of motivation, four patterns of extrinsic motivation have been identified (Hartnett, St. George, & Dron, 2011). External regulation refers to the type of motivation where individuals are responsive to threats or the offer of rewards. Students who engage in activities because they believe others expect them to are motivated by introjection. Identified regulation is associated with student behaviors based upon the individuals' perceived task value. This pattern is considered external as the utility of the task and the end product is more valuable than the enjoyment of the behavior (Brophy, 2008). Integration is the final type of extrinsic motivation "where learners engage in the activity because of its significance to their sense of self" (Hartnett, St. George, & Dron, 2011, p. 23). The elements of the SDT model of motivation conceptualized for this study are found in Figure 1.

		Extrinsic Types of Motivation		
	Amotivation	External Regulation	Identified Regulation	Intrinsic Motivation
Quality of Behavior	Non-self-determined	→		Self-determined

Figure 1. Elements of the SDT model. Adapted from Hartnett, St. George, & Dron (2011).

Purpose/Objectives

The purpose of this research study was to describe the relationship between learner motivation and self-regulated learning within secondary students in an online dual enrollment agriculture course. The objectives of the study were:

1. Determine the levels of online self-regulated learning of students enrolled in an online agriculture dual enrollment course.

2. Describe the motivations (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and self-efficacy for learning and performance) of students enrolled in an online agriculture dual enrollment course.

3. Describe the relationships between the motivation components, intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, and self-efficacy for learning and performance, and students' online self-regulated learning.

Methods

This study implemented the use of a descriptive survey. The participants were a census of all secondary students enrolled in an online/hybrid introductory horticulture dual enrollment course (*N* = 153) during the Fall 2016 semester. Students engaged in laboratory activities in-class with their secondary agriculture instructor and completed all assessments (tests, quizzes, discussion posts, final projects) online. Demographically, the course was comprised of slightly more females (57%) than males (43%). Academically, the course included Sophomores (24%), Juniors (32%), and Seniors (44%). Students identified themselves as Native Americans (41%), Caucasian (33%), and Hispanic (26%). Data were collected online through a link within the course learning management system. Of the 153 students enrolled in the course, 130 completed the survey for a final response rate of 85%.

Due to the nature of the study, caution should be used when generalizing the findings beyond the population. However, generalization with caution may contribute to the knowledge base and the improvement of agricultural science courses taught in an online environment.

Self-regulated learning was measured using a short form of the Online Self-Regulated Learning Questionnaire (OSLQ) (Lan, Bremer, Stevens, & Mullen, 2004). The OSLQ-short form is a 5-point, 24-item Likert-type instrument with response choices ranging from *strongly disagree* (1) to *strongly agree* (5). Higher scores on this scale indicate better self-regulation in online learning (Barnard, Patton, & Lan, 2008). The OSLQ consists of six constructs of self-regulation in online learning: environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. Due to the hybrid nature of the course, students were directed to indicate their levels of self-regulation regarding the educational content in the online portion of the course separately from in-class laboratory activities. Table 1 shows the results of the post-hoc reliability analyses of the OSLQ.

Table 1
Internal Factor Reliability of the OSLQ, Post-Hoc

Construct	Cronbach's Alpha Reliability Coefficient
Environment Structuring	.90
Goal Setting	.94
Time Management	.87
Help Seeking	.90
Task Strategies	.87
Self-Evaluation	.90

Note. 5-point scale. 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

The motivation scales of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, & McKeachie, 1991) were used to measure student motivation. The six motivation scales of the larger instrument include 31 items in a 7-point Likert-type format with response choices ranging from *not at all true of me* (1) to *very true of me* (7). The motivation scales of the MSLQ included in this study consist of six constructs of motivation: intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. Post-hoc reliability of the MSLQ is found in Table 2.

Table 2
Internal Factor Reliability of the MSLQ Motivation Scales, Post-Hoc

Scale	Cronbach's Alpha Reliability Coefficient
Self-Efficacy for Learning and Performance	.93
Task Value	.91
Test Anxiety	.80
Intrinsic Goal Orientation	.75
Control of Learning Beliefs	.68
Extrinsic Goal Orientation	.63

Note. 7-point scales. 1 = *not at all true of me*, 7 = *very true of me.*

Findings

Objective one was to determine the levels of self-regulated online learning of students enrolled in an online agriculture dual enrollment course. Self-regulated learning was measured using a short form of the OSLQ. Students had an overall self-regulated online learning mean score of 3.49 (*SD*=.45). The dual enrollment students were found to have the highest level of self-regulated online learning within the construct of goal setting (*M*=3.65, *SD*=.66). Goal setting refers to concepts connected to setting standards and short and long-term goals to guide one's learning. Conversely, students scored the lowest in the construct of help seeking (*M*=3.36, *SD*=.45). Table 3 provides average students' scores for each of the six constructs of online self-regulated learning.

Table 3
Overall Self-Regulated Learning Scores by Construct (N=130)

Construct	*M*	*SD*
Goal Setting	3.65	0.66
Environment Structuring	3.59	0.72
Time Management	3.44	0.61
Self-Evaluation	3.41	0.55
Task Strategies	3.38	0.50
Help Seeking	3.36	0.57
Scale Total:	3.49	0.45

Note. 5-point scale. 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

The second objective was to describe the motivation of students enrolled in an online agriculture dual enrollment course. The motivation scales of the larger MSLQ were used to collect the data from the student participants. Of the six motivation components, students scored the highest in task value (*M* = 5.03, *SD* = 1.07) and extrinsic goal orientation (*M* = 5.02, *SD* = .97). On the other hand, students were motivated the least by test anxiety (*M* = 4.75, *SD* = 1.22). These data can be found in Table 5.

Table 4
Motivation of Online Agriculture Dual Enrollment Students by Construct (N=130)

Motivation Component	*M*	*SD*
Task Value	5.03	1.07
Extrinsic Goal Orientation	5.02	0.97
Control of Learning Beliefs	4.98	1.16
Self-Efficacy for Learning and Performance	4.95	1.10
Intrinsic Goal Orientation	4.87	1.03
Test Anxiety	4.75	1.22

Note. 7-point scales. 1 = *not at all true of me*, 7 = *very true of me.*

Research objective three was to describe the relationships between the motivation components, intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety and students' online self-regulated learning. Results of a Pearson product-moment correlation yielded very strong (Davis, 1971) associations between online self-regulated learning and task value (r = .76), self-efficacy for learning and performance (r = .76), and intrinsic motivation (r = .74). Extrinsic motivation (r = .68) and control of learning beliefs (r = .63) were substantially (Davis) related to online self-regulated learning. A low (Davis) association (r = .18) was found between online self-regulated learning and test anxiety. These data can be found in Table 5.

Table 5
Correlations among Motivation Constructs and Online Self-Regulated Learning

Variable	Task Value	Self-Efficacy	Intrinsic Motivation	Extrinsic Motivation	Control Beliefs	Test Anxiety
Online Self-Regulated Learning	0.76^{**}	0.76^{**}	0.74^{**}	0.68^{**}	0.63^{**}	0.18^{*}

Note. ** p < .001, * p < .05.

Conclusions/Implications/Recommendations

Consistent with findings from Chumbley, Haynes, and Hainline (2015), the students taking agriculture dual enrollment courses were of similar demographics when compared to secondary agriculture students in New Mexico. Contrary to these researchers, however, Native American students enrolled in this course at a higher rate than Caucasians and Hispanics. Nevertheless, Native American and Hispanic students still enrolled in these courses at higher rate than is traditionally found among these demographics (Hughes, 2015). This phenomenon could be a result of the student demographics of New Mexico or indicative of the idea that learners, regardless of their race/ethnicity, socioeconomic status, or prior academic achievement benefit from dual enrollment programs (Kanny, 2015).

Objective one sought to describe the levels of online self-regulated learning of the students enrolled in an online agriculture dual enrollment course. Students in this study scored the highest in the construct of goal setting. This stands in contrast to similar studies (Davis & Neitzel, 2011; Chumbley, Haynes, & Hainline, 2015) where students scored highest in environment structuring. With the less structured schedule of traditional face-to-face courses, it may be implied that the students in this online course set immediate and long-term goals to better meet academic goals. Conversely, students indicated the lowest level of agreement within the construct of help seeking. Through experience in the online environment, students develop the skills to regulate their learning, and thus, know how to acquire the knowledge needed to be successful in this environment (Cunningham & Billingsley, 2003). The students in this study may not have simply developed those skills and may not know where to seek the information needed to be successful in the course.

The second objective was to describe the levels of motivation of students enrolled in an online agriculture dual enrollment course. The value of the task and extrinsic factors were the motivation components in which students showed the highest levels of agreement. In this case, students viewed the tasks as interesting, important, and useful (Pintrich, et al., 1991). Extrinsic goals refer to those goals concerning why they are participating in a course (e.g., grades, rewards, performance, comparison to others) (Pintrich, et al., 1991). On the other hand, students scored lowest test anxiety. Low-anxious students tend to be effective and efficient learners who implement appropriate cognitive strategies for achievement (Pintrich & DeGroot, 1990).

Objective three sought to describe the relationship between self-regulated learning and the motivation components intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety. Task value, self-efficacy for learning and performance, and intrinsic motivation had very strong relationships with online self-regulated learning. Substantial relationships existed between online self-regulated learning and extrinsic motivation and control of learning beliefs. Test anxiety had a low relationship with online self-regulated learning. These findings were not surprising as researchers have identified task value (Lawanto, Santoso, Goodridge, & Lawanto, 2014; Metallidou & Vlachou, 2010; Pintrich, 2003), self-efficacy (Schraw, Crippen, & Hartley, 2006), and intrinsic motivation (Pintrich, 2000a) as predictors of self-regulated learning. Within the constructs of online self-regulated learning, Lawanto, et al. (2014) found substantial relationships between task value and goal setting, task strategies, help seeking, and self-evaluation.

Faculty and instructors of distance education courses should be proactive with new students regarding the strategies needed to be successful in the online environment. Self-efficacy has been positively related to student engagement and performance (Pintrich & DeGroot, 1990). Students who believe they are capable are more likely to be self-regulating in terms of metacognitive strategies and are more likely to persist at difficult tasks (Pintrich & DeGroot). Specifically, students should be provided examples of resources with which to consult when information is needed or assistance is required. Furthermore, students should be taught how to analyze their learning through meta-analysis procedures to assess their learning to determine strengths and weaknesses to mitigate the inherent isolation of the online environment. Although the students in this study were not specifically deficient in their ability to manage their time, emphasis should be placed on assisting students in the further development of the skills needed to be more cognizant of the management requirements needed in an online program.

Intrinsic motivation and task value have important relationships with self-regulated learning, specifically. Students who are more intrinsically motivated are more likely to be engaged in the coursework and implement more self-regulated processes to manage their learning. Furthermore, students who are intrinsically engaged in the coursework are more interested in the content and view the tasks in which they are engaged as more valuable (Pintrich & DeGroot, 1990). It is recommended that faculty or instructors socialize students' intrinsic value for academics (Pintrich & DeGroot) through valuable learning tasks. As teachers implement more valuable learning tasks, students will be more engaged in the course, not necessarily because it will lead to higher grades, but because it may lead to more cognitive engagement in the online environment.

Eccles (1983) indicated intrinsic motivation was tied to students' choice of future math courses. Additionally, Pintrich and DeGroot (1990) reported intrinsic value was an important component of students' choice regarding engagement in academic work. As found in this study, intrinsic motivation was very strongly related to online self-regulated learning. This finding is especially important to agricultural education. It is recommended that faculty and instructors in agriculture implement strategies to increase student's intrinsic motivation to learn agriculture concepts by incorporating valuable learning tasks, in the online environment, to motivate students to pursue additional agriculture coursework. In addition, by incorporating the use of goal setting prior to and upon conclusion of an online course students will be able to complete a self-evaluation of their learning (Chumbley, Haynes, & Hainline, 2015).

Problem-based learning and authentic assessments have been shown to aid in the development of self-regulated learning (Iran-Nejad & Chissom, 1992). As these methods are more practical and engaging to the students, it is encouraged that course developers incorporate these methods in the online environment. It is further recommended that researchers investigate the use of problem-based and authentic assessments and their relationship to intrinsic motivation and task value in the online environment. Additionally, to improve student engagement within the multi-platform nature of hybrid online environments, course developers and researchers are encouraged investigate the use team-based learning approaches within the online environment.

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EXAMINING STUDENT PERCEPTIONS OF THEIR EXPERIENCE IN A TBL FORMATTED CAPSTONE COURSE

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Abstract

While shown to be less effective than active learning strategies, traditional methods of content delivery in post-secondary classrooms are the most prominent. Flipped classrooms, an example of an active learning approach, have been shown to be effective in long-term student outcomes. Team-Based Learning (TBL), a specific application of the flipped approach, has been linked to an increase in student performance, engagement, and satisfaction. TBL emphasizes the application of content knowledge through structured problem solving and decision making activities. The AgEdS 450 course at Iowa State University was recently restructured to implement TBL. This course revision sought to emphasize the development of skills necessary for success in an evolving workforce. The purpose of this study was to examine student perceptions concerning their attitudes and beliefs about learning, their motivation to learn, and their professional development through critical thinking. Pretest and posttest measures were compared and showed statistically significant increases across all three areas. These results offer valuable insight for the adoption of student-centered teaching methods, specifically TBL. Further examination of this teaching method compared to traditional teaching methods is warranted and recommended.

Introduction

Lecturing and other teacher-centered instructional approaches are frequently utilized in secondary and post-secondary settings (Balschweid, Knobloch, & Hains, 2014; Smith, Rayfield, & McKim, 2015). In a national study of secondary agricultural education programs concerning the effectiveness of instructional activities, Smith, Rayfield, and McKim (2015) found that a majority of agricultural education teachers devoted most of their class time to lecturing. Puzzlingly, those same teachers reported the effectiveness of lecturing to be relatively low (Smith et al., 2015). Balschweid, Knobloch, and Hains (2014) noted many faculty members perceive teaching as lecturing and that sentiment is "…embedded in their schema" (p. 163). Based on this preconception it is difficult for faculty members to apperceive other methods of instruction. Whittington and Newcomb (1993) recommended "[p]rofessors make conscientious changes in their current teaching methodology to reach the cognitive levels to which they aspire for their instruction" (p. 61). Implementing active learning techniques may prove useful in improving cognitive levels reached (Perry Paulsen, & Retallick, 2015) and eliminate instructor's sole reliance on lecture methods

Flipped classrooms have garnered much attention at all levels of academic instruction in recent years (Barkley, 2015; Bishop & Verleger, 2013). The increased traction of flipped learning in higher education may be explained by a focused effort by instructors to reach higher cognitive levels in student learning processes, increase student engagement, and ensure the development of skills desired by employers (Espey, 2010; Lamm, Carter, & Melendez, 2014; Tucker, 2012). The flipped classroom has also received considerable attention within agricultural education (Barkley, 2015; Conner et al., 2014a; Conner et al., 2014b; Gardner, 2012; McCubbins, Paulsen, & Anderson, 2016). While the popularity may be relatively new, flipped classrooms have existed for several decades in some manner or another (Chen, Wang, Kinshuk, & Chen, 2014). When implementing the flipped approach to teaching, instructors provide basic, introductory content to students prior to a face-to-face class session so that class time is available for meaningful learning activities (Enfield, 2013). Enfield (2013) suggested group discussions, demonstrations, projects, and team building were advantages of the flipped classroom. In the flipped model, students interact with peers and the instructor as they construct knowledge during class time (Bergmann & Sams, 2012; Missildine, Fountain, Summers, & Gosselin, 2013; Kong, 2014). The foundation of the flipped classroom is comprised of constructivist ideologies paired with behaviorist principles; two learning theories that were once viewed as incongruous (Bishop & Verleger, 2013). The material in which students engage prior to class, usually through readings or recorded lectures, fit under the behaviorist principle of direct instruction while the activities carried out during class sessions align with constructivist's views (Bishop & Verleger, 2013).

One of the earlier documentations of the flipped model in the postsecondary setting occurred at the University of Oklahoma in the late 1970s and was called Team-Based Learning (TBL) (Michaelsen, Knight, & Fink, 2004; Sibley & Ostafichuk, 2014). As noted by McCubbins, Paulsen, and Anderson (2016), a consensus on the origins of the flipped learning model is elusive. TBL has been defined as an active teaching method that emphasizes small-group work and the application of content; in stark contrast with traditional methods of passive content reception (Michaelsen, Sweet, & Parmalee, 2011). TBL, when developed, was reportedly an amalgam of mastery learning and cooperative learning principles (Michaelsen, 1992). Though similar to cooperative learning, important characteristics set TBL apart (Michaelsen & Sweet, 2011). Sibley and Ostafichuk (2014) outlined the four elements essential to the TBL method as: 1) properly formed and managed teams, 2) readiness assurance process to ensure preclass preparation (RAP), 3) learning how to apply course concepts, and 4) the importance of accountability. The teams should consist of five to seven students and be determined by the instructor based on set criteria to ensure heterogeneity (Michaelsen et al., 2004; Michaelsen et al., 2011; Sibley & Ostafichuk, 2014). The RAP includes four steps: 1) preclass preparation, 2) individual readiness assurance test (IRAT), 3) team readiness assurance test (TRAT), and 4) an appeals process (Michaelsen & Sweet, 2011).

Preclass preparation requires students to engage in the instructor-organized course content via readings, videos, and other forms of media prior to attending class. During the first class session of a module, students are assessed individually via the IRAT, and again immediately following via a TRAT (Michaelsen et al., 2004). The TRAT "…unleashes the power of social learning and immediate focused feedback…" (Sibley & Ostafichuk, 2014, p. 11). This is accomplished by allowing students to discuss the questions and through immediate feedback on their readiness assurance response. Immediate feedback is possible by administering the TRAT via an Immediate Feedback Assessment Technique (IFAT) card ("What is the IF-AT?", n.d.). For the appeals process, students are able to provide a written, scholarly argument to recapture points on missed questions. Students must provide an argumentative statement and supporting evidence from the preclass preparation materials (Michaelsen et al., 2004; Michaelsen & Sweet, 2011; Michaelsen et al., 2011). Following the RAP, a targeted, clarifying instruction session is conducted. Clarifying instruction is geared toward the concepts that may remain unclear to the students (Michaelsen et al., 2004). Remaining class sessions within the module allow students the opportunity to apply course concepts via application exercises. Application exercises are designed to present students with a significant problem grounded in a real-world scenario where students work together to make a decision (Michaelsen et al., 2004).

The final component highlighted by Sibley and Ostafichuk (2014) is the importance of accountability. The importance is solidified as students determine the grade-weights for the entire course across three categories: 1) individual performance, 2) team performance, and 3) peer evaluation (Michaelsen et al., 2004). Students are held accountable via the IRAT, TRAT, application exercises, and finally through graded peer evaluations. This teaching approach requires "…a shift in the role of the instructor from dispenser of information to manager of a learning process" (Michaelsen, 1992, p.109). Despite the lack of consensus on when or where flipped learning began, parallels exist between TBL principles and flipped learning principles. Table 1 depicts the parallels found in the Flipping Principles (Jeffries, 2015) and TBL components (Michaelsen et al., 2004).

Table 1
Parallels of the Flipped Course and Team-Based Learning Model

Flipping Principles	TBL Component
Knowledge transfer moved outside of the class	Pre-class preparation
Application of the content in class	Application Exercises
Peer teaching	Peer discussions during the TRAT
	Intra- and Inter-team discussions during application exercises.
Contextual learning	Application exercises- Should be relevant and real-world.
Assessment reinforces learning	IRAT and TRAT

TBL has been touted as an effective means for improving student performance (Baldwin, Bedell, & Johnson, 1997; Johnson & Lee, 2008) and engagement (Balwan et al., 2015; Kelly et al., 2005). However, implementing TBL requires a focused redevelopment of an entire course's structure (Sibley & Ostafichuk, 2014). Support for the transition from a teacher-centered to a student-centered method is important. Addo-Attuah (2011) noted the criticality of buy-in from faculty, students, and administration for successful implementation of TBL. That buy-in can often be difficult to achieve when deciding to adopt student-centered instructional practices (Hains & Smith, 2012). Hains and Smith (2012) noted that instructors can be resistant to adopt student-centered teaching methods; administrators may resist the adoption to seemingly allow faculty to focus on research; and students may combat the transition because they are not attuned to the transition of authority within the classroom. Similarly, students may not value working with other individuals based on previous, negative experiences in team settings (Espey, 2010), adding to the difficulty of student buy-in. Conversely, Espey (2010) found that the value students place on working with others increases significantly after a semester of TBL exposure.

Theoretical/ Conceptual Framework

The transference of authority within the learning environment may aid in the development of transferable skills for workplace success. Students may consider assuming the responsibility for their own learning as a disorienting dilemma. Mezirow (2000) stated that a disorienting dilemma is an essential component to transformative learning. Accordingly, Mezirow's (2000) Transformative Learning Theory served as the theoretical framework for this study. Mezirow (2000) posited that much of what individuals know and believe is dependent upon the context. The context, as Mezirow (2000) explains, is generally embedded in biographical, cultural, or historical contexts of individuals. Mezirow (2000) further identified the importance of developing decision-making skills by analyzing individual experiences, assessing the specific context of the experience, and working to establish informed meaning and justification for resulting interpretations and opinions in adult education. In adult learning, emphasis must be placed on "contextual understanding, critical reflection on assumptions, and validating meaning by assessing reason" (Mezirow, 2000, p. 3).

The development of Transformative Learning Theory (Mezirow, 2000) "was influenced by the concept of *paradigm*, made popular as a factor in the development of scientific thought by Thomas Kuhn (1962), and that of *conscientization*, described by Paulo Freire in his influential *Pedagogy of the Oppressed* (1970)" (p. *xiii*). In its later stages of development, Critical Theory and its emphasis on critical reflection, as well as the work by Jurgen Habermas (1984) which extended the work of Critical Theory, played important influential roles in Transformative Learning Theory (Mezirow, 2000). Transformative Learning Theory is comprised of three common themes which include "…the centrality of the experience, critical reflection, and rational discourse in the process of meaning structure and transformation" (Taylor, 1998, p. 8). In regard to centrality of the experience, Taylor (1998) espoused that student's experiences are socially constructed, which allows them to be deconstructed and acted upon. Mezirow (1995) noted the beginning of and the subject matter for transformative learning is the learner's experience. Transformative Learning Theory is grounded in the nature of human communication (Taylor, 2007). Taylor (1998) opined that Tennant's (1991) description of a learner's experience offers an incredible deal of congruency with transformative learning. Tennant (1991) stated:

> [Shared] learning experiences establish a common base from which each learner constructs meaning through personal reflection and group discussion… The meanings that learners attach to their experiences may be subjected to critical scrutiny. The teacher may consciously try to disrupt the learner's world view and stimulate uncertainty, ambiguity, and doubt in learners about previously taken-for-granted interpretations of experiences (p. 197).

Critical reflection allows the learner to question assumptions and beliefs that are deeply rooted in their past experiences; while rational discourse is the medium through which transformative learning is promoted and developed (Taylor, 1998).

Mezirow (2000) noted seven factors which must be present in order for learners to fully immerse themselves in rational discourse and included; 1) accurate and complete information, 2) freedom from coercion and distorting self-perception, 3) openness to alternative points of view (empathy and concern about how others think and feel), 4) the ability to weigh evidence and assess arguments objectively, 5) greater awareness of the context of ideas and, more critically, reflectiveness of assumptions, including their own, 6) an equal opportunity to participate in the various roles of discourse, and 7) willingness to seek understanding and agreement and to accept a resulting best judgment as a test of validity until new perspectives, evidence, or arguments are encountered and validated through discourse as yielding a better judgment.

Transformative Learning Theory (Mezirow, 2000) seeks to transform frames of reference that are likely based on less reliable assumptions. A frame of reference, as explained by Mezirow (2000), is the structure of individual assumptions that form meaning. “It selectively shapes and delimits perception, cognition, feelings, and disposition by predisposing our intentions, expectations, and purposes” (Mezirow, 2000, p. 16). Mezirow (2000) defined adult educators as those who do not indoctrinate, but create opportunities to shift their authority over the learning environment. This transition allows passive learners to become collaborative learners, but the traditional power relationships that exist between teachers and learners must be eliminated. When this transition occurs, it allows the learners to become more autonomous within the learning environment (Mezirow, 2000). Many of these notions expounded by Mezirow seemingly align with the TBL format and capstone course framework.

Though originally created as a model for outlining the learning activities within a teaching methods course, the Taxonomy of Learning Activities (TLA) (Roberts, Stripling, & Estepp, 2010) is useful in conceptualizing a transition from teacher-centered activities to more autonomous, student-centered activities, such as with the adoption of TBL. The TLA, depicted in Figure 1, allows instructors to visualize the continuum of learning activities, beginning with teacher-centered activities and moving toward student-centered activities. This transition of learning activities from teacher as authority to autonomous student learners aligns with Mezirow’s (2000) description of educators within Transformative Learning Theory. Mezirow (2000) espoused that educators must strive to transition authority within the learning environment to their students, and when feasible, to create a collaborative learning environment where students become self-directed learners. In regards to the TLA model, teacher-centered activities include lecturing and demonstration; social interaction activities include questioning, discussion, and cooperative learning; and student-centered activities utilize inquiry and individualized applications (Roberts et al., 2010). The theoretical and conceptual frameworks which served as a foundation for this study were operationalized through the implementation of the TBL teaching method in a capstone course. TBL aims to develop high performing teams, capable of applying course content to solve complex, real-world problems while holding themselves and their peers accountable for learning the material (Michaelsen et al., 2004; Michaelsen et al., 2011).

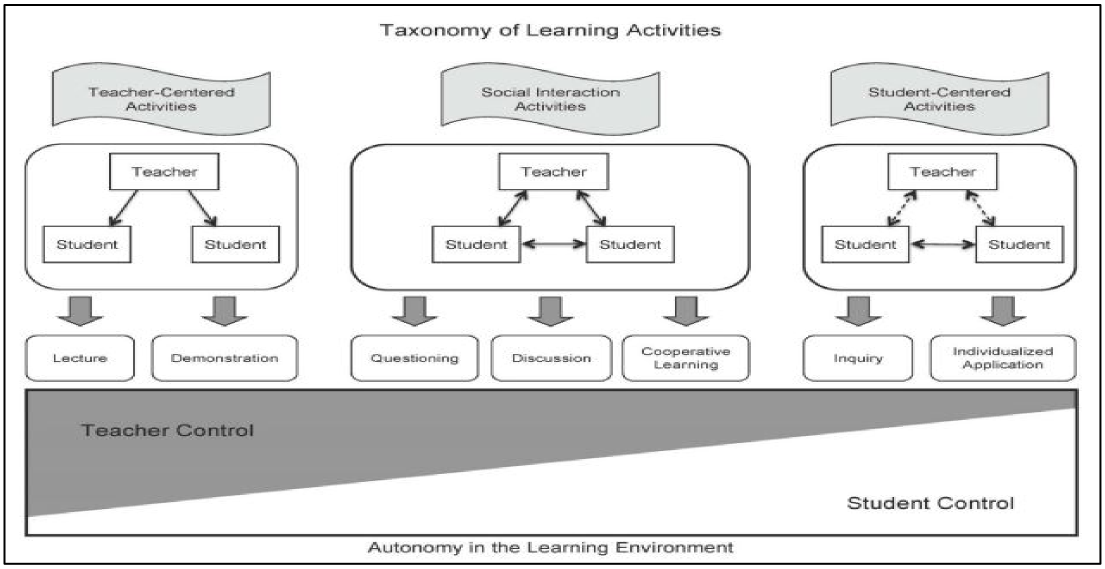

Figure 1. Taxonomy of Learning Activities Model (Roberts, Stripling, & Estepp, 2010)

McCubbins, Paulsen, and Anderson (2016) developed a crosswalk of the activities found in the TLA with activities in TBL. Table 2 displays those parallels. TBL activities are embedded in each section of the continuum developed by Roberts et al. (2010).

Table 2
Parallels between the Taxonomy of Learning Activities and Team-Based Learning

TLA (Roberts et al., 2010)	TBL Activity
Teacher-Centered Activities	Preparation
Lecture	Out-of-class reading (or video)
Demonstration	Out-of-class reading (or video)
Social Interaction Activities	Preparation/ Application
Questioning	Individual and team tests
Discussion	Corrective instruction, application activities
Cooperative Learning	Team tests, appeals, application activities
Student-Centered Activities	Application/ Assessment
Inquiry	Individual application exercises, review
Individual Application	Individual application exercises, individual exam/ Project

Note. From “Student Perceptions Concerning their Experience in a Flipped Undergraduate Capstone Course,” by OP McCubbins, T. H. Paulsen, and R. G. Anderson, 2016, Journal of Agricultural Education. Reprinted with permission.

Purpose and Objectives

Following a recommendation from McCubbins et al. (2016), this study sought to explore the impact of exposure a TBL-formatted capstone farm management course had on students’ attitudes and beliefs about learning, motivation to learn, and professional development through critical thinking. This recommendation, as well as TBL’s implementation as a newly-adopted instructional approach within the course, provided a supportive foundation for the present study. The development of research-based pedagogies and “enhanced understanding of learning and teaching environments…" (Edgar, Retallick, & Jones, 2016, p. 39) is of utmost importance in meeting agricultural education's goal. This study addresses the American Association for Agricultural Education's National Research Agenda Research Priority Area 4: Meaningful, Engaged Learning in All Environments (Roberts, Harder, & Brashears, 2016). This study is explicitly aligned with the research priority question three which seeks to explore educational programs that "…continually evolve to meet the needs and interests of students" (Edgar et al., p. 39). Specific objectives of this study were to:

1. Describe student perceptions regarding their attitudes and beliefs about learning, motivation to learn, and professional development prior to completing the TBL formatted AgEdS 450 course.
2. Describe student perceptions regarding their attitudes and beliefs about learning, motivation to learn, and professional development after completing the TBL formatted AgEdS 450 course.
3. Determine if there were changes in student perceptions regarding their attitudes and beliefs about learning, motivation to learn, and professional development after completing the TBL formatted AgEdS 450 course.

Methods and Procedures

This study was part of a larger research project that sought to examine the effectiveness of the TBL pedagogical practice in an undergraduate capstone course. This study employed a non-experimental, pretest—posttest design in order to measure the impact a TBL formatted course had on student perceptions of their experiences. The researcher identified the target population as all students enrolled in the AgEdS 450 course (N = 121) for the fall 2015 (n = 61) and spring 2016 (n = 60) semesters. The course consisted of a combined lecture period, and two laboratory sections, in which the students met on the farm once per week.

The Student Learning Experiences (SLE) survey developed by Bickelhaupt and Dorius (2016) was utilized to measure student perceptions of their experience in previous group projects and the TBL format. The instrument consisted of 35 Likert-type questions and two open-ended questions for feedback on the structure of the course. The SLE is comprised of three constructs (Likert scales), representing three learning domains, and included; 1) beliefs and attitudes about learning, 2) motivation to learn, and 3) professional development through critical thinking. Two of the 35 items were classified as independent measures as they did not situate within the established constructs. The researchers utilized Qualtrics, a web-based survey program, to collect student perceptions within the three learning domains. A pretest–posttest design was utilized to measure change in students' perceptions within three learning domains. The pretest and posttest instruments varied only in how the questions were targeted. The pretest questions focused on previous experience while the posttest focused on the specific experience within the TBL formatted course. For example, a pretest item stated "*When a theory, interpretation, or conclusion has been presented in other courses or in previous readings, I try to decide if there is good supporting evidence,*" while the posttest item was stated as, "*When a theory, interpretation, or conclusion was presented in class or in the readings, I tried to decide if there was good supporting evidence*."

Bickelhaupt and Dorius (2016) established face and content validity by utilizing a panel of experts in survey design and TBL. The instrument was pilot-tested with students (n = 1039) enrolled in TBL formatted courses at Iowa State University (ISU) to measure reliability (Bickelhaupt & Dorius, 2016). After the pilot study, focus groups were conducted with students to further enhance face validity. Following the suggestions of Urdan (2010), the pilot study conducted by Bickelhaupt and Dorius (2016) resulted in construct reliability coefficients deemed acceptable (α = 0.84 – 0.92). Additionally, McCubbins et al. (2016) utilized the posttest instrument and deemed the resulting reliability coefficients acceptable (α = 0.73 – 0.91). Instruments in the present study were collected from respondents in the fall 2015 (n = 56) and spring of 2016 (n = 54) for a 91.6% response rate (n = 110). Pretest and posttest construct reliability coefficients were deemed acceptable (Table 3).

Table 3
Reliability Coefficients for Student Learning Experience Constructs

Construct	*Post hoc* Cronbach's Alpha Observed: Pretest	*Post hoc* Cronbach's Alpha Observed: Posttest	Established Posttest Cronbach's Alpha (McCubbins et al., 2016)
Beliefs and Attitudes about Learning	0.97	0.95	0.91
Professional Development through Critical Thinking	0.96	0.93	0.84
Motivation to Learn	0.95	0.75	0.73

After approval from the Institutional Review Board was received, demographic and academic attributes of students were obtained from the Office of the Registrar at ISU. To describe students' academic attributes, university-specific terminology was used, and is described as follows. Semester credit hours were defined as the number of credit hours in which the student was enrolled during the study. Semester grade point average (GPA) was calculated for the semester in which the study occurred. Cumulative credit hours were defined as the total hours received at ISU, and cumulative GPA was calculated from ISU credits only. Total hours was the sum of all credits including those transferred in from other institutions. Method of entry refers to direct enrollment from high school or transfer from an outside institution. Descriptive statistics were used to describe the student demographic data. To address research objective one and two, measures of central tendency and variability were calculated in SPSS for each construct. For objective three, paired-samples t-tests were utilized to determine the significance of differences in student perceptions based upon enrollment in the TBL formatted AgEdS 450 course.

Qualitative data from the two open-ended items were analyzed following Guest, MacQueen, and Namey's (2012) Applied Thematic Analysis (ATA) procedures. ATA is an amalgamation of components from other "…theoretical and methodological camp[s]…" (Guest et al., p.15) that are most useful in an applied context. The applied nature of the study allowed the qualitative data analysis to be conducted through structural coding procedures. Structural coding was "used to identify the structure imposed on a qualitative data set by the research questions and design" (Guest et al., 2012, p. 55).

The present study contained two structural topics (themes) relating to the two open-ended questions; a) suggestions for improvement, and b) general comments. Data bound within these two themes were analyzed through ATA coding procedures, and a codebook was created. The use of intercoder agreement procedures and an external reviewer were employed to strengthen the validity of the qualitative analysis. Intercoder agreement was established through the analysis of segments of the text with the developed codebook by two individuals associated with the research study and one individual not associated with the study (external review). Subjective assessment procedures were employed to resolve "discordant coding" (Guest et al., p. 89) between the researchers and an individual not associated with the study. In the case of a discrepancy, the coders discussed the reasoning, arrived at a solution, and revised the codebook as appropriate. The entire data analysis process was documented in order to establish an audit trail. Verbatim quotes from the participants are utilized throughout as they should be, according to Guest et al., "…pivotal parts of the narrative" (p. 95). Student numbers, in lieu of pseudonyms, were randomly assigned within Qualtrics after the pre- and posttests were matched. The structure imposed on the qualitative data allowed the researchers to focus the narratives to gather relevant information concerning recommendations for improving the course experience through the participant's voices. In regards to educational degree pursuit, the results represent a homogenous sample. Care should be exercised when extrapolating results beyond the students enrolled in AgEdS 450. Data gleaned from this study may provide useful insight for instructors of other courses within colleges of agriculture regarding student perceptions towards TBL.

Results

The majority of student respondents were male (n = 85, 77.3%), between 21 and 25 years of age (n = 93, 83.6%), and had direct entry into ISU from high school (n = 60, 54.5%). The average number of credit hours students in which student participants were enrolled was 14.11 (SD = 3.04). The average cumulative GPA was 2.82 (SD = 0.48) and the average composite ACT was 20.84 (SD = 0.32).

Objective One

The first objective sought to determine student perceptions regarding their attitudes and beliefs about learning, motivation to learn, and professional development prior to completing the TBL formatted AgEdS 450 course. Table 4 displays the construct descriptive statistics for the pretest administration of the SLE instrument. The highest rated construct was Professional Development (M = 2.56, SD = 1.09) and the lowest was Motivation to Learn (M = 2.42, SD = 1.04).

Table 4
Pretest Descriptive Statistics for Student Learning Experiences

Construct	*M*	*SD*	*Min*	*Max*
Professional Development	2.56	1.09	1.00	5.00
Beliefs and Attitudes about Learning	2.52	0.99	1.00	4.89
Motivation to Learn	2.42	1.04	1.00	4.67

Note. The SLE Instrument utilized two Likert-type scales. 1 (strongly disagree), 2 (disagree), 3 (Neutral), 4 (agree), and 5 (strongly agree). 1 (not at all true of me), 2 (sometimes), 3 (neutral), 4 (mostly), and 5 (very true of me).

Objective Two

Objective two sought to determine student perceptions after completing the TBL formatted AgEdS 450 course. Table 5 highlights the descriptive statistics stemming from the posttest administration of the SLE instrument. Similar to the pretest administration, the highest rated construct was Professional Development (*M* = 4.34, *SD* = 0.61) and the lowest was Motivation to Learn (*M* = 4.09, *SD* = 0.62).

Table 5

Posttest Descriptive Statistics for Student Learning Experiences

Construct	*M*	*SD*	*Min*	*Max*
Professional Development	4.34	0.61	1.00	5.00
Beliefs and Attitudes about Learning	4.28	0.62	1.00	5.00
Motivation to Learn	4.09	0.62	1.00	5.00

Note. The SLE Instrument utilized two Likert-type scales. 1 (strongly disagree), 2 (disagree), 3 (Neutral), 4 (agree), and 5 (strongly agree). 1 (not at all true of me), 2 (sometimes), 3 (neutral), 4 (mostly), and 5 (very true of me).

Objective Three

To address the third research objective, multiple paired-samples *t*-tests were conducted in order to compare the means from each of the three constructs from the pretest and posttest administration of the SLE instrument. There was a statistically significant, positive difference in the mean scores for each of the three constructs. The professional development construct had a statistically significant increase from the pretest (*M* = 2.56, *SD* = 1.09) to the posttest (*M* = 4.34, *SD* = 0.61), *t* (109) = 14.5, *p* = .000, *d* = 0.71. Student perceptions regarding beliefs and attitudes about learning was found to have a statistically significant increase from the pretest (*M* = 2.52, *SD* = 0.99) to the posttest (*M* = 4.28, *SD* = 0.62), *t* (109) = 14.9, *p* = .000, *d* = 0.73 as well.

Table 6
Paired Samples t-test Results of Student Learning Experience Pretest and Posttest (n = 110)

	Pretest		Posttest			95% CI					
	M	SD	*M*	*SD*	Diff.[a]	*LL*	*UL*	*t*	*p*[b]	*df*	Effect Size[c]
Professional Development	2.56	1.09	4.34	0.61	1.78	1.53	2.02	14.5	.000*	109	0.71

Beliefs and Attitudes about Learning	2.52	0.99	4.28	0.62	1.76	1.53	1.99	14.9	.000*	109	0.73
Motivation to Learn	2.43	1.04	4.09	0.62	1.66	1.43	1.89	14.2	.000*	109	0.70

Note. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.
[a]Posttest minus pretest; [b]Probability of difference; [c]Mean difference divided by group *SD* (0.02 = small; 0.5 = medium; 0.8 = large).

To determine if there was a statistically significant association between the mean differences and select demographic variables (GPA and credit hours), a correlation was calculated. Since the assumption of normality was not violated, Pearson correlations were computed. There was a slight negative correlation between GPA and the motivation to learn mean difference, r (108) = -.26, p = .006; attitudes and beliefs about learning mean difference, r (108) = -.29, p = .002; and professional development mean difference, r (108) = -.26, p = .027. There were no statistically significant associations between GPA, the number of credit hours taken, and mean difference for each construct.

Independent samples *t*-tests were computed to determine differences between mean differences for each construct and select demographic variables (gender and method of entry). No statistical differences were found in those computations.

Conclusions and Discussion

TBL is a significant shift in traditional content delivery techniques. Students receive the content prior to attending a class session which opens the majority of class time for the application of content knowledge in a team setting. This transition in the learning environment likely served as a disorienting dilemma (Mezirow, 2000) for students. Alongside quantitative measures, student voices were heard through two structured questions in order to examine the benefit of this atypical teaching approach. The evaluation of meaningful learning environments is a convoluted task but is essential to guide learning and engagement (Edgar et al., 2016). Contemplative of that sentiment, it is concluded that the implementation of TBL within the capstone course framework develops an engaging learning environment in which students assume responsibility for their own learning while working collaboratively to solve real-world problems. This particular application of TBL contributes to the professional development of students and strengthens their perceived ability to apply course concepts to situations after graduation.

Across all three constructs, statistically significant increases in student perceptions were observed. These results are encouraging as the need for research-based pedagogical practices are important for instructors of agriculture (Edgar et al., 2016). Furthermore, the pretest and posttest results offer valuable insights on overcoming preconceived notions stemming from past negative experiences in working with other students, similar to Espey’s (2010) findings. These findings support the continuation of the TBL instructional approach within AgEdS 450 as well. Similar to previous research on flipped classrooms in agricultural contexts (Barkley, 2015; Conner et al., 2014a; Conner et al., 2014b; Gardner, 2012; McCubbins et al., 2016), students viewed this TBL formatted course favorably. TBL, in this context, reinforced specific critical thinking abilities, fostered student's motivation to learn the content, aided in the self-perceived ability to connect theory to practice, and widened students' frames of reference. Students felt that the time spent working with groups was beneficial in holding them accountable to various assignments and farm-related tasks.

In conclusion, TBL is a useful approach in transformative learning. Mezirow (2000) discussed the importance of analyzing individual experiences in the process of assessing reasoning and making meaning. As is obvious in the qualitative responses, this iteration of TBL allowed students to engage with other individuals and negotiate throughout the semester. Through the structure of this course, students were able to question their previous assumptions–as they related to the course content and the value they placed on working with others–and engage in rational discourse to widen their frames of reference (Mezirow, 2000).

Recommendations and Implications

Mezirow (2000) noted the importance of a trusting, social context to nurture transformative learning, which is supported by the current findings as well as previous research (McCubbins, Paulsen, & Anderson, 2016). Continual evaluation of student perceptions in this particular course is recommended. It is further recommended that student outcomes be evaluated alongside similar data. Evaluating student performance on exams compared to their perceptions of TBL would be of particular interest, and could hold significant implications for the instructional approaches employed by faculty members within agricultural education, broadly defined.

As recommended in McCubbins, et al. (2016), critical thinking abilities should be measured before and after exposure to TBL. This data could be compared to national norms, similar to what was conducted in Perry et al.'s (2015) work, who recommended the examination of critical thinking in line with active learning strategies. Additionally, comparison of student performance in TBL formatted courses versus traditionally taught (i.e., lecture based) courses within Colleges of Agriculture is warranted. This could potentially expand the significance and utility of the findings from the present study.

We also recommend considerable attention be given to faculty professional development workshops on designing, implementing, and sustaining student-centered frameworks (Balschweid et al., 2014; McCubbins et al., 2016). With consideration of the potential barriers in the adoption of student-centered course design (Hains & Smith, 2012), it is likely time for faculty members within agricultural education to advocate for more emphasis on teaching and learning in their alignment of institutional responsibilities. Traditionally, "effective teaching has continually been hampered by pedagogical constraints, such as time, materials, and ever changing technological advances" (Edgar et al., p. 38). TBL, while not a panacea, provides a solution to the hampering of effective teaching practices. It is long past time that those charged with teaching students for a changing world quit handicapping those students by the perpetuation of teaching methods known to be less effective.

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Conceptualizing the Integration of Team-Based Learning into a Capstone Farm Management Course: Advice from Larry Michaelsen

Abstract

Chickering and Gamson (1987) suggested that learning is not a spectator sport. Students must talk about what they are learning, relate it to past experiences, and make it a part of themselves. Conner et al. (2014) point out a need for instructors to be innovative when designing and delivering courses in higher education. Lecturing or other passive learning strategies are not effective with today's learners (Knight & Wood, 2005). While not a new concept, student-centered instruction is becoming a heavily researched topic (Conner et al., 2014; Hains & Smith, 2012; Herreid & Schiller, 2013; Tucker, 2012). Enter the development of Team-Based Learning (TBL). Growing evidence exists that TBL is an effective, interactive teaching method that incorporates peer teaching and enhances enthusiasm for learning (Parmalee, 2007). This narrative based exploratory study utilized interview methodology to glean information about TBL. The aim for this narrative based, exploratory study is to gather detailed information on TBL and advice for incorporating TBL into a [Capstone Farm Management Course]. The themes that emerged from the qualitative analysis are identified and described in further detail below and included: a) application of content, b) student accountability, c) decision making, and d) evidence. The adoption of TBL may inch the discipline closer to more meaningful and engaging learning environments. It may also assist in doing the same across disciplines within higher education. We recommended exploring the effect TBL's implementation has on student outcomes.

Introduction

Doerfert (2011) posited that the teachers' role should transition from the sole source of knowledge to becoming a facilitator of the learning process in all environments, because students are more diverse than ever. "Learners who are not engaged in meaningful learning are either at risk for failure or become adept at memorizing rote facts, but are not proficient at solving complex problems with an ever changing knowledge base" (Doerfert, 2011, p. 22). Chickering and Gamson (1987) suggested that learning is not a spectator sport. Students must talk about what they are learning, relate it to past experiences, and make it a part of themselves. Passive learning does little to aid in student acquisition of new knowledge. Estepp, Stripling, Conner, Giorgi, and Roberts (2013) found that lecturing was the learning activity most frequently utilized by agricultural educators, and that the lecture method reached mostly lower levels of cognition. Chickering and Gamson (1987) further contended, "learning is enhanced when it is more like a team effort than a solo race…working with others often increases involvement in learning" (p. 3).

Conner et al. (2014) point out a need for instructors to be innovative when designing and delivering courses in higher education. Lecturing or other passive learning strategies are not effective with today's learners (Knight & Wood, 2005). Implementing active learning strategies in higher education can lead to improved student engagement and better retention of content knowledge (Cross, 1987; Prince, 2005). Many of these strategies require faculty to assume the role of facilitator as opposed to the sole source of knowledge (Doerfert, 2011). Conversely, the role of a facilitator is marred with barriers (Bonwell & Eison, 1991) but can be implemented with careful planning. One such method for the inclusion of active learning is by utilizing the backwards design instructional planning method (Wiggins & McTighe, 2005). In backwards design planning, teachers identify the desired outcomes, determine what would prove acceptable for meeting those outcomes, and then plan learning activities accordingly. Additional research is available to aid higher education faculty in the transition from passive learning to more active learning techniques (Bonwell & Eison, 1991; Conner et al., 2014; Knight & Wood, 2005).

While not a new concept, student-centered instruction is becoming a heavily researched topic (Artz, Jacobs, & Boessen, 2016; Conner et al., 2014; Hains & Smith, 2012; Herreid & Schiller, 2013; McCubbins, Paulsen, & Anderson, 2016; Tucker, 2012). Many forms of active learning exist (i.e., modified lectures, demonstrations, problem-based learning, discussion, and the case study method) and flipped learning can be classified as such (Bonwell & Eison, 1991). Research has demonstrated that college students learn more when they become involved in the education process (Bonwell, & Eison, 1991; Lake, 2001, Michaelsen, Knight, & Fink, 2004). Prince (2004) posited that engaging students in the learning process through any number of instructional methods is considered active learning.

Kirschner, Sweller, and Clark (2010) classified experiential learning activities (derived from experiential learning theory) as a 'minimal guidance' instructional method, and that it is an ineffective method for student learning. On the contrary, research involving experiential learning in agricultural education, although not yet mastered by agricultural educators (Shoulders & Myers, 2013), is overwhelmingly positive (Baker, Robinson, & Kolb, 2012; Baker, Brown, Blackburn, & Robinson, 2014; Brown & Kelsey, 2013; Shoulders, Blythe, & Myers, 2013). Furthermore, experiential learning is a relevant component in the higher education process (Andreasen, 2004), even though its acceptance into the formal classroom setting may be somewhat limited (Steiner, 2004). Does a course structure exist that places adequate emphasis on experiential learning? Crunkilton, Cepica, and Fluker (1997) noted that when implemented correctly, a capstone course "provides students a rich contextual frame of reference for furthering connection between theory and practice…" (p. 4). Utilizing various instructional methods to meet the needs of 21st century learners is an important task for agricultural educators.

Flipped Learning

Sams and Bergmann (2013) pose an important question; is face-to-face interaction more important while students are being introduced to content, or when they are struggling to apply it? Active learning methods, from which flipped learning was derived, have become more popular in the delivery of modern curricula (Clark, Nguyen, Bray, & Levine, 2008). Tucker (2012) noted there is not a single model for flipped learning, however, content traditionally taught in classroom settings is now the responsibility of the student prior to the face-to-face learning experience. The Flipped Learning Network (2014) provides an in depth definition:

> Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter (p. 1).

This definition of flipped learning aligns with the TBL model, as developed by Michaelsen (2004). Bergman and Sams (2012) noted that flipped learning has a high potential to positively affect student learning. The National Research Council (2009) argued that faculty adoption of active learning techniques has been slow despite the demonstrated benefits of such techniques. Students learn more when actively engaged and presented real-world situations to consider (The National Research Council, 2009). Active learning can aid in students retaining more information and effectively adding to their existing knowledge base (Cross, 1987).

Experiential Learning and Capstone Courses

Many models of experiential learning exist and can be directly linked to the traditional theories of Lewin, Dewey, and Piaget (Andreasen, 1998). Experiential learning, problem solving, and decision-making are an essential element in the higher education process (Andreasen, 2004). The Grant Foundation (1988) reported that learning through hands-on participation, making errors, and eventually closing the gap between failure and success should be the focus of the educational process. “Learning activities and/or instructional techniques are often an integral part of experiential learning in a capstone course” (Trede & Andreasen, 2000, p. 35). Kolb (1984) defined learning as the process in which knowledge is created through the transformation of experience. Kolb (1984) offered an experiential learning model which depicts a four-stage cycle with four adaptive modes: concrete experiences, reflective observation, abstract conceptualization, and active experimentation (Figure 1). Andreasen (1998), in relation to Kolb’s (1984) model, stated, “Knowledge, then, is transformed either through intention or extension and grasped either by comprehension or apprehension” (p. 13). These experiential learning components divide Kolb’s (1984) model into four quadrants: accommodative knowledge, divergent knowledge, convergent knowledge, and assimilative knowledge. These quadrants consider processes where knowledge is transformed through an individual’s experiences.

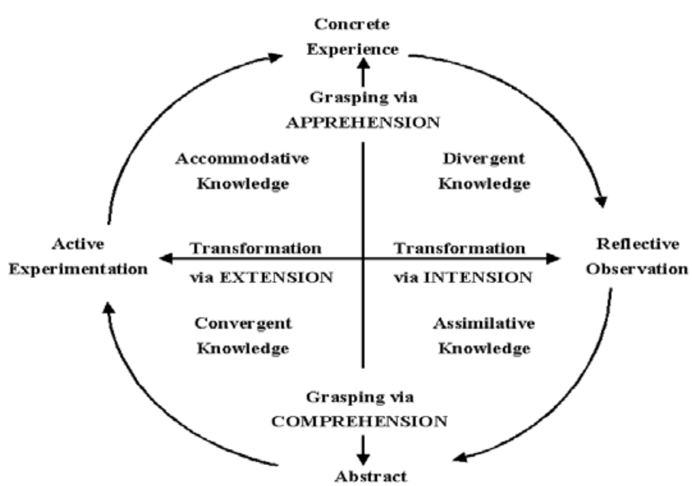

Figure 1. The Model of Experiential Learning Process. Reprinted from *Experiential Learning: Experience as the Source of Learning and Development* (p. 42), by David A. Kolb, 1984, Englewood Cliffs, NJ: Prentice-Hall, Inc. Copyright 1984 by Prentice-Hall, Inc.

Crunkilton et al. (1997) defined a capstone course as a planned learning experience that requires students to synthesize previous subject matter content knowledge, and integrate new information into that knowledge base in order to solve simulated or real world problems.

Projects, case studies or issue analysis, group work, and communication should be integral components of capstone courses (Crunkilton et al., 1997). Enriching the capstone course experience to include specific attributes of experiential learning has also been an emphasized research topic (Andreasen, 1998; Andreasen, 2000; Trede & Andreasen, 2000).

Model for the Integration of Experiential Learning into a Capstone Course

Andreasen (1998) developed a model to conceptualize the integration of experiential learning into capstone courses in Colleges of Agriculture—The Model for the Integration of Experiential Learning into a Capstone Course (MIELCC). MIELCC is founded in the experiential learning principles of Kolb (1984), Joplin (1981), and Pfeiffer and Jones (1977). Andreasen (1998) adapted the stages of experiential learning into five “R’s” (receive, relate, reflect, refine, and reconstruct), which were designed to spiral and funnel the required capstone components, into a synthesis, which integrated subject matter content. The *receive* component is defined by an activity experienced by the learner. Students then *relate* when fragmented knowledge integrated into a unified skill. Learners then move to the *reflect* stage where they systematically cogitate on learned experiences and connect them to other situations. The *refine* step provides the learner opportunity to further explore the applicability of the learned experience to and with other knowledge. In the final step, students *reconstruct* the subject matter content through a culminating synthesis, which occurs when the learner integrates it into their knowledge base. Figure 2 depicts the MIELCC model in its entirety.

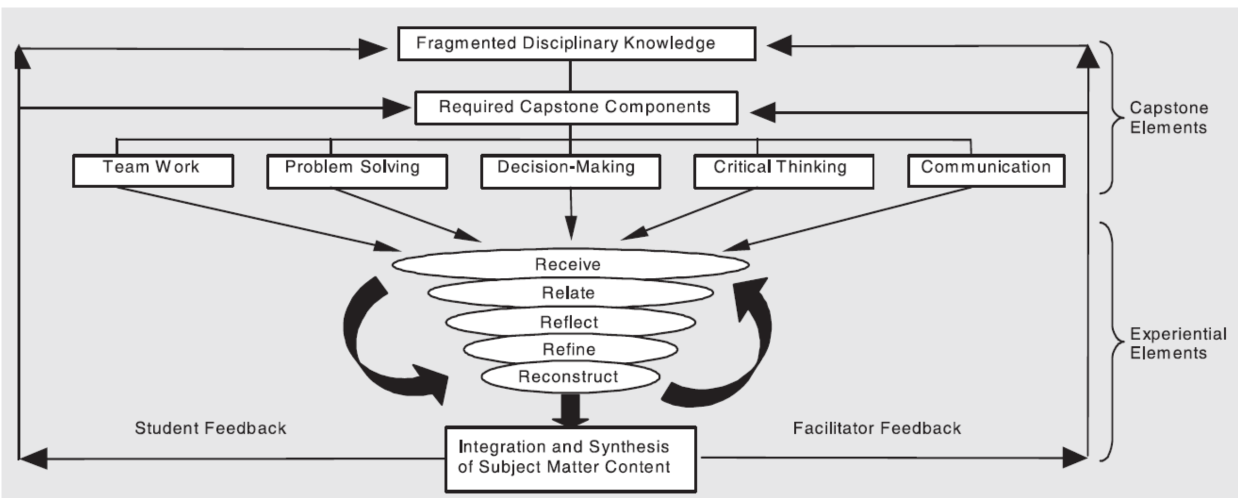

Figure 2. Model for the Integration of Experiential Learning into a Capstone Course
Reprinted from “Integrating Experiential Learning into College of Agriculture Capstone Courses: Implications and Applications for Practitioners” by R. J. Andreasen, 2004. *NACTA Journal, 48 (1),* p. 52-57. Copyright 2004 by the NACTA Journal.

Team-Based Learning

Team-Based Learning (TBL), developed by Dr. Larry Michaelsen in the late 1970’s, is a teaching method that focuses on student learning teams applying course content to solve complex problems (McCubbins, Paulsen, & Anderson, 2016; Sibley, 2015). Michaelsen developed TBL to combat passive learning in his courses with high student enrollment (Michaelsen, Knight, & Fink, 2004). The guiding philosophy was that students should be able to apply course content instead of merely regurgitating it for assessment purposes.

Different from other forms of group work, TBL follows a specific sequence as students navigate the course content. The course content is available to students before they attend class. When they arrive to class, they complete an individual test over the content; then complete the same test in their learning teams. This process holds students accountable for engaging with the content. A short instructional session is led by the instructor to address any misconceptions identified on the individual or team test. The remainder of class allows students to solve complex application exercises (Michaelsen et al., 2004; Sibley, 2015).

Application exercises follow the 4S format and must pose a *significant problem* with a *specific choice* for teams to decide on. Each team works on the *same problem* and *simultaneously report* their decisions. The instructor facilitates discussion between the teams to further clarify any misconceptions and to draw out the team's decision-making process (Michaelsen et al., 2004; Sibley, 2015). The entire process–content engagement before class, individual and team test, and application exercises–is repeated for each major unit of instruction.

Problem and Purpose

Scholarship in teaching and learning has been a foundational research focus for agricultural education. Doerfert (2011) advised "learners who are not engaged in meaningful learning are either at risk for failure or become adept at memorizing rote facts, but are not proficient at solving complex problems with an ever changing knowledge base" (p. 1, para. 5). This study aligns with the American Association of Agricultural Educations (AAAE) National Research Agenda (NRA) priority area number four which focuses on "meaningful, engaged learning in all environments" (Edgar, Retallick, & Jones, 2016). The purpose of this narrative based exploratory study was to gather information on the process of flipping the current, lecture-based structure of the AgEdS 450 course at ISU to TBL format. How does one combat passive learning and promote active learning in a setting such as this?

Epistemology and Conceptual Framework

As defined by Crotty (2003), epistemology is the knowledge embedded in one's theoretical perspective which is in turn embedded in the methodology. The epistemological perspective used throughout this study is rooted in interpretivism, and more specifically, pragmatism. Creswell (2013) posits that "…interpretive frameworks based on pragmatism focus on the outcome of the research…" (p. 28). Crotty (2003) further explains that the interpretivist approach "looks for culturally derived and historically situated interpretations of the social life-world" (p. 67).

The Model for the Integration of Experiential Learning into a Capstone Course (MIELCC, 1998) served as the conceptual framework for this study. The MIELCC Model draws upon observations and research from educators with diverse fields of expertise and is oriented toward capstone courses in Colleges of Agriculture, with relation to the principles of experiential learning; receive, relate, reflect, refine, reconstruct (Andreasen, 1998). MIELLC, when utilized, "provides an actualization of the relationship between and among these educational principles" (p. 61). MIELLC provides a more holistic view of integrating experiential learning into a capstone course. Various teaching methods have been implemented to achieve the desired outcomes of experiential learning (Trede & Andreasen, 2000).

The Setting: AgEdS 450 – Farm Management and Operations

AgEdS 450 serves as the capstone course for all Agricultural Studies majors at Iowa State University (ISU). A student managed farm serves as the experiential learning laboratory for the course. The course provides a strong emphasis on experiential learning and hands-on application of a typical Midwest farming operation. The AgEdS 450 farm is completely student managed. The professor-in-charge, instructor, and farm operator provide guidance and information on best practices and university policies for the students to follow, but students have the power to make decisions to manage the farm. All decisions are made by a majority of the students enrolled in the course during weekly business meetings throughout the semester. Decisions range from seed selection, establishing a fertilizer plan, marketing grain, purchasing equipment, to hiring labor.

Methods and Methodology

This narrative based exploratory study utilized interview methodology to glean information about TBL. The aim for this narrative based, exploratory study is to gather detailed information on TBL and advice for incorporating TBL into the AgEdS 450 course. We interviewed Dr. Larry Michaelsen, the developer of TBL, in order to garner background information, information about the creation of TBL, and helpful advice for flipping a course. We conducted a two-hour interview with Dr. Michaelsen on the campus of the University of Central Missouri, Dr. Michaelsen's most recent place of employment. The researchers utilized a semi-structured interview protocol as outlined by Savin-Baden and Major (2013). Semi-structured interviews are conducted in a formal manner and include a list of questions to be asked during the interview. Following a semi-structured interview protocol allows for additional questions in response to participant comments and reactions. Savin-Baden and Major (2013) noted that semi-structured interviews are also recommended when "the researcher has only one opportunity to interview someone… it allows the researcher to decide how to best use the limited time available and keeps the interaction focused" (p. 359). The interview participant was initially contacted about a potential interview at a recent annual TBL conference, and again via email communication one month prior to the interview.

Reflexivity Statement

Reflexivity statements allow researcher's to make clear their stance within a particular qualitative study (Creswell, 2013).The reflexivity statement may provide valuable insight on a researcher's background and "how it informs their interpretation of the information in a study…" (Creswell, 2013, p. 47). The principal researcher on this project currently teaches a TBL formatted course and is actively involved in the Team-Based Learning Collaborative, an international group who share ideas and research pertaining to TBL.

Data Collection/ Data Analysis/ Trustworthiness/ Validity

The primary data sources were verbatim transcripts resulting from the recording of one face-to-face, semi-structured interview with the developer and leading expert on TBL, and a thorough review of literature regarding TBL, experiential learning, and capstone courses.

An independent third party transcriptionist not associated with the study transcribed the audio-recorded interview verbatim. The principal researcher and an individual not associated with the study read the transcripts multiple times before beginning the analysis process. The verbatim transcripts were hand coded utilizing open, axial, and selective coding techniques (Strauss & Corbin, 1990). Saldana (2008) stated that "coding is not a precise science; it's primarily an interpretive act" (p. 4). Categories emerged from the data and statements from the interview were arranged accordingly. The principal researcher and the individual not associated with the study compared the coded data to enhance inter-coder reliability (Denzen & Lincoln, 2000). Credibility was addressed by utilizing multiple researchers in order to triangulate the data after the transcription process to ensure the accuracy of the statements made by the interviewee (Lincoln & Guba, 1985). Validity was addressed by member checks (Maxwell, 2013) after transcription and again after the coding was completed.

Findings

The themes that emerged from the qualitative analysis are identified and described in further detail below and included: a) application of content, b) student accountability, c) decision making, and d) evidence. The MIELCC model was revised to conceptualize the inclusion of TBL into the AgEdS 450 course at ISU.

Application of Content

Application of content was the most consistent theme that emerged from the data. This relates directly to the application component of the TBL model. An example of an item coded as Application of Content is "students have to use course concepts from the pre-readings to solve problems." Michaelsen spoke to the importance of applying new and transformational knowledge to real-world situations. These are typically presented following a '4 S' framework. Same problem, significant problem, specific choice, simultaneous reporting comprises the '4 S' framework (Michaelsen, Knight, & Fink, 2004). Michaelsen further supported the use of application exercises by stating, "The most important is the application that follows. That's when you give assignments that require them to use concepts to make decisions, and create a situation so they make their decision, and they represent their decision." Furthermore, he stated that "learning occurs when we set up a structure in our head and then we encounter new information that doesn't easily fit the structure," meaning that the introduction of new knowledge doesn't always fit with the learners' prior experiences. Michaelsen also noted he began his career in teaching because he wanted to "teach where the application was the focus" and "I did not want to lecture… the reason I went to business school was to work with applications."

Michaelsen continued praising the *application of content* via TBL by stating:

> The thing that is so frustrating to me about higher education… is that the assumption is if you can regurgitate back answers, then you are educated, and that's not true at all. You're only educated if you can think about things using those ideas. TBL enables students to *use* [emphasis added] ideas not just memorize them.

Researchers note the importance of activities or application type exercises. Knight and Wood (2005) concluded that the incorporation of clicker questions allowed the students to think about and discuss topics of the course versus simply recording information. Students will remember more content when activities (i.e. application exercises) are incorporated into traditional teaching styles (Prince, 2005). Overall student engagement is higher as a result of authentic, real-world situations posed in the form of application exercises (Michaelsen, Knight, & Fink, 2004).

Student Accountability

Holding students accountable for their learning was evident in the analysis of the transcript. Students must complete pre-class readings in order to prepare them for the RAP process. An example of an item that would fall under the Student Accountability theme is "Michaelsen noted that an instructor's physical presence can hinder learning, and by holding students accountable for their learning before class, it helps eliminate this issue. The students are held accountable to themselves through the IRAT, and they're held accountable to their teams on the TRAT. This has served as a motivator for Michaelsen since the inception of TBL.

Furthermore, existing literature involving TBL in agricultural education also support this notion. Quinn, Harding, and Matkin (2011) noted that students felt motivated to not let their teammates down on the TRAT. Students in the study reported striving to do their best work as a result of being part of a team.

Decision Making

Quinn, Harding, and Matkin (2011) reported that students in their TBL courses are charged with making ethical decisions revolving around various agricultural topics. These decisions are framed around application exercises. Wilson (2005) suggested that superior decisions are made within a team setting. Michaelsen also noted the importance of students making decisions using real-world problems. He mentioned the aspects of locating specific businesses in prime locations as a sample of his application exercises.

Michaelsen posited that a student taking notes "is not meaningful work." He explained the benefits of student engagement in holding students accountable for their learning and making real world decisions. Michaelsen stated in regards to TBL in AgEdS 450, "at various stages along the way, they [students] have to make decisions on the farm," and "that's exactly the kind of decision that needs to be made." These comments represent the importance of presenting students with real-world problems in an active learning environment. Michaelsen further discussed the importance of designing assignments that require the utilization of previous course concepts in order to reach a decision. "The most important is the application that follows. That's when you give assignments that require them to use concepts to make decisions, and create a situation so they make their decision, and they represent their decision."

Evidence

Michaelsen dedicated much time explaining why TBL works and is beneficial to students as well as teachers. Specifically, Michaelsen noted the rich discussion that was taking place during the TRAT and application exercises during the TBL sequencing model. He stated that the discussion he noticed taking place included the same information he would have delivered in a full lecture. Michaelsen also addressed the worries of students who thought that relying on team members would be detrimental to their grade. He shared data he collected over 15 years relating to individual performance and team performance. Michaelsen tallied each teams score on the TRAT and highest scoring member of that particular team. He calculated the percent gain from these numbers, and in only one instance over 26 years of implementation, "an individual outscored the worst performing team" in the course.

Conclusions, Recommendations, and Implications

Michaelsen provided a detailed account on why he developed TBL, the structure of the teaching technique, and evidence that supports its inclusion in higher education. The popularity of student-centered instruction (Hains & Smith, 2012; Herreid & Schiller, 2013; Tucker, 2012), also supports the case of utilizing the TBL model in the AgEdS 450 course at ISU. TBL is a student-centered teaching method (Parmalee, 2007) and can be utilized in a manner that effectively addresses the capstone course components and elements of experiential learning. Collaboration with Michaelsen helped clarify the interconnectedness of TBL, experiential learning, and capstone courses.

Model for Integrating TBL and Experiential Learning into a Capstone Course

Based on the results of this study, a review of the literature involving experiential learning and capstone courses, and mounting pressure for active learning, the MIELCC model was revised to include TBL (Figure 4). This revised model, known as the Model for Integrating TBL and Experiential Learning into a Capstone Course (MITELCC), conceptualizes the process of reaping the benefits of experiential learning and capstone courses through the TBL teaching method.

In the TBL teaching method, students are required to work in teams, solve problems, make decisions, think critically, and communicate. It is then a natural fit that the beginning of the funneling process captures the essence of the capstone course components. The *receive* and *relate* stages are tied to the pre-class preparation within the TBL RAP process. Students complete pre-class preparation (i.e., readings, video review) to acquire the content knowledge, and then relate it to the IRAT and TRAT for each module. *Reflection, Refine,* and *Reconstruct* are tied to the application component of TBL. Students must actively reflect on the newly acquired knowledge and then activate it. This knowledge is then transformed through one of the quadrants in Kolb's (1984) Experiential Learning Model. This process is repeated for each major unit of instruction in the course. Relating the concepts of experiential learning and capstone course components to a specific active learning technique is needed. The MITELCC provides that relationship, and allows the conceptualization of integrating experiential learning and various capstone course components into a student-centered teaching method (TBL). AgEdS 450 at ISU is specifically designed to provide an active learning environment for students. Capstone course components, and experiential learning activities are heavily emphasized in the AgEdS 450 course at ISU as reflected in the course syllabi (McCubbins, 2014).

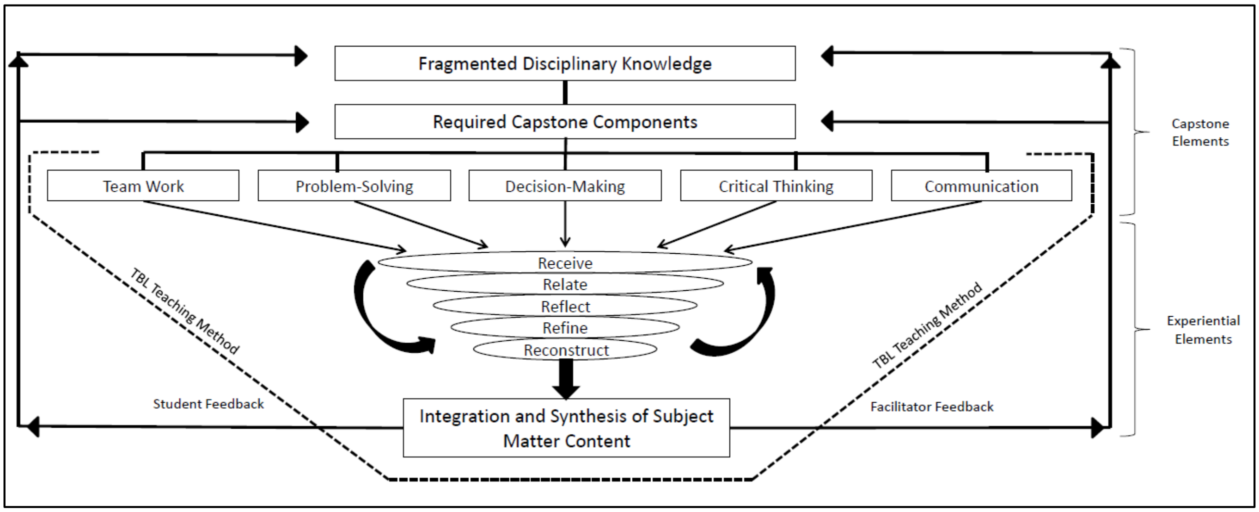

Figure 4. Model for Integrating TBL and Experiential Learning into a Capstone Course. Adapted from "Integrating Experiential Learning into College of Agriculture Capstone Courses: Implications and Applications for Practitioners" by R. J. Andreasen, 2004. *NACTA Journal, 48 (1)*, p. 52-57. Copyright 2004 by the NACTA Journal.

Data shows that lecture methods are ineffective (Knight & Wood, 2005) and innovative delivery methods are needed (Conner et al., 2014). Active learning opportunities are needed in capstone courses (Crunkilton et al., 1997), and TBL has led to increases in specific skills related to critical thinking (McCubbins et al., 2016). Agricultural education faculty members are charged with creating meaningful and engaging learning environments (Edgar et al., 2016). The limited literature available regarding TBL's implementation in agricultural courses in higher education warrants further examination.

More specifically, we recommended exploring the effect TBL's implementation has on student outcomes. Regarding the Model for Integrating TBL and Experiential Learning into a Capstone Course, we suggest further research regarding the models' use and effectiveness. This is especially needed within capstone courses that follow Crunkilton et al.'s (1997) framework to determine the impact TBL has on students ability to effectively work in teams, communicate, solve problems, make decisions, and think critically. The adoption of TBL may inch the discipline closer to more meaningful and engaging learning environments. It may also assist in doing the same across disciplines within higher education.

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Shaping Pedagogical Content Knowledge for Experienced Agriculture Teachers in the Plant Sciences: A Grounded Theory

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Abstract

This grounded theory study explored the pedagogical content knowledge (PCK) of experienced agriculture teachers in the plant sciences. The most emergent phenomenon to surface from the data was the influence of beliefs on participants' PCK. This central phenomenon became the cornerstone for the model of what was shaping experienced agriculture teachers' PCK in the plant sciences. The three major components that shaped the participants' PCK were: integrated belief systems, experiences prior to and during inservice, and the influence of the school and community context. A substantive level theory was developed that illustrated relationships between these three main components and their impact on participants' PCK. Recommendations from this study include conceptualization of experienced agriculture teachers' PCK for a variety of agriculture topic areas and exploration into the development of PCK in preservice and beginning teachers.

Introduction and Review of Literature

The most significant impact on student learning is the teacher and how they use their knowledge to teach (Darling-Hammond & Bransford, 2005). Research on teaching and learning has identified two primary knowledge bases important for all teachers to possess: subject matter expertise and pedagogical content knowledge (PCK) in a specific subject matter field (National Research Council, 2010). PCK is a teachers' knowledge of content merged with knowledge of how to teach that content (Shulman, 1986). In his first article addressing PCK, Shulman (1986) discussed the historical emphasis on teacher content knowledge, describing exams used for teacher certification that focused primarily on content knowledge. He claimed research and reform efforts had since strayed away from valuing content knowledge in teachers and challenged educators to reassess the importance of content knowledge in relation to pedagogy.

Since its introduction by Shulman (1986), various research studies have been conducted to further elaborate on the PCK construct. PCK research is one way to conceptualize the complexity of teacher knowledge necessary for teaching (Gess-Newsome & Lederman, 1999). PCK research can aid in creating a picture of what teachers do when teaching, relate teaching to student learning, and further establish content knowledge alone does not make an individual qualified to teach (Kind, 2009). Exploration of PCK in a variety of disciplines can contribute to a further understanding of the knowledge and skills that make teachers effective (Abell, 2008). Research has indicated ways to strengthen PCK in teachers could lead to increased student progress and student learning (Baumert et al., 2010; Hill, Rowan, & Ball, 2005).

PCK is not just important; it is arguably the most important knowledge base a teacher can possess. Specifically in agricultural education, PCK is considered critical for effective teaching (Knobloch, 2002; Roberts & Kitchel, 2010). Agriculture teachers' PCK influences their choice of teaching strategies, approach to curriculum, assessment methods, and knowledge of their student base, all within an agriculture context. An example of agriculture teachers' PCK in the plant sciences, specifically within the area of greenhouse management and plant growth, could include knowledge of common student misconceptions. One student misconception related to this area is plants get their ‘food’ from the soil and thus need soil to grow (Driver, Squires, Rushworth, & Wood-Robinson, 1994). If an agriculture teacher is aware of this student misconception, they may choose to teach a lesson on hydroponics to demonstrate plants can grow without soil. They may also have students conduct experiments using different growing mediums in the greenhouse to demonstrate how they influence plant growth. Dispelling this misconception could pave the way for deeper conversations about photosynthesis. Knowledge of student misconceptions for a particular topic and the subsequent teaching strategies chosen to dispel those misconceptions are all grounded in agriculture teachers’ PCK.

Despite the importance of PCK illustrated in the previous example, the agricultural education discipline does not know what PCK agriculture teachers have or need to have for any topic within agriculture. Investigating experienced agriculture teachers currently in the field is an important first step in unpacking agriculture teachers’ PCK. In science education research, experienced teachers were consulted to develop documents representing detailed PCK for specific science topics such as genetics and electrical circuits (Loughran, Berry, & Mulhall, 2012). While experience in the field does not guarantee an individual will possess PCK, it does increase the likelihood PCK has been developed (Hashweh, 2005). A recent study in agricultural education investigating beginning teachers’ abilities to deconstruct content knowledge for student understanding concluded this process was impeded by teachers’ lack of content knowledge and PCK (Rice & Kitchel, 2016). This further substantiates the need to investigate experienced agriculture teachers. Additionally, because this study is focused on providing a foundation for future agricultural education PCK research, it is also important to study teachers with not only teaching experience, but with expertise in a specific agriculture topic.

Purpose of Study

The purpose of this grounded theory study was to both conceptualize PCK for a specific topic in agriculture and develop a model for investigation and conceptualization of additional topics. The guiding question aligns with priority four of the 2016-2020 National Research Agenda- meaningful and engaged learning in all environments (Roberts, Harder, & Brashears, 2016): What is experienced agriculture teachers’ PCK related to the plant sciences?

Methods

The methods used in this study may be similar or identical to methods used in an extension of this study. I chose the emergent design of grounded theory because of the exploratory nature of the research question. Agricultural education research in PCK has been limited and the field does not have a conceptualization of PCK for any topic area within agriculture. Generating a theory in one particular topic area, plant sciences, can serve as the foundation for future PCK research in agricultural education. Aiming to better understand the complexity of social situations and experiences and investigating the processes that shape and sustain a phenomenon are two defining tenants of grounded theory methodology (Corbin & Strauss, 2008). Considering PCK is the knowledge teachers use as they plan and go through the teaching process (Kind, 2009), the decision to apply Corbin and Strauss’s (2008) grounded theory approach is further supported.

I approached this study from a pragmatic lens. The epistemological roots of grounded theory rest in pragmatism and interactionism (Strubing, 2007), making this lens appropriate for the methodology. The purpose of grounded theory is to generate theory from data which are treated as reality under construction (Strubing, 2007). Key assumptions of grounded theory, such as the importance of actions and interactions in developing meaning, have roots in the work of early pragmatist philosophers John Dewey and George Mead (Corbin & Strauss, 2008). Pragmatists view reality as something that cannot be separated from the researcher because reality exists as experienced through people. The actor and the environment determine each other and truth is what is known at the time but is subject to change (Corbin & Strauss, 2008). In addition to my epistemological lens, it is also important to disclose my positionality because of its influence on my research (Creswell, 2013). I identify as a former high school agriculture teacher from a multi-teacher department with a strong background in plant science content. At present, I am employed as a teacher educator at a land-grant university.

Participants in this study included eight high school agriculture teachers in Missouri with a minimum of eight years teaching experience. I chose this specific experience range based on literature stating expertise begins to be achieved for teachers after they have spent approximately five to eight years in the field (Darling-Hammond & Bransford, 2005). I specifically chose experienced teachers to increase the likelihood they would possess PCK. Recommendations from teacher educators regarding teachers' quality and possession of plant science PCK were used in the purposeful selection of teachers. All selected teachers had professional development experiences in plant science and a reputation as an effective teacher by teacher educators. All participants were located within a 120-mile radius of the university to allow for field work.

Data Sources and Collection

Teachers can demonstrate PCK in different settings. At the 2014 science PCK summit, a consensual PCK definition developed by researchers indicated PCK emerges in both the planning and in-the-moment phases of teaching (Carlson et al., 2015). Additionally, reflection is a key piece of PCK development (Schneider & Plasman, 2011; Van Driel & Berry, 2012), with knowledge, reasoning, and planning prompting explicit reflection *on* action and the act of teaching leading to explicit or tactic reflection *in* action (Carlson et al., 2015). Hashweh (2005) asserted experienced teachers develop PCK as a result of planning, teaching, and reflecting on teaching. To adequately capture agriculture teachers' PCK in plant sciences, the exploration of data sources spanning those various settings became important.

I collected the following six sources of qualitative data: pre-observation interviews, classroom teaching observations, field notes, lesson artifacts, teacher journal reflections, and post-observation interviews with stimulated recall. Each data source occurred during one of the three settings above and provided a unique contribution for creating a complete picture of agriculture teachers' PCK. I collected data during fall 2014 over the course of a single plant science unit for each participant. Plant science was chosen because it is a common content area in Missouri, taught by numerous experienced agriculture teachers, and I had the appropriate content knowledge to recognize and study PCK. I visited each participant on six separate occasions, totaling 48 visits. I conducted one-on-one semi-structured interviews; each lasting between 45 minutes to an hour. I conducted all pre-observation interviews prior to teachers beginning classroom instruction for the plant science unit to capture PCK emerging during the planning phase of teaching. PCK is partially an internal construct (Baxter & Lederman, 1999), making interviews an integral part of my data (Padilla & Van Driel, 2011). An example of a pre-observation interview question was: What preconceptions do students typically have with concepts in this unit?

I conducted classroom teaching observations to capture PCK emerging during the in-the-moment teaching phase. For example, if a student displays difficulty grasping a concept during a lesson, the teacher may or may not demonstrate PCK in response to addressing that difficulty by explaining the problem in a different way as the lesson unfolds. PCK may not be evident from one single lesson observation (Loughran, Mulhall, & Berry, 2004); therefore, I conducted two observation blocks each lasting two days in length. I video recorded observations to capture and replay instances of PCK during analysis and stimulated recall during post-observation interviews. Additionally, I wrote field notes to capture instances of PCK emerging during the in-the-moment teaching phase not evident on the video recording.

I collected two sources of data that spanned the entire plant science unit. I collected lesson artifacts to capture PCK emerging during both the planning phases and in-the-moment teaching phases of teaching (see Hume and Berry, 2011). I used teacher journal reflections to capture PCK emerging during the reflection phase of teaching. The knowledge behind PCK is often hidden within a teachers' thought process making it difficult to identify (Kind, 2009). My limited time in the field and the complex nature of PCK led to a desire to capture the participants' thoughts as the unit progressed. After each lesson was complete, the participants responded to five reflection questions corresponding to that particular lesson. An example of a reflection question was: What representations, illustrations, or analogies related to content did you utilize during this lesson and why did you choose those particular strategies?

Finally, I used post-observation interviews with stimulated recall to capture PCK emerging during the reflection phase of teaching at the conclusion of the unit. I conducted one-on-one semi-structured interviews lasting between 45 minutes to 90 minutes in length. An example of a post-observation interview question was: what changes (if any) would you make to this unit if you were to reteach it again? In addition to general reflection questions based on the unit, I played a minimum of three video clips from the two teaching observation blocks to engage the participants in a stimulated recall. Stimulated recall is an introspective technique designed to allow participants to explain their thought processes and decision making after hearing or viewing a stimulus to prompt recollections (Mackey & Gass, 2005). Meade, McMeniman, Wilson, Kanes, and Davey (1991) indicated stimulated recall can be effective for examining knowledge bases of teachers that underlie their classroom actions.

Data Analysis and Changes to Central Question

I engaged in collection and analysis simultaneously due to the nature of grounded theory methodology (Corbin & Strauss, 2008). All six data sources were used in data analysis. I analyzed data using a constant comparative process where data is compared against data, beginning with the first piece of datum collected to search for similarities and differences (Corbin & Strauss, 2008). I followed the three step coding process of open, axial, and selective coding (Corbin & Strauss, 2008). The purpose of open coding is to develop categories, the purpose of axial coding is to connect categories, and the purpose of selective coding is to create a story ending in a developed theory (Corbin & Strauss, 2008). To begin the open coding process, I examined all data sources as they became available for initial codes and adapted my data collection and analysis based on information needed to saturate a particular idea (Creswell, 2013). Once an initial set of categories had been developed, I identified a pervasive phenomenon to focus on for this study that served as the central piece of my theory (Creswell, 2013).

It became apparent after the first three interviews that plant sciences was not specific enough of a topic to be able to adequately describe the participants' PCK in a way that allowed for comparisons between participants and ultimately the development of a theory. While all of the participants taught a plant science unit, the actual unit topics varied. Simultaneous to this realization, a different phenomenon began to surface. Beginning with the first pre-observation interviews, the participants discussed their beliefs regarding agricultural education. This was of particular interest because questions regarding orientations were purposefully left for the post-observation interviews. When I began open coding, I also noticed this emerging theme of beliefs that seemed to shape teacher knowledge. In grounded theory, a wide net is cast in the form of a research question to see what truly emerges from the data (Creswell, 2013). At times the central phenomenon that emerges from the data demands that the original research question be altered to reflect the new direction of the study. My original research question was: "What is experienced agriculture teachers' PCK related to the plant sciences?" Upon the emergence of the central phenomenon, the new guiding research question became: "What shapes experienced agricultural teachers PCK in the plant sciences?" Using this question as my guide, I re-coded existing data and applied the new research question to all subsequent data collected and analyzed.

The next step in the coding process was axial coding. Utilizing my central phenomenon as a guide, I continued to analyze the data using the strategies mentioned above. Corbin and Strauss (2008) describe open coding as breaking the data apart and axial coding as bringing the data back together in a new, more meaningful way. I analyzed the data for context, conditions, and consequences (Corbin & Strauss, 2008); to better understand the central phenomenon and how the categories interrelated. This process helped me to see how beliefs shaped the PCK of my participants. I kept memos throughout the entire process and reflected upon them during data collection and analysis. Memos were used not to simply record information but also to analyze information, making memos a crucial part of the data analysis process (Corbin & Strauss, 2008).

The final step in the coding process was selective coding. This phase was integral in developing the theory for this study. During selective coding, the researcher attempts to create a story from the data by interrelating categories related to the central phenomenon (Creswell, 2013). I was able to establish linkages between my core categories and how they influenced PCK of the participants. During the selective coding phase, I asked follow-up questions of my participants in an attempt to answer any questions that still remained regarding the context and dimensions of my theory and to achieve saturation (Corbin & Strauss, 2008). Diagrams were utilized to display how the theory fit together and changed throughout the process. I attempted to reach a level of abstraction from the data (Corbin & Strauss, 2008) and tie together the different elements of the theory. The final result was the development of a substantive theory that explained the central phenomenon. This theory developed over time with assistance from participants, various models were developed as the study progressed, and follow-up questions were asked to refine lingering questions about connections in the data.

Validation Strategies

Creswell (2013) described evaluation measures specifically for a grounded theory study. These measures include: study of a process, coding process emerges from the data to the theory, theory is presented in a figure or diagram, a story line connects the categories, memoing is used throughout the process, theoretical sampling is conducted, and reflexivity and positionality are addressed. To meet the process criterion, I developed a research question associated with a process. Additionally, the pervasive concept that served as the central point to the theory was based around a social process. To meet the coding process criterion, I engaged in open, axial, and selective coding (Corbin & Strauss, 2008). I utilized rich, thick description of the data itself to demonstrate how the theory emerged from the data. I presented the theory as a diagram and a story line was used to connect the concepts of the theory. I used memoing throughout the research process and it was an instrumental tool in surfacing the central phenomenon, establishing connections between categories, and refining the overall substantive theory. I elected to not utilize theoretical sampling in the traditional sense of sampling additional participants to contribute to the developing theory, but instead used it as a means of sampling the existing data and focusing on events, incidents, and scenes that contributed to the developing theory (Fassinger, 2005). I addressed reflexivity and positionality by continuously reflecting on my own previous experiences with content knowledge and PCK to prevent my own biases from overshadowing the emerging data collection and analysis process.

Findings

Based on the three main themes (beliefs, experiences, and context) a theory was developed to describe what shapes experienced agriculture teachers' PCK in the plant sciences (see Figure 1). Throughout the description of the findings, I elaborated on each of the three main themes in more detail including: connections between themes, the influence of those themes on the participants' PCK, and finally how the three main themes coalesce to explain the overall substantive theory.

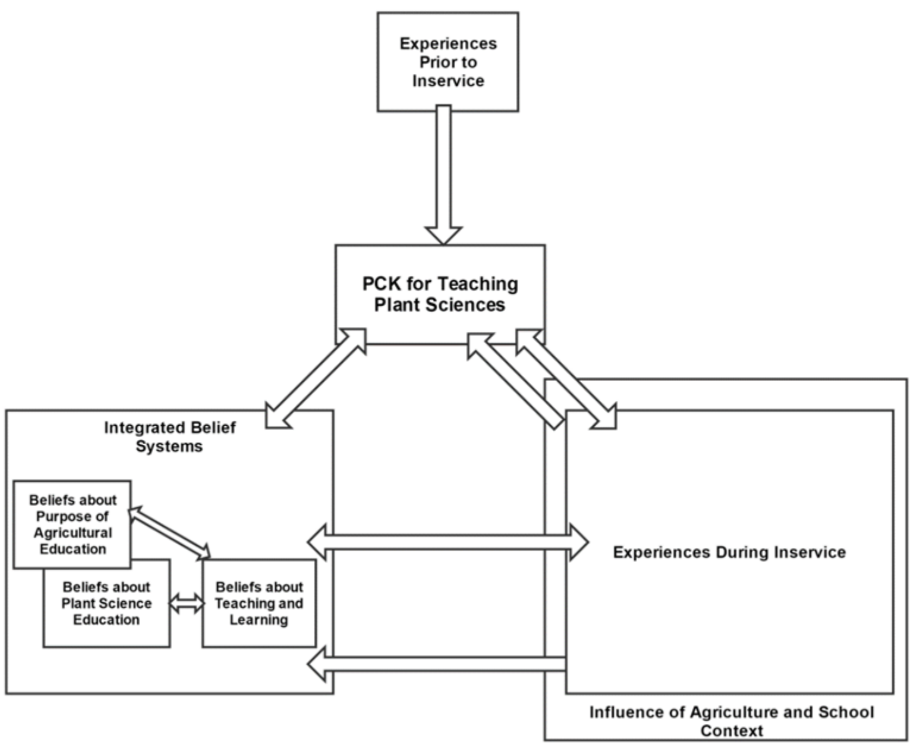

Figure 1. Substantive Theory behind what is Shaping Experienced Agriculture Teachers' PCK in the Plant Sciences

The integrated belief systems theme was presented first because it was the most emergent theme in the study. This theme has previously been described in Rice and Kitchel (in press), as it was the richest of the three themes and warranted a thorough unpacking in its own manuscript. To achieve clarity in the connections between the three main themes and their contribution to the overall theory, I described the integrated beliefs system theme again in this manuscript.

Integrated Belief Systems and their Connection with Teachers' PCK

The first major theme shaping the PCK of experienced agriculture teachers in the plant sciences was integrated belief systems. Integrated belief systems were comprised of three main components: beliefs about the purpose of agricultural education, beliefs about plant science education, and beliefs about teaching and learning in agricultural education. These three components interacted with each other to form the participants' integrated belief systems. After some contemplation and discussion with participants, it began to emerge that their individual beliefs regarding the purpose of agricultural education in general (not plant science specific) seemed to directly influence their other beliefs within the integrated belief systems. The participants' specific beliefs about plant science education and beliefs about teaching and learning mirrored their overall beliefs about the purpose of agricultural education.

Beliefs about the purpose of agriculture included five different views: career preparation, college preparation, agricultural literacy, practical life skills, and student individualization. Clint demonstrated how important beliefs were to his teaching and the structure of his agriculture program. "I really pride this program on its ability to prepare a student to go to a 4 year college while that student is sitting right next to someone who is only going to graduate." Beliefs about plant science education that emerged from the data included beliefs about the purpose of the school greenhouse (teaching lab vs. production facility), belief that science integration was an important component to plant science, and the belief that students possess more plant science prior knowledge than other agriculture subjects. When describing her balance of student work in the greenhouse, Allison said, "I think their primary role is to be students and learn the ends and outs, but I also think they obviously have to be the labor force behind everything you grow."

Finally, beliefs about teaching and learning included: belief that it is the teachers' responsibility to be a lifelong learner and reflector, belief that students played a substantial role in determining the agriculture content taught, and belief that students learn best through hands-on experience. Utilizing stimulated recall, the majority of participants described a variety of instructional strategies for teaching the same piece of content and all expressed aspects of their lessons they planned to alter for improvement. For example, James discussed in a post-observation interview that his students were not effectively grasping plant diseases and contemplated utilizing a disease triangle handout to increase student comprehension. To sum up the importance of reflection Clint stated, "I truly believe sincerely practicing daily reflection of the educational process leads to pedagogical growth as a professional."

Experiences Prior to and During Inservice and their Connection with Teachers' PCK

Many of the participants' experiences prior to inservice directly influenced the participants' PCK in the plant sciences. One participant in particular, Clint, often discussed the role of his own high school experiences on his PCK. Clint provided justification for relying heavily on his high school experiences. "I believe the way I learned in high school, or still learn, is not much different than the way these students are learning…. I was a run of the mill average student." Since Clint considered himself the "average" student, he felt the way he learned best was also the way his students' learned best. Consequently, he felt a need to develop strategies to teach content in that way. Experiences prior to inservice, particularly teacher preparation, did not always have the influence on PCK the participants' expected. For example, my first question in my pre-observation interview with Cora was, "Tell me a little bit about your background as a plant science teacher." Cora's answer to this question took an unexpected turn when she voiced her lack of preparation in plant sciences after college, "When you come out as an ag teacher you feel overwhelmed in that you have so many different areas you have to teach, you have not been able to specialize." This quote acknowledged that while experiences prior to inservice could influence participants' PCK, they may not always have the influence teacher educators expect.

Experiences in the classroom also directly influenced participants' PCK. Specifically, classroom experiences developed knowledge about student misconceptions with content and ways to present content to counteract student misconceptions. In a journal reflection, Dawn described how her classroom experiences with student misconceptions altered her teaching strategies for approaching that content. "Students were having a difficult time understanding basic plant science concepts and plant parts. The 2nd day of the lesson, I brought in cuttings so students would have visual representations of the various plants." Experiences in the classroom directly related to the participants' knowledge of content and students. Many of the participants described the use of visual examples and real life applications as effective ways to teach agriculture content. Dawn said, "I try to make analogies which would relate specifically to students' home situations or items they can relate to outside of the school setting." Another important influence of experiences on PCK development is simply the experience of teaching the content. Cora described how she sequenced the content for her greenhouse class, and why she sequenced the content in that particular way. When I asked where she developed the knowledge to complete this task, she replied "through experience in the classroom."

Professional development experiences also directly influenced participants' PCK. Cora illustrated just how important a greenhouse course was on her plant science PCK. "I knew that I was going to get a greenhouse and so I made sure to sign up that summer to take that class." Cora went on to describe how she utilized experts to help her gain the necessary PCK to teach students how to raise poinsettias. However, professional development for mid-career teachers was a concern for participants. Dawn, Kelly, and Allison all mentioned a desire for professional development that focused on teachers with over 5 years' experience. Allison commented, "I don't typically go to professional development for greenhouse or things like that because most of the time it's lower than what I need." The point in time that the participant learned the content in their career was another contextual component that influenced participants' PCK. Cora reflected on her experiences taking a greenhouse class as a beginning teacher. "I wish I had time to go though as a refresher because there are so many things now that I took away as a beginning teacher that would be totally different from what I would take away now."

Contextual Influencers and their Connection with Teachers' PCK

The most emergent contextual influencer in agricultural education was the role of the community, specifically the type of agriculture in the community (e.g. forages production or local greenhouses). Clint summarized its influence, "To be successful I believe you have to have a needs assessment, know what the needs of this community are agriculturally, and that's what you teach.” Allison and Dawn mentioned their advisory councils, which are bodies of community stakeholders that meet periodically and advise the local agriculture teacher(s) and department (Talbert et al., 2005). These councils can also influence the PCK a teacher develops because of their potential direct influence on the agriculture program. Sometimes the community had specific expectations. Clint, who had a substantial community influence on his program said, “Parents, alumni, community members, ag community, they expect students to leave this program knowing about forages.” This attention to the livelihood of the community altered the quantity, quality, and depth of PCK participants developed for a topic area.

Another contextual influencer specifically related to agriculture is the structure of career development events (CDEs) through FFA as an intra-curricular part of agricultural education. The participants varied in the amount of influence CDEs had on their PCK. James said, “I would say CDE’s play a significant role as the objectives for many CDE’s are the same as major parts of my classes.” Many of the participants also chose the students to compete in career development events from their classes and utilized teaching the contest as a way to get students engaged in learning the content. CDEs for Missouri agriculture teachers involved more than just FFA involvement and application of curriculum. In Missouri, CDE results of students influenced funding for agriculture programs. This assessment method contributed to the type of knowledge participants developed because many felt the need to teach to the test.

In addition to agriculture specific contextual influencers, there was also the influence of the participants’ school structure and available resources. Being in a multi-teacher or single teacher department influenced PCK. Dawn said, “If you’re a single teacher, you need to be broad-ranged. For me, I knew I wanted to teach in a multi-teacher and I knew that’s where my interest areas were so it made it a lot easier to specialize.” It is interesting to note that all of the participants in the study who were purposefully selected because they demonstrated strong PCK in plant sciences were all located in multi-teacher programs and had the opportunity for the majority of their careers to specialize in plant sciences. Related to the type of department was the type of school. Participants who emphasized content or skills based professional development were all based at area career centers. Facilities and monetary resources influenced participants’ abilities to seek out professional development opportunities and invest in supplies for their classroom. CASE, an agriculture instructional curriculum, had a cost attached to preparation and implementation. Dawn expressed cost and limited resources were barriers to her pursuing this type of curriculum, which focuses on science applications of agriculture. If participants were operating under a constricted budget this influenced the type of activities they did in their classroom, which also limited their PCK for various teaching methods in plant science.

Summary: Connection of Themes to the Substantive Theory

Within this substantive theory, all three themes (beliefs, experiences, and context) influenced PCK directly in a variety of ways. Additionally, experiences can alter beliefs, beliefs can determine experiences pursued, and teachers are always developing new knowledge for teaching within a particular context. Development of PCK occurs over the course of a teachers’ entire career. The first experiences participants surfaced as having a profound influence on shaping their PCK began with their high school agriculture classes, with the exception of participants who grew up on a production farming operation. These experiences prior to inservice directly influenced PCK. Experiences during inservice were more heavily influenced by context and had linkages with the integrated belief system. Contextual influencers unique to agricultural education such as FFA, CDEs, and the community context were a critical part of this overall model because they heavily influenced the other components. Finally, the integrated belief system was the most emergent phenomenon in the overall theory with beliefs about plant science education and beliefs about teaching and learning in agricultural education mirroring beliefs about the purpose of agricultural education.

Discussion

The substantive theory developed from this study depicted PCK as a continuously evolving fluid knowledge base throughout a teachers' career. This echoes findings from previous studies in other educational disciplines that describe PCK as an ongoing cyclical process (Hashweh, 2005; Lee, 2011). The three main themes involved in the PCK shaping process that emerged from this study (beliefs, experiences, and context) have been included in various PCK studies and models; however, there has been a lack of depth when examining these shapers of PCK in the literature (Friedrichsen, Van Driel, & Abell, 2010). Overall, the influence of the integrated belief systems on participants' PCK warrants further attention to teacher beliefs in future preservice teacher education and inservice professional development. These individual beliefs could be seen throughout various data sources and greatly impacted the various strategies the participants utilized in the classroom. Because of the personal nature of beliefs, it is possible many agriculture teachers have not discussed how these beliefs impact their teaching.

Experiences also had a significant influence on the participants' PCK. Grossman (1990) identified sources of PCK development including: classroom observations, university coursework, experiences in the classroom inservice, and professional development. All of these sources were mentioned by participants in some capacity as influential sources of PCK. One source that may be unique to agricultural education is the influence of participants' high school experiences in agricultural education on their PCK. Multiple participants expressed their first sources of plant science knowledge were their high school experiences and they often taught in similar ways to their high school agriculture teacher, even James who had been teaching for 28 years. This is consistent with teaching and learning literature that stated the majority of teachers will teach in ways similar to how they were taught as students (Darling-Hammond & Bransford, 2005) and high school experiences were an important source of content knowledge and PCK for inservice agriculture teachers (Rice & Kitchel, 2015). However, utilizing high school experiences as sources of knowledge could be problematic as both agriculture content information and pedagogical information changes over time.

While teacher preparation programs are an important source of knowledge for agriculture teachers (Rice & Kitchel, 2015), data from this study indicated they may not have as much of an influence on PCK development as could be anticipated. The most influential teacher preparation experience from all participants was student teaching, which is consistent with agricultural education literature (Edwards & Briers, 2001). Student teaching was when many of the participants began heavily engaging in the learning and reflecting process and when they were able to apply their newly forming PCK to teaching real-life students.

All of the participants in this study were in multi-teacher programs. This was not planned as these teachers were simply recommended as having PCK in the plant sciences, were located within close proximity to the university so field work could be conducted, and had at least eight years of classroom experience. It is possible that being located in a multi-teacher program positively affected their PCK development because the participants had more of an opportunity to specialize in fewer areas of agricultural education. Since PCK is topic specific (Carlson at al., 2015; Etkina, 2010; Van Driel & Berry, 2012), developing PCK in a variety of agriculture topics within various content areas could be challenging, particularly in a single teacher department. However, the reality remains that many agriculture programs across the nation are still single teacher programs and those teachers are responsible for teaching a variety of agriculture content.

Finally, context greatly influenced the PCK of experienced agriculture teachers. Since the beginning of agriculture programs, agriculture teachers have been encouraged to utilize their teaching autonomy to design their agriculture programs around their local communities (Talbert et al., 2005). Talbert et al. (2005) also claimed that even in states with mandated curriculum the local agriculture teachers should practice autonomy and address local community needs. This common desire to teach to the needs of the local community had interesting implications on participants' PCK. If the surrounding community had careers available in agriculture, the participants were more likely to include a career or college preparatory focus as their purpose of agricultural education. Particularly in the plant sciences, the community influenced what the participants grew in the greenhouse, contributed to the participants' decision to utilize the greenhouse for production vs. laboratory, and often provided important supplemental knowledge to the participants in the plant sciences. Talbert et al. (2005) acknowledged agriculture teachers cannot know everything about their subject matter and emphasized the importance of local community partnerships to supplement knowledge.

Depending on the influence of the local community, participants in the study sought out different types of knowledge and engaged in different professional development experiences. Clint for example, who was located in a community with substantial forage production, described professional development he attended specifically in grasslands to better meet the individual needs of his community. Additionally, participants expressed a desire to teach to the interests and needs of their students, which related to the local community influence. If the agricultural education discipline as a whole desires to maintain a community focus, then tools for knowledge development related to individual communities must be provided to preservice teachers by teacher preparation programs. Additionally, encouragement to develop advisory councils, a groups of stakeholders in the community that advise agriculture programs (Talbert et al., 2005), could also assist beginning teachers in meeting the needs of their communities.

Recommendations for Practice

Clint discussed that he engaged in agriculture experiences outside of his strength areas and made an effort to develop new content knowledge and PCK. Kelly and Dawn also supplemented their knowledge with work experience during college and held the belief that teachers should be lifelong learners and reflectors. If current preservice teachers are not inherently engaging in this type of behavior, as predicted by Cora and Clint, it is partially the responsibility of teacher preparation programs to provide assistance. Perhaps an exam when students enter teacher preparation programs to identify weaker areas of content or advising sessions that address the need for additional knowledge in agriculture content during college could assist future teachers. Teacher preparation plans of study often include elective courses in agriculture content that could also be utilized to enhance content knowledge and PCK if purposefully selected. For students who do not come from agriculture backgrounds, internships and work experiences during college could be a way to supplement their agriculture knowledge and should be encouraged by teacher preparation programs.

While experiences prior to inservice did have an influence on participants' PCK, experiences in the classroom during inservice were the most influential experiences, which is consistent with previous literature (Gess-Newsome & Lederman, 1999; Hashweh, 2005). These experiences were especially impactful when they were combined with in-depth reflection (Hashweh, 2005). It is again recommended that teacher preparation programs provide preservice teachers with the tools to reflect on practice and establish the need for reflecting on practice during inservice. It should not be assumed by agriculture teacher educators that preservice teachers will develop positive reflection habits on their own.

PCK development is not complete when students graduate and receive their initial teacher certification. In fact, the PCK development trajectory continues to occur long after teacher preparation (Abell et al., 2009). Therefore, it is recommended the quantity and quality of professional development for inservice teachers should also increase. There is evidence from the literature that professional development can impact the PCK of beginning teachers (Clermont et al., 1994). The participants in this study also indicated that professional development for mid-career teachers was not always applicable to their situations. They expressed a desire for professional development that delved deeper into the content, professional development separate from beginning teachers when appropriate, and lower cost associated with professional development. Popular professional development programs, such as CASE, were not explored by the participants in this study primarily due to cost. Teacher preparation programs, agriculture content professors, state agriculture staff, and community stakeholders should collaborate to develop professional development that is useful for teachers at all stages of their careers.

Recommendations for Research

Part of the struggle with PCK research is capturing this illusive knowledge base (Kind, 2009). The exploratory nature of this study also led to thoughts on future data sources for PCK. Conducting lesson creation and analysis similar to Friedrichsen and Dana (2005) or completing CoRe or PaPeRs (Loughran et al., 2004) might be helpful in examining PCK more specifically for an agriculture topic. This data source could also supplement classroom observations. Journal reflections were a surprisingly insightful data source for participants in this study. If journal reflections contain directed questions and teachers are given adequate time to complete the reflection, this could be a valuable data source for future agricultural education PCK research. It might also be interesting to examine beginning teachers' reflections and compare them to experienced agriculture teachers' reflections.

Examination of what shapes PCK specifically in agriculture teachers can serve as a starting point for future PCK development studies specifically in agricultural education. Data from this study points to inservice experiences as the most impactful type of experience, but teacher preparation programs and student teaching did serve a role in shaping participants' PCK. This substantive level theory can be utilized as a guide for both future research and as knowledge for teacher preparation programs. The data from this study also raises philosophical questions about the true purpose of agricultural education and how these beliefs influence teacher PCK and subsequently classroom teaching. There is a need to explore teacher beliefs about the purpose of agricultural education more in-depth because of the influence it had on the other components of the integrated belief system and the other themes shaping PCK. It is uncertain when these beliefs begin to develop and what has the most impact on these beliefs.

Finally, there is a need for further PCK research in agricultural education. Conceptualization of experienced agriculture teachers' PCK for a variety of agriculture topic areas, including plant science, is still needed in the agricultural education discipline. Additionally, exploration into the development of PCK in preservice and beginning teachers will also be critical future research. Data from this study surfaced influencers of PCK that may be unique to the agricultural education. Examining the influence of high school experiences on PCK, community influence and teacher autonomy on PCK, and the tradition of manual skill development and career preparation on PCK could provide important knowledge not only for the agricultural education discipline, but also the body of PCK research as a whole.

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Agricultural Mechanics Lab Safety Practices in South Texas

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Abstract

A pressing concern in all agricultural mechanics courses is safety. Lab activities have an inherent propensity to cause serious injury. The safety practices which are taught by teachers are largely dependent on the equipment in the laboratory and the resources available to the program. It has been posited by different researchers that problems have existed in the safe instruction of agricultural mechanics for some time. This study sought to determine how safety is taught, what equipment instructors use and attitudes towards teaching safety of agricultural mechanics teachers. The majority of instructors were certified in first aid and felt confident to use that training in the event of an emergency. The average teacher was found to teach high enrolment labs and furnished at no cost to the student eye protection in the form of safety glasses with side shields. It was found that teachers' agreed that safety instruction in the lab was important, especially involving power tools, electricity and industrial quality eye protection. Agricultural programs should be evaluated regularly for inadequate conditions that may exist in facilities, equipment, and safety. Additional research is needed targeting what barriers potentially exist with teachers using recommended safety practices in the instruction of agricultural mechanics.

Introduction

Among the myriad of responsibilities affixed upon the shoulders of agricultural mechanization teachers, the most pressing responsibility is maintaining laboratory safety. Laboratory activities such as metal working, agricultural machinery repair, and wood working have an inherent propensity to cause serious injury or death to the students and instructors. With that said, it is imperative that teachers maintain a high regard for safety by providing adequate supervision to students working in the laboratory, and teaching students safety procedures to follow when working with tools and equipment. Saucier and McKim (2011) indicated that the largest areas of need for preservice teachers in Texas were repairing and maintaining equipment and safety in the laboratory. Although, ensuring student safety is a moral obligation of agricultural mechanics teachers, failure to properly maintain a safe working environment can be associated with legal ramifications for teachers (Gliem & Hard, 1988).

According Phipps, Osborne, Dyer & Ball (2008), laboratory activities constitute a large part of most agricultural education programs. Agricultural laboratories serve many purposes and provide inquiry-based learning environments for students. Along with traditional agricultural mechanics laboratories, secondary agricultural programs utilize laboratories such as greenhouses, aquaponics centers, and livestock facilities. Each laboratory possesses unique dangers, but due to the nature of agricultural mechanics laboratories, injuries in these labs are commonplace. One aspect of agricultural mechanics which heightens the propensity for injuries is student-based construction.

At an industry standpoint, construction is also one of the most dangerous industries in the world (Brunette, 2004; Cheng, Lin & Leu, 2010). There are many job practices in the realm of agriculture mechanics which intersect with practices in the construction industry (i.e. use of power tools, metal fabrication, etc.). Schooner, Bonauto, Silverton, Adams, and Clark (2010) noted these industries were particularly dangerous because workers lack the appropriate safety training. Furthermore, Pinto, Nunes and Ribeiro (2011) indicated a lack of occupational risk assessment (ORA) and safety culture among future employees in these industries.

In regard to both industry and educational settings, enhancing safety climate in work and learning environments is vitally important. Cultivating a culture of safety in students early is a key to reducing laboratory-based injuries (Gillen, Goldenhar, Hecher, & Schneider, 2013). Along with safety climate, Torner and Pousette (2009) added that project characteristics and individual competencies/attitudes are main components contributing to safety standards. Agricultural mechanics, a facet of career and technical education (CTE), aims to prepare students for future careers in various industries. Exposing students to a culture focused on safety in the school setting can bolster students' competencies of safety, and can result in reduced future workforce injuries.

A multitude of previous studies have noted that agricultural education preservice teachers' fail to receive adequate laboratory safety education prior to their first year of teaching (Dyer & Andreasen, 1999; Swan, 1992). The adequacy of teacher preparation programs providing pre-service safety education is important. One possible culprit of the problem is the reduction of credit-hours in undergraduate programs, restricting the implementation of additional agricultural mechanics courses which address safety issues. In support of this notion, Burris, Robinson, and Terry (2005) found that teacher preparation professionals believed agricultural mechanization instruction was important in pre-service programs, yet they indicated the pre-service teachers received less than adequate instruction for the duties they would encounter as a teacher. On the other hand, Lawver (1992) posited that teachers were using recommended safety practices, but failed to provide the practices to the extent warranted when working in a dangerous environment. Along with the noted shortcomings of teachers in regard to knowledge and application of shop safety, Walter (2002) noted agricultural laboratories are lacking in the following areas: appropriate posting of warning signs, appropriate implementation of safety inspections, and the use of proper personal protective equipment (PPE).

According to Bear and Hoerner (1986), (1) identifying the safety practices taught, (2) the instructional methods by which the teacher informs their students of safety practices, and (3) an investigation of available safety equipment are the three components which must be observed to assess the safety of an agricultural mechanics laboratory. The instructional methods used to teach safety practices varies from teacher-to-teacher. Previous research (Lawver, 1992; Dyer & Andreason, 1999) indicated the most common instructional methods used in agricultural mechanics are demonstrations, worksheets, and videos. Burris et al. (2005) noted the demonstration of safety techniques was essential in laboratory settings. In agreement with Burris et al., Harper (1984) found that when teachers demonstrated appropriate safety practices, students were more safety conscious and demonstrated a deeper understanding of safety.

The safety practices which are taught by teachers is largely dependent on the equipment in the laboratory and the resources available to the program. Aside from instruction of safety procedures taught about specific equipment, eye protection safety has been previously noted as a topic which is commonly addressed with high priority (Chumbley, 2015; Lawver & Fraze, 1995). Similar to safety instruction on equipment, training students about PPE is contingent on the tools and machinery used in the agricultural mechanics laboratory. In a laboratory safety practices study conducted in New Mexico, Chumbley (2015) found that industrial quality eye protection, welding gloves, hearing protection, and a shop coat were the most commonly used PPE in the agricultural education laboratory.

While teachers have rated teaching safety as a high priority, their knowledge concerning the management of an agricultural mechanics laboratory has shown to be low. As previously noted, Saucier and McKim (2011) identified laboratory safety and instruction as an area of professional development need for Texas teachers. Approximately 80% of Texas high school agricultural science programs offer some type of agricultural mechanics course (January 2017, Texas State FFA personal communication). To determine the structure of professional development to bolster teachers' ability to teach laboratory safety, it is first important to determine how safety procedures are currently being taught in Texas programs. Hence, there was a need to examine the agricultural safety and laboratory management practice of south Texas teachers. Determining the methods teachers use to provide safety instruction, safety procedures implemented, and personal protective equipment used assist teacher educators and state leaders in providing appropriate training and in-service instruction to their stakeholders. Providing effective professional development is addressed in the National Research Agenda for Agricultural Education, Research Priority Five: Efficient and Effective Agricultural Education Programs. Thoron, Myers, and Barrick (2016) noted "research in the context of agricultural education… is needed to evaluate the effectiveness of these established professional development attributes and can greatly improve the body of knowledge on effective professional development" (p. 45). Along with these aspects contributing to effective professional development, the ultimate benefit of this research was to provide a safer learning environment for students and instructors in agricultural mechanics laboratories.

Theoretical Framework

The theoretical framework for this study was based around the theory of planned behavior (Azjen, 1985), which is an extension of the theory of reasoned action (Fishbein & Azjen, 1975; Azjen & Fishbein, 1980). The theory of reasoned action depicts the psychological process by which attitudes cause behavior (Fishbein, 1967). Both were designed to exhibit the relationship between informational and motivational influences on behavior (Connor & Armitage, 1998). The theory of planned behavior suggests that behavioral intentions can be best viewed as consequences of an individual's attitude.

The theory of planned behavior suggests that demographic variables and knowledge influences values and beliefs. These in turn affect attitude, intention and behavior. The theories impact the study of confidence levels and the factors that influence agriculture teacher success in teaching safety in the agricultural education laboratory. The theory of planned behavior represents behavior as a function of behavioral intentions and perceived behavioral control (PBC) (Azjen, 1991). Motivational factors are indications of how hard people are willing to try and how much of an effort they are planning to exert in order to perform the behavior.

Teacher confidence is routinely linked to Bandura's concept of self-efficacy. This can be described as a teacher's judgment of their capabilities to organize and execute courses of action required to change types of performance (Bandura, 1984). Self-efficacy can enhance or impair performance through their effects on cognitive, affective, or motivational intervening processes. It is important to note that a person's beliefs about their capabilities are not the same as actual ability, but they are closely related. If a person has low efficacy or confidence in a task, then their performance in that task is expected to be low (Bandura, 1997). Conversely, higher ability levels would tend to increase their confidence levels and thus, their level of performance.

As adapted for this study, these theories suggest that agricultural mechanics teachers past experiences and characteristics influence their decisions to teach specific safety standards in their courses. This may also have an effect on how teachers deliver instruction on these specific topics. By understanding teacher confidence and perceptions of teaching safety, researchers will more likely be able to determine how confident teachers are to successfully implement these concepts into their courses and agriculture programs.

Objectives

The purpose of this study was to identify the safety practices of South Texas agricultural science teachers, specifically focusing on underrepresented teacher populations, for teaching safety and managing an agricultural mechanics laboratory environment. The following objectives guided this study:

1. To determine demographic and safety characteristics of south Texas agricultural science teachers.

2. To determine the availability of selected safety equipment and emergency items in south Texas agricultural mechanics laboratories.
3. To identify the instructional methods and materials used by teachers to teach agricultural safety.

4. To investigate perceptions held by south Texas agricultural science teachers concerning the importance of agricultural mechanics safety instruction and practices.

Methods

The target population for this descriptive study was South Texas secondary agricultural science teachers who offered an agricultural mechanics component within their programs. The majority of these teachers (82%) identify as Hispanic, an underrepresented population in national agricultural education (Roberts, Hall, Briers, Gill, Shinn, Larke., & Jaure, 2009). A list of teachers was obtained from the Texas public education department. Dillman's Tailored Design Method (2007) guided the collection of data and correspondence with census participants. The researcher identified individuals from Texas Area X FFA association for the sample population. The Texas FFA Association is comprised of 12 administrative subdivisions (i.e., areas). In general, the areas are separate geographic regions which are realigned every 10 years based on student membership. In fact, in 2016, the Texas FFA added two additional areas, transitioning from 10 to 12 areas (see Figure 1). Area X (see Figure 2), located in south Texas, is comprised of 27 counties, 95 FFA chapters, and over 10,000 FFA members (Texas FFA Association, 2016).

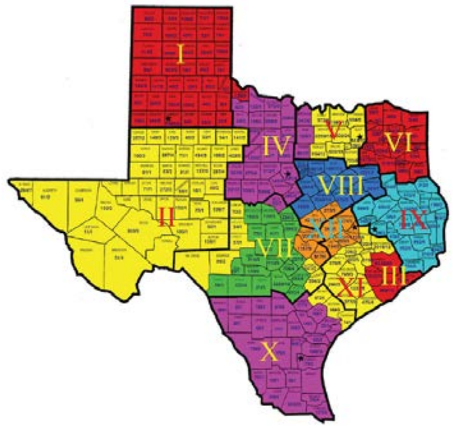

Figure 1. Texas FFA Areas (Texas FFA Association, 2016)

Figure 2. Texas FFA Area X (Texas FFA Association, 2016)

This included 192 agriculture science teachers in this region of the state, of which 172 teachers taught at least one agricultural mechanics course. Those teachers who identified themselves as teaching at least one course in an agricultural mechanics laboratory (N = 172) were asked to complete the survey. Teachers were asked to complete an online survey through Surveymonkey, an online survey software tool. Subjects were contacted up to five times through e-mails from the researcher. There were 118 respondents to the survey, resulting in a response rate of 69%. Comparison of early and late responders revealed no significant ($p < .05$) difference. Non-response error was not an overt concern due to the descriptive nature of this study. As such, the results are applicable to the respondents and are not overly generalizable to the non-respondents.

The instrument used for this study was one previously employed by Lawver (1992) to assess safety practices of teachers in Texas. This instrument is a modified version of an original instrument developed by Hoerner and Kessler (1989). The instrument used in this study has been successfully exercised in similar studies of other states (Johnson & Fletcher, 1990; McKim & Saucier, 2011; Chumbley, 2015). To ensure face and content validity a panel of experts (N = 9) consisting of five university faculty and four agricultural science teachers were consulted. Recommendations to update language in the instrument were considered and integrated into the instrument. Cronbach's alpha coefficients were used to measure internal consistency in order to establish reliability. The data revealed a reliability Cronbach's alpha coefficient of .823. Nunnally (1978) suggested that Cronbach's alpha coefficients of .5 -.6 are acceptable in the early stages of research, with these findings well outside that acceptable range.

Part one of the instrument focused on demographic information and the safety materials most readily used and available in the agricultural science laboratory. This included information about years of teaching experience, college hours in agricultural mechanics, number of students enrolled in the program, what certifications the teacher had received concerning safety and average number of courses taught. The instrument also sought to identify the number of major and minor accidents that occurred in the agricultural mechanics laboratory. Injuries in the lab can vary greatly based on the type of work being performed and environment. Major injuries were characterized as injuries that resulted in a student not being able to effectively perform laboratory duties for more than one day after the injury. Examples provided to teachers included second degree burns, concussions, major falls and broken bones. The researcher felt this was important as employers with 10 or more employees are required by the Occupational Safety and Health Administration (OSHA) to report similar information.

The second section solicited responses concerning most commonly used safety practice and instructional methods utilized for teaching safety. This included questions concerning availability of PPE, proper equipment storage, instructional strategies used, instructional materials most often used and other questions related to safety in the agricultural mechanics laboratory. This section of the survey concluded with questions pertaining to teacher's perceptions of safety in the agricultural mechanics laboratory.

Findings

Objective one was to describe characteristics of the South Texas agricultural mechanics programs and of the teachers who were supervising these programs. As stated earlier in the manuscript, 82% of the respondents identified as Hispanic. The average respondent had 12 years teaching experience with the most novice teacher having ½ a years teaching experience and the most senior having 39 yrs. teaching experience. Table one illustrates the average number of college agriculture mechanics courses teachers had taken.

Table 1
Frequency of College Agricultural Mechanics Course Enrollment (n = 118)

Number of Courses Taken	*f*	%
None	9	7.63%
1	10	8.47%
2	15	12.71%
3	23	19.49%
4	27	22.88%
5 or more	34	28.81%

Teachers taught an average of one (20; 16.95%), two (20; 16.95%), three (29; 24.58%), four (19; 16.1%), five (12; 10.17%) and six or more (18; 15.25%) of agricultural mechanics courses per semester. The researchers found that 54% of teachers did not know if they carried any liability insurance, 15% had none and of those that did, the average amount of liability insurance was for $100,000. All programs surveyed had some type of separate agricultural mechanics lab with the average size ranging from 1,000 to 2,000 square feet. Table two describes additional characteristics of the agricultural mechanics programs.

Table 2
Characteristics of the Agricultural Mechanics Programs (n = 118)

Characteristic	*M*	*Min*	*Max*
Number of Students in Program	192	22	600
Average Class Size	18	4	30

We found that 60% (*n* = 71) of teachers were certified in first aid compared to 40% (*n* = 47) who were not. Of those trained in first aid, 88% of teachers felt confident to use that training in an emergency. The two most common safety certifications teachers had received included the National Center for Construction Education and Research (NCCER) and Occupational Safety and Health Administration (OSHA) safety certifications. Some other safety certifications teachers identified included university safety certifications and American Welding Society (AWS). Teachers felt “moderately” to “very well prepared” (94.92%) to provide safety instruction within their classes. It was found that 56% of teachers kept a written report of all accidents in their lab.

Objective two was to determine the availability of selected safety equipment and emergency items in south Texas agricultural mechanics laboratories. Teachers were also asked to respond to the use of eye protection in their educational laboratories. Full face shields and Spectacles (ANSI Z87+) with side shields were the most common types of eye protection found in the laboratory environment. Most teachers were found to provide eye protection to the students at no cost. It was found that 83% of programs stored safety glasses in the lab either by use of a commercial cabinet or custom made storage device, the remaining programs had students store glasses on their own and bring to class. The types of eye protection most often found in the agricultural mechanics lab and how teachers managed their use are listed in table three.

Table 3
Teachers’ Use of Eye Protection in the Agricultural Mechanics Lab (n = 118)

	f	%
Most Common Types Used		
Full Face Shields	103	92.79
Spectacle with Side Shields	86	77.48
Goggles	79	71.17
Spectacles without Side Shields	52	46.85
How is Eye Protection Provided		
School Furnished at No Cost to Student	103	92.79
Students Furnish Their Own	8	7.21
School Provides at a Rental Fee	0	0

The researchers found that teachers had an extensive amount of available safety equipment in the lab. The most prevalent items found in the lab include industrial quality eye protection, welding gloves and welding aprons or jackets. The least common safety items found were hard hats, steel toed boots and fire resistant shirts. Table four provides information about what safety items were available in the laboratory to students.

Table 4
Frequency and Percentages of Available Safety Equipment (n = 118)

Safety Items	*f*	%
Industrial Quality Eye Protection	107	96.40
Welding Gloves	106	95.50
Welding Apron or Jacket	94	84.68
Hearing Protection	83	74.77
Shop Coat or Overalls	53	47.75
Respirators	41	36.94
Hard Hats	21	18.92
Steel Toed Boots	11	9.91

Other safety item provided in the lab included welding sleeves, steel toed boots and donated old welding shirts. The most common safety materials and practices involved the use of fire extinguishers, industrial quality eye protection, welding gloves, properly marked exits, fire alarms and eye wash stations. Safety posters, marked safety zones and fire blankets were the least common safety materials found in the agricultural mechanics laboratories.

Objective three was to identify the instructional methods and materials used by teachers to teach agricultural safety. Teachers were found to devote a range of times to teaching safety, with 41% devoted to teaching safety less than a third of their time, 36% devoting 1/3 to half of their time to teaching safety and the remaining 23% using over half their instructional time teaching safety topics. Teachers were prompted with the questions "Where do you devote the most time in teaching safety in agricultural mechanics?". The researchers found that 25.23% taught safety as a separate unit, 24.32% taught safety by integrating into each instructional unit and 50.45% taught safety equally in a separate unit and within other instructional units.
Safety in the agricultural mechanics lab was found to be taught in a variety of ways. The most common lessons included safety demonstrations with hand tools (97.3%), demonstration lessons with power tools (95.5%), assessments on laboratory safety exams (94.59%) and using a laboratory clean up schedule (69.37%). Only 37% utilized routine safety inspections along with 26% designating a cleanup foreman along with the cleanup schedule.
When asked what materials are used to teach safety to their high school students, teachers were most likely to take advantage of hands-on safety materials (95.5%), videos (90%), worksheets (89.2%) and computer program (59.2%). Other instructional materials utilized included transparencies, YouTube, textbooks and local presenters from industry representatives.

Objective four was to investigate what teachers perceived was the most valuable in regards to safety topics in the agricultural mechanics lab. Respondents were asked to rank the importance of various agricultural safety instructional topics. The value of each topic was measured on a

Likert-Type scale ranging from 1-5 (1= little importance to 5 = highest importance). Teachers felt the most important topics were power tool and electrical safety. Respondents felt that the least important topics were the development of safety posters and accident report forms. Table five presents a rank order listing of most important topics identified by teachers.

Table 5
Teachers' Perceptions of Important Safety Topics (n = 118)

Safety Topic	*M*	*SD*
Power Tool Safety	4.61	0.57
Electrical Safety	4.60	0.60
Welding Exhaust Systems	4.40	0.76
Hand Tool Safety	4.40	0.68
Administration of Safety Exams	4.32	0.70
Industrial Quality Eye Protection	4.28	0.53
Laboratory Safety Inspections	3.83	0.95
Accident Report Forms	3.50	1.01
Safety Posters	3.34	0.91

The final question teachers were asked was to rate how well they felt prepared to provide safety instruction related to various instructional topics. The responses were measured on a five point scale of 1 = poorly prepared to 5 = very well prepared. Respondents felt the best prepared to teach the industrial eye protection and welding exhaust systems. They felt the least prepared to teach various safety topics related to color coding of shop equipment, developing safety posters, making accident report forms and state safety laws. Table six lists teacher preparedness to teach various safety topics in rank order.

Table 6
Teachers' Preparedness to Provide Safety Instruction (n = 118)

Safety Topic	*M*	*SD*
Industrial Quality Eye Protection	4.33	0.74
Welding Exhaust Systems	4.02	0.90
Electrical Safety	3.98	0.82
Clean Up Schedules	3.62	0.89
Developing Safety Posters	3.59	0.96
State Safety Laws	3.51	0.83
Color Coding Safety Equipment	3.50	1.02
Accident Report Forms	3.48	1.02

Conclusions and Recommendations

The purpose of this study was to identify the safety practices of South Texas agricultural science teachers, specifically focusing on underrepresented teacher populations, for teaching safety and managing an agricultural mechanics laboratory environment. Since the population of the study was just a snapshot of professional educators in the state teaching school-based agricultural education, care should be taken not to generalize these findings outside of the population area. The population researched of South Texas agricultural mechanics programs revealed that 82% of the population were identified as Hispanic, had an average (.5 – 39) of 12 years of teaching experience, and having between one and five or more (1 – 7.63%; ≥ 5 – 28.81%) preparatory courses in agricultural mechanics in their teacher preparation programs.

As a result of the data collected in this study, it was determined that participants were not adequately prepared to teach all aspects of safety in a school-based agricultural education program. A previous study by Chumbley (2015) on Laboratory Safety Practices of New Mexico Agricultural Science Teachers identified that 88% of the teachers in that state (76% of the agricultural education programs) engaged in the instruction of school-based agricultural mechanics (Chumbley, 2015), which is similar to the population in South Texas, where XX% of schools in the region offer school-based agricultural mechanics in their programs. Burris, Robinson, and Terry (2005) posited that although faculty in pre-service teacher preparation programs believed that instruction in agricultural mechanization was essential in pre-service teacher certification programs, they indicated that instruction was lacking to support the duties adequately that would be found in school-based agricultural mechanics. With regard to Bandura's self-efficacy theory (1984) a teachers' confidence in the delivery of safety instruction through school-based agricultural mechanics can be influenced by their past experiences. Could a lack of sufficient preparation in this area contribute to their inability to adequately provide instruction in this area? McKim and Saucier (2011) suggested that university based instruction in agricultural mechanics has diminished in teacher preparation programs since 1981, which could support inadequate teacher preparedness in providing safety instruction in school-based agricultural education.

Contradictory to the findings that teachers were not adequately prepared to teach all aspects of an agricultural mechanics safety program, if was discovered that the researched population felt "moderately" to "very well prepared" (94.92%) to provide safety instruction within their classes. Which controverts the findings of Dyer and Andrease (1999) and Swan (1992) who reported that agricultural education pre-service teachers failed to acquire the skills necessary to instruct laboratory safety education preceding service in school-based agricultural education programs. Could it be that an interpretation of preparedness to adequately instruct safety in agricultural mechanics is directly correlated with their exposure to agricultural mechanics' teacher preparation?

The research sought to determine the availability of selected safety equipment and emergency items in South Texas agricultural mechanics laboratories. It was determined that teachers had an extensive amount of safety equipment available for their use in the learning laboratory. Commonly used safety equipment such as industrial quality eye protection, welding gloves, and welding aprons /jackets were the most prevalent. In practice, safety materials utilized and discussed in the programs included the most prevalent safety equipment available to the programs, and additionally included fire extinguishers, properly marked exits, eye wash stations, as well as the use of properly marked safety exits. In support of this research, Chumbley (2015) and Lawver and Fraze (1995) found that eye protection was a safety topic commonly addressed as a high priority item in school-based agricultural mechanics programs. However, the establishment of marked safety zones, use of safety posters, and fire blankets were the least common safety protocol utilized, which correlates with the safety topics that those researched felt the least prepared to teach. Could it be that their past experiences have had a profound influence on what safety instruction they teach in their courses?

Regarding the approach to instruction of safety, those researched identified that materials utilized in the instruction of safety were likely to consist of hands-on safety materials (95.5%), videos (90%), worksheets (89.2%) and computer program (59.2%). This finding was supported by research conducted by Lawver (1992) as well as Dyer and Andreason (1999) who indicated that the most common instructional methods utilized to instruct safety consisted of classroom and laboratory demonstrations, student worksheets, and instructional videos.

Recommendations for Research

As a result of this study, the researchers felt that multiple recommendations existed in both areas of research, and recommendations for practice. It was determined that participants were not adequately prepared to teach all aspects of safety in a school-based agricultural education program. Teacher preparation programs should incorporate research projects in courses where pre-service teachers have an opportunity to more deeply investigate safety protocol and practices related to commonly taught areas of agricultural mechanics in the school-based agricultural education program. Additional research is needed targeting what barriers potentially exist with teachers using recommended safety practices in the instruction of agricultural mechanics. More so, cost of laboratory programs, equipment, and consumables (Saucier, Vincent & Anderson, 2014) continues to be a barrier behind inadequate instruction not only in content, but in safety practices associated with them. Research targeting solutions and their application should be further conducted.

It was identified through the findings that teachers felt “moderately” to “very well prepared” (94.92%) to provide safety instruction within their classes. Since the general findings of the study determined that teachers were ‘in fact’ inadequately prepared to competently provide safety instruction holistically, does a false sense of confidence and self-efficacy exist? Further research in this area aligned with Bandura’s self-efficacy theory should occur to see what areas promote a false sense of self-efficacy. Additionally, is this lack of preparedness limited to agricultural education? Career and Technical Education (CTE) teachers provide students with coursework targeting architecture, construction, and manufacturing, much like teachers of agricultural mechanics. Do CTE teachers lack the skills to adequately teach safety as well? A research study targeting both agriculture and CTE teacher efficacy levels should be conducted to see what differences may exist in this area.

Recommendations for Practice

A high percentage of courses are currently offered through school-based agricultural education in South Texas that target agricultural mechanics. Since this is considered to be a staple in South Texas as well as in courses offered throughout the United States, pre-service as well as in-service teachers of agriculture should be adequately prepared to meet the safe needs of their charges. Professional development on both the university level as well as corporate entities (i.e., Lincoln Electric, Miller, Briggs and Stratton, Kohler, etc.) should occur for both pre-service and in-service teachers to help them better teach the subject of agricultural mechanics, not only in content, but in safety as well.

An evaluation of coursework leading to teacher certification and endorsement should occur in both agricultural education and Career and Technical Education. Do courses exist in the different programs that might better prepare future educators to more effectively teach the safety inherent in their courses? Or might we find that Career and Technical Education programs have some of the same concerns that are found in agricultural mechanics? Further investigation in this area should occur.

It has been posited by different researchers that problems have existed in the safe instruction of agricultural mechanics for some time. The safety of students should be first and foremost in our everyday practices. Agricultural mechanics programs should be evaluated regularly for inadequate conditions that may exist not only in facilities, equipment, and safety, but in teacher preparedness as well, serving as a source of help to not only guide professional development in agricultural mechanics for teachers, but as a voice with administration on deficiencies that may exist in the program. In this way teachers may better demonstrate safety practices specific to content taught in the program, allowing for students to be more safety conscious themselves in courses that continue to be increasingly popular in school-based agricultural education.

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Career and Technical Education Teachers' Perceived Tool and Equipment Availability Related to Teaching Two-Stroke Engines Content: A Preliminary Study

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Abstract

Career and technical education (CTE) remains an excellent vehicle for hands-on, minds-on instructional content that works to prepare students for industry-based settings (Slusher, Robinson, & Edwards, 2011). Access to appropriate resources for CTE programs, such as available tools and equipment, can be influential in determining the quality of such coursework and laboratory management more broadly (McKim & Saucier, 2013). Through the lens of distributed cognition as our conceptual framework and in the context of a larger preliminary study rooted in mechanics-based education, we examined the available tools and equipment to teach two-stroke engines as reported by CTE teachers (N = 20) who participated in a comprehensive, industry-led two-stroke engines workshop at Iowa State University. Echoing the findings of McCubbins, Anderson, Paulsen, and Wells (2016), the teachers in the present study reported limited availability of many of the tools and equipment needed to teach two-stroke engines content within their own programs. Recommendations include replication of this study on a national scale, the establishment of program and industry partnerships to identify and procure the necessary tools and equipment for each skill area, and continued professional development opportunities for teachers in the areas of two-stroke engine inspection, troubleshooting, repair, theory, and safety.

Introduction

Physical, real-world applications of course content remain a prominent and valuable tenet within a variety of areas of career and technical education (CTE) (Phipps, Osborne, Dyer, & Ball, 2008; Wells, Perry, Anderson, Shultz, & Paulsen, 2013; McCubbins, Anderson, Paulsen, & Wells, 2016). Such instruction allows for hands-on, minds-on learning opportunities that engage students in new and novel ways (Parr, Edwards, & Leising, 2006). In addition, content based on phenomena that are well-grounded within the realm of practical applications is extremely valuable in preparing the workforce of the 21st century (Parr et al., 2006; Young, Edwards, & Leising, 2009). A prominent example of the use of such content and its aligned educational opportunities lies within mechanics-based education (Parr et al., 2006). Foundational to perhaps the largest segment of CTE, school-based agricultural education (SBAE), mechanics education has been a cornerstone of the CTE learning experience since its inception (Burris, Robinson, & Terry, 2005).

As the content within mechanics-based education covers a broad swath of fields, including welding, electricity, small engines, and more (McCubbins, Wells, Anderson, & Paulsen, in press), the requirements to teach the content associated with differing content areas can be significantly diverse as well. These differing requirements can include specific training and prior education, adequate facilities, and available tools and equipment (Byrd, Anderson, & Paulsen, 2015; McCubbins et al., 2016; Wells et al., 2013). Further, in regard to available resources, such as available tools and equipment, McCubbins et al. (2016) described potential ramifications of a lack of availability, including limited instruction in some content or, at worst, decisions to forego selected content areas entirely. Moreover, as the skills associated with CTE are frequently sought by industry employers (Slusher, Robinson, & Edwards, 2011), programs lacking the proper tools and equipment may be producing ill-prepared members of the workforce of the future.

The lack of available teaching resources (i.e., tools and equipment) has, for quite some time, been documented in educational fields outside of CTE. Niemann (1970) described the dissatisfaction held by English Language Arts (ELA) teachers regarding available teaching equipment. In addition, Crotty (2005) illustrated the lack of available teaching resources had a negative impact on the training of medical professionals in Australia. Lankford and Mims (1995) reported that a considerable number of elementary art teachers were desirous for increased teaching resource budgets. These challenges have been present in CTE as well. Regarding the CTE field of agricultural education, McKim and Saucier (2013) and Saucier, Vincent, and Anderson (2014) described the challenges associated with laboratory management factors, such as procuring materials and equipment, in relation to restrictive budgeting practices that may, in consequence, inhibit the educational process and, as a result, work to restrict the progress of the hands-on, minds-on nature of CTE.

Relative to two-stroke engines, McCubbins et al. (2016) found that agricultural education teachers in Iowa frequently lacked the tools and equipment necessary to teach the skills found within this content area. Moreover, Shultz, Anderson, Shultz, and Paulsen (2014) cited that agricultural education teachers in Iowa believed that teaching two-stroke engines content was important. Interestingly, the teachers in Shultz et al.'s (2014) study also described that they, for the most part, possessed a reasonable degree of competence to teach the content area. However, these studies (McCubbins et al., 2016; Shultz et al., 2014) did not identify specific concepts to be taught within two-stroke engines content, nor any specific tools or equipment to be used therein. Perhaps a more thorough and more broadly inclusive investigation of such a topic (e.g., examining other areas and stakeholders of CTE, such as industrial technology program teachers) would be beneficial in understanding the issue of the availability of tools and equipment to teach two-stroke engines content.

Conceptual Framework

We utilized distributed cognition as the conceptual framework to guide this study. As described by Nakhleh, Polles, and Malina (2003), the development of knowledge and thought results from interactions between objects, individual people, and locations. Further, Nakhleh et al. (2003) illustrated that "[k]nowledge from this viewpoint is a process,… [and] can be distributed across people and objects in a specific context… [a]nd objects (tools) in the environment can carry some of that knowledge within themselves" (p. 83-84). More specifically, in the context of the present study, knowledge was operationalized as CTE teachers' prior understanding about two-stroke engines, with the acknowledgment that the development and advancement of such understanding changes over time and through experiences. Additionally, the available tools and equipment for teaching two-stroke engines content were cast as the objects described by Nakhleh et al. (2003).

Interestingly, Nakhleh et al. (2003) rationalized that “people use tools to construct understanding” (p. 84) and that tools, within the sphere of the educational process, could vary between contexts to include engine service manuals, torque wrenches, diagnostic software, and more. This concept, described as tool mediation by Cole and Engestrom (1993), presents tools not merely as objects used to accomplish a task, but rather acknowledges the varied types, kinds, and roles that they play within educational settings. These ideas could indicate that perhaps tools and equipment (such as a crescent wrench or screwdriver) commonly found within mechanics-based instructional settings (i.e., within an agricultural mechanics or industrial technology program laboratory) can assist their users (e.g., students, teachers, etc.) to unlock a variety of mental functions and capacities as problems and issues are encountered and, hopefully, overcome. Perhaps the tools and equipment used to teach two-stroke engines content may present more opportunities than meets the eye.

Purpose & Objectives

As the present study was part of a larger study related to the teaching of two-stroke engines, its purpose was multi-faceted. The first purpose was to create, pilot, and validate a new instrument related to understanding the teaching of two-stroke engines content within secondary CTE coursework, while the second purpose was to assess the effectiveness of an industry-led two-stroke engines instructional workshop. The purpose of this study was to develop an understanding of the participating teachers’ perceived availability of tools and equipment related to two-stroke engines instruction. To accomplish and guide these purposes, the following objectives were established:

1) Describe teachers’ availability of tools and equipment used to teach two-stroke engine inspection and troubleshooting.

2) Describe teachers’ availability of tools and equipment used to teach two-stroke engine repair.

3) Describe teachers’ availability of tools and equipment used to teach two-stroke engine safety and theory.

The purpose and objectives of our study aligned with the National Research Agenda (NRA) of the American Association for Agricultural Education (AAAE). More specifically, the present study aligns with Research Priority 5 of the AAAE NRA, Efficient and Effective Agricultural Education Programs. This study also is congruent with the National Career and Technical Education Research Agenda Research Problem (RPA) 5: Program Relevance and Effectiveness (Lambeth, Elliot, & Joerger, 2008). As identified by Roberts, Harder, and Brashears (2016), advances within industry have helped to drive and dictate the need for skilled and knowledgeable educational professionals, such as agricultural education and industrial technology teachers, who are capable of adequately utilizing available resources, such as available tools and equipment, to reach and teach the future members of the industrial workforce. Moreover, well-maintained and well-operated educational programs can contribute much to the short- and long-term success of secondary students, as described by Roberts et al. (2016); thus, the availability of necessary and proper teaching tools and equipment can positively impact the learning environment as well (McCubbins et al., 2016). As such, the availability of such tools and equipment can have a direct impact on the long-term sustainability and effectiveness of a mechanics-based learning environment (McCubbins et al., 2016).

Methods

As part of a larger study, the population of the current study consisted of 20 (N = 20) CTE teachers from several states across the United States. The two content areas taught by this population of teachers included agricultural education and industrial technology. These teachers participated in an intensive two-stroke engines workshop held at Iowa State University's agricultural mechanics teaching laboratory. The focus of the workshop was instruction related to a wide variety of areas related to two-stroke engine service, testing, repair, and so forth. Prior to the workshop activities, we developed a research instrument designed to gather data related to two-stroke engines instruction conducted within secondary schools. This instrument addressed a variety of areas, including curriculum availability, skill performance competency, teaching competency, etc., and as designed to be used to collect pre- and post-workshop data. A panel of 10 experts with varying backgrounds that included agricultural education teacher educators with experience teaching agricultural mechanics courses and two-stroke engine technical trainers were consulted as the instrument was constructed. These experts identified 51 different skill areas commonly taught within two-stroke engines instruction. The panel of experts also served to review the instrument for face and content validity, and ultimately determined that this instrument was suitable for use within this study. Two of the agricultural education teacher education experts participated in the workshop and provided additional feedback and suggestions about the instrument.

Prior to the workshop, Institutional Review Board (IRB) permission was granted to conduct the present study. On the first day of the workshop, all 20 teachers were informed about the nature of the study and were asked to complete a paper-based pre-workshop instrument. The pre-workshop instrument contained questions related to a variety of topics related to two-stroke engines instruction, including the perceived availability of tools and equipment for teaching the selected two-stroke engines topics and content. Prior to the start of the workshop, approximately 30 minutes were allocated for the data collection process. It should be noted that because the present study is preliminary in nature and its population was fairly small, a paper-based instrument was used to collect data. The two-stroke engines workshop was organized and led by a technical trainer from industry who was not affiliated with either this study or our institution. At the conclusion of the second and final day of the workshop, teachers were asked to complete the post-workshop instrument. The post-workshop instrument contained additional questions related to two-stroke engines instruction. It should be noted that data related to tool and equipment availability were collected only during the pre-workshop phase. We assumed that the tools and equipment that teachers had available to them within their respective programs would not change during the course of the workshop. Therefore, it was not necessary to collect these data during the pre- and post-workshop phases. Approximately 30 minutes were allocated for the data collection process, and teachers were dismissed after completing their instruments. Using the Statistical Package for the Social Sciences (SPSS) 24.0 software, all collected data were coded and entered into the data set used within this study. All data were analyzed using descriptive statistics; more specifically, frequencies and percentages were used. Because the present study was preliminary in nature, reliability scores for each section of the instrument were calculated through a post-hoc analysis, and Cronbach's alpha coefficients are reported in Table 1 below. Per George and Mallery (2003), all of these construct coefficients below were rated as *Excellent*.

Table 1

Cronbach's Alpha Scores for Instrument Constructs

Construct Item	Cronbach's Alpha Score
Tools and equipment available to teach inspection and testing	$\alpha = .981$
Tools and equipment available to teach safety and theory	$\alpha = .979$
Tools and equipment available to teach repair	$\alpha = .958$

Results

The typical teacher in this study was male (*f* = 18, 90%), held a bachelor's degree (*f* = 16, 80%), taught agricultural education coursework (*f* = 11, 55%), was 38.55 years old, and had taught for 13.70 years. Further, the typical teacher (*f* = 14, 70%) had successfully passed the Stihl Bronze Certification modules online prior to attending the workshop.

The purpose of the present study was to develop an understanding of the teachers' perceived availability of tools and equipment related to two-stroke engines instruction. Fifty-one skill areas were divided into three constructs which included *Tools and equipment available to teach inspection and testing*, *Tools and equipment available to teach repair*, and *Tools and equipment available to teach safety and theory*. The individual items represented specific skills found within each of the construct areas. Each item, in terms of tool and equipment availability, was rated using the following five-point summated scale: *None/Very Poor*, *Below Average*, *Average*, *Above Average*, and *Excellent*. Grand means and standard deviations were calculated for each of the constructs. The *Tools and equipment available to teach repair* construct had the highest grand mean of 2.85, with a standard deviation of 0.879; on the converse, the *Tools and equipment available to teach safety and theory* had the lowest grand mean of 2.75, with a standard deviation of 1.035. Table 2 below describes the grand means and standard deviations for each construct.

Table 2

Two-Stroke Engines Skill Area Tool and Equipment Availability Grand Means and Standard Deviation by Construct

Construct	*M*	*SD*
Tools and equipment available to teach repair	2.85	0.879
Tools and equipment available to teach inspection and testing	2.78	0.891
Tools and equipment available to teach safety and theory	2.75	1.035

Note. 1 = None/Very Poor, 2 = Below Average, 3 = Average, 4 = Above Average, 5 = Excellent

Table 3, below, displays the perceived availability of tools and equipment to teach inspecting and troubleshooting two-stroke engines as described by teachers who participated in a two-day professional development workshop. The skill area with the greatest frequency of *Above Average* and *Excellent* responses was *Inspecting an air filter* (55%; *n* = 11), while the skill area with the greatest frequency of *None/Very Poor* and *Below Average* responses was *Conducting failure analysis* (75%; *n* = 15). The highest frequencies and percentages of responses for the majority of the skills typically fell within the *Below Average* or *Average* categories.

Table 3

Frequencies and Percentages of Responses by Item for the Availability of Tools and Equipment to Teach Inspecting and Troubleshooting Two-Stroke Engines (N = 20)

Skill	*n*	None/ Very Poor *f*(%)	Below Average *f*(%)	Average *f*(%)	Above Average *f*(%)	Excellent *f*(%)
Identifying two-stroke engine components	20	1(5.0)	4(20.0)	**8(40.0)**	3(15.0)	4(20.0)
Fueling a two-stroke engine	20	1(5.0)	2(10.0)	**8(40.0)**	5(25.0)	4(20.0)
Starting a two-stroke engine	19	1(5.3)	2(10.5)	**7(36.8)**	6(31.6)	3(15.8)
Inspecting fuel for quality	20	2(10.0)	6(30.0)	**7(35.0)**	2(10.0)	3(15.0)
Checking engine compression	19	1(5.3)	**7(36.8)**	5(26.3)	4(21.1)	2(10.5)
Inspecting an air filter	20	0(0.0)	2(10.0)	**7(35.0)**	5(25.0)	6(30.0)
Inspecting a spark plug	19	0(0.0)	2(10.5)	**7(36.9)**	4(21.1)	6(31.6)
Inspecting a fuel filter	19	1(5.3)	**5(26.3)**	4(21.1)	**5(26.3)**	4(21.1)
Testing a fuel line and carburetor for leaks	20	1(5.0)	7(35.0)	**8(40.0)**	2(10.0)	2(10.0)
Inspecting restrictions at spark screen & exhaust port	19	4(21.1)	**6(31.6)**	5(26.3)	2(10.5)	2(10.5)
Performing a carburetor fuel pump impulse test	20	**8(40.0)**	5(25.0)	5(25.0)	1(5.0)	1(5.0)
Performing an engine pressure / vacuum test	19	5(26.3)	**8(42.1)**	4(21.1)	1(5.3)	1(5.3)
Carburetor evaluation	19	1(5.3)	**8(42.1)**	7(36.8)	2(10.5)	1(5.3)
Perform an ignition test	20	3(15.0)	**10(50.0)**	4(20.0)	2(10.0)	1(5.0)
Using an engine evaluation guide	19	3(15.8)	**8(42.1)**	5(26.3)	2(10.5)	1(5.3)
Test run an engine	20	1(5.0)	5(25.0)	**10(50.0)**	2(10.0)	2(10.0)
Evaluate engine performance	19	1(5.3)	6(31.6)	**8(42.1)**	2(10.5)	2(10.5)
Using a tachometer to measure engine rpm	20	6(30.0)	**7(35.0)**	3(15.0)	2(10.0)	2(10.0)
Engine troubleshooting	20	1(5.0)	6(30.0)	**8(40.0)**	4(20.0)	1(5.0)
Inspecting a spark arrestor	20	6(30.0)	**7(35.0)**	5(25.0)	1(5.0)	1(5.0)
Using small engine diagnostic software	20	**7(35.0)**	**7(35.0)**	4(20.0)	1(5.0)	1(5.0)

Inspecting carburetor for fuel misuse	19	3(15.8)	**10(52.6)**	3(15.8)	2(10.5)	1(5.3)
Testing fuels for quality and use	20	**7(35.0)**	**7(35.0)**	4(20.0)	1(5.0)	1(5.0)
Storing gas-powered equipment (any length of time)	20	0(0.0)	**9(45.0)**	6(30.0)	4(20.0)	1(5.0)
Conducting failure analysis (individual parts, etc.)	20	4(20.0)	**11(55.0)**	3(15.0)	1(5.0)	1(5.0)

Note. Construct grand mean = 2.78; Construct SD = .891; None/Very Poor = I have none/almost none of the tools needed to teach this concept.; Below Average = I have a few of the tools needed to teach this concept.; Average = I have some of the tools needed to teach this concept.; Above Average = I have most of the tools needed to teach this concept.; Excellent = I have all of the tools needed to teach this concept. The highest mode per skill area was highlighted for clarity.

Table 4, below, displays the perceived availability of tools and equipment to teach repairing two-stroke engines as described by teachers who participated in a two-day professional development workshop. The skill area with the greatest frequency of *Above Average* and *Excellent* responses was *Replacing a sparkplug* (47.4%; *n* = 9). Additionally, the skill areas with the greatest frequency of *None/Very Poor* and *Below Average* responses were *Sealing a crankcase* (60.0%; *n* = 12) and *Ignition module replacement and setting air gap* (60.0%; *n* = 12). The highest frequencies and percentages of responses for all of the skills fell within the *Below Average* or *Average* categories.

Table 4

Frequencies and Percentages of Responses by Item for the Availability of Tools and Equipment to Teach Repairing Two-Stroke Engines (N = 20)

Skill	*n*	None/ Very Poor *f*(%)	Below Average *f*(%)	Average *f*(%)	Above Average *f*(%)	Excellent *f*(%)
Replacing an air filter	19	0(0.0)	3(15.8)	**8(42.1)**	3(15.8)	5(26.3)
Replacing a spark plug	19	0(0.0)	3(15.8)	**7(36.8)**	4(21.1)	5(26.3)
Replacing a fuel filter	20	0(0.0)	3(15.0)	**8(40.0)**	4(20.0)	5(25.0)
Using two-stroke engine tools	20	1(5.0)	**10(50.0)**	5(25.0)	2(10.0)	2(10.0)
Repairing a rewind starter	20	1(5.0)	7(35.0)	**9(45.0)**	1(5.0)	2(10.0)
Sealing a crankcase	20	2(10.0)	**10(50.0)**	4(20.0)	2(10.0)	2(10.0)
Adjusting a throttle cable	20	1(5.0)	7(35.0)	**9(45.0)**	1(5.0)	2(10.0)
Unflooding a two-stroke engine	20	3(15.0)	6(30.0)	**9(45.0)**	1(5.0)	1(5.0)
Ignition module replacement and setting air gap	20	2(10.0)	**10(50.0)**	5(25.0)	2(10.0)	1(5.0)
Installing a chain saw	20	4(20.0)	**7(35.0)**	6(30.0)	2(10.0)	1(5.0)

drive sprocket						
Replacing a fuel line	20	1(5.0)	6(30.0)	**8(40.0)**	2(10.0)	3(15.0)
Replacement of a bushing	20	2(10.0)	**9(45.0)**	6(30.0)	1(5.0)	2(10.0)
Servicing and adjusting tool attachments	20	3(15.0)	5(25.0)	**9(45.0)**	2(10.0)	1(5.0)

Note. Construct grand mean = 2.85; Construct SD = .879; None/Very Poor = I have none/almost none of the tools needed to teach this concept.; Below Average = I have a few of the tools needed to teach this concept.; Average = I have some of the tools needed to teach this concept.; Above Average = I have most of the tools needed to teach this concept.; Excellent = I have all of the tools needed to teach this concept. The highest mode per skill area was highlighted for clarity.

Table 5, below, displays the perceived availability of tools and equipment to teach two-stroke engines safety and theory as described by teachers who participated in a two-day professional development workshop. The skill area with the greatest frequency of *Above Average* and *Excellent* responses was *Two-stroke equipment [Personal Protective Equipment] PPE* (42.1%; n = 8). Further, the skill areas with the greatest frequency of *None/Very Poor* and *Below Average* responses were *Pruner use and safety* (57.9%; n = 11), *Two-stroke engine tools and usage* (57.9%; n = 11), and *Two-stroke diaphragm carburetor theory* (57.9%; n = 11). The highest frequencies and percentages of responses for the majority of the skills typically fell within the *Below Average* or *Average* categories.

Table 5

Frequencies and Percentages of Responses by Item for the Availability of Tools and Equipment to Teach Safety and Theory of Two-Stroke Engines (N = 20)

Skill	*n*	None/ Very Poor *f*(%)	Below Average *f*(%)	Average *f*(%)	Above Average *f*(%)	Excellent *f*(%)
Operation	20	1(5.0)	5(25.0)	**8(40.0)**	4(20.0)	2(10.0)
Troubleshooting	19	1(5.3)	**8(42.1)**	7(36.8)	1(5.3)	2(10.5)
Failure analysis	19	2(10.5)	**8(42.1)**	6(31.6)	1(5.3)	2(10.5)
Theory	19	1(5.3)	4(21.1)	**9(47.4)**	3(15.8)	2(10.5)
Chainsaw use & safety	19	3(15.8)	5(26.3)	**6(31.6)**	2(10.5)	3(15.8)
Blower use & safety	19	5(26.3)	5(26.3)	**6(31.6)**	1(5.3)	2(10.5)
Pruner use & safety	19	5(26.3)	**6(31.6)**	5(26.3)	1(5.3)	2(10.5)
Line trimmer use & safety	19	4(21.1)	**6(31.6)**	5(26.3)	2(10.5)	2(10.5)
Two-stroke engine tools & usage	19	1(5.3)	**10(52.6)**	5(26.3)	1(5.3)	2(10.5)
Two-stroke equipment PPE	19	2(10.5)	4(21.1)	**5(26.3)**	**5(26.3)**	3(15.8)
Correct use of fuels, oils, cleaners, and lubricants	19	1(5.3)	7(36.8)	**8(42.1)**	1(5.3)	2(10.5)
Mix-lubricated four-cycle engine theory	19	2(10.5)	**7(36.8)**	5(26.3)	3(15.8)	2(10.5)

Two-stroke diaphragm carburetor theory	19	2(10.5)	**9(47.4)**	4(21.1)	2(10.5)	2(10.5)

Note. Construct grand mean = 2.75; Construct SD = 1.035; None/Very Poor = I have none/almost none of the tools needed to teach this concept.; Below Average = I have a few of the tools needed to teach this concept.; Average = I have some of the tools needed to teach this concept.; Above Average = I have most of the tools needed to teach this concept.; Excellent = I have all of the tools needed to teach this concept. The highest mode per skill area was highlighted for clarity.

Conclusions & Discussion

Per objective one of the current study, describe teachers' availability of tools and equipment used to teach two-stroke engine inspection and troubleshooting, we found that teachers most frequently reported *Average* or *Below Average* availability of the tools necessary to teach the skills within this area of two-stroke engines, particularly within many of the highly technical and advanced skill areas (i.e., *Using small engine diagnostic software*, etc.). Regarding objective two, describe teachers' availability of tools and equipment used to teach two-stroke engine repair, we found that teachers most frequently reported *Average* or *Below Average* availability of the tools necessary to teach the skills associated with this area of two-stroke engines (e.g., *Adjusting a throttle cable*, etc.). Moving to objective three, describe teachers' availability of tools and equipment used to teach two-stroke engine safety and theory, we found that teachers most frequently reported *Average* or *Below Average* availability of the tools necessary to teach the skills within this area of two-stroke engines (i.e., *Two-stroke diaphragm carburetor theory*, etc.).

Overall, the findings of the present preliminary study indicate that the CTE teachers within this population (N = 20) do not have many of the tools and equipment used to teach a variety of two-stroke engines-related skills available to them. These results align with prior research regarding resources available (McCubbins et al., 2016; McKim & Saucier, 2013) in the field of agricultural mechanics education, and within the field of education more broadly (Crotty, 2005; Lankford & Mims, 1995; Niemann, 1970). Moreover, the results of this study indicated that many of these teachers may not, due to lacking some of the tools and equipment necessary to teach many of the topics noted within this research, be able to reach the larger goal of effectively educating the next generation of industry employees, as described by Roberts et al. (2016) and Lambeth et al. (2008).

Due to the small population of CTE teachers within this study (N = 20), these results are only reflective of the teachers who attended this particular two-stroke engines workshop and are not generalizable to all CTE teachers. Furthermore, it should be noted that the tool and equipment availability data were collected during the pre-workshop phase of this study. Therefore, any impact or awareness related to tool and equipment availability was not recognized within this study. Additionally, we did not define the specific tools and equipment that teachers should possess in order to teach each of the two-stroke engine skills. Further clarification could be useful in order to improve the accuracy of the findings.

Per the distributed cognition conceptual framework of this study, the use of objects, such as tools and equipment used with two-stroke engines, can be used to unlock cognitive functions within the larger process of education (Nakhleh et al., 2003; Cole & Engestrom, 1993). Could it be surmised that the lack of availability of such tools and equipment could result in lost opportunities for such mental stimulation? Moreover, could this lack of interaction with the types of teaching and learning opportunities afforded through the inclusion of, and instruction within, mechanics-based curricula result in compromised instruction offered by this population of teachers? Wells et al. (2013) suggested that the teachers may pursue instructional topics based upon prior experiences. Thus, it may be reasonable to suppose that perhaps a perceived lack of competency and comfort with the subject of two-stroke engines content may result in a lack of willingness to invest in the items used within the curriculum area (e.g., tools and equipment).

It was interesting to note that, for the most part, many of the CTE teachers within the present study expressed that, in terms of teaching *Two-stroke equipment PPE*, their availability of tools and equipment was relatively high, as 68.4% (n = 13) of the teachers reported that their availability was *Average* or better. Perhaps, as suggested by prior research (McCubbins et al., 2016; Shultz et al., 2014), teachers believe safety to be a priority and may regard themselves to be more comfortable and competent teaching safety and have thus chosen to acquire the resources necessary to teach this particular skill area based on that perceived competency and comfort. On the converse, perhaps the acquisition of safety tools was an easier process due to a variety of factors, such as cost, ease of access, etc., that may have promoted the procurement process.

We found that many of the skill areas that teachers reported low availability of tools and equipment (i.e., *Conducting failure analysis*, *Sealing a crankcase*, *Ignition module replacement and setting air gap*, *Pruner use and safety*, and *Two-stroke diaphragm carburetor theory*) were not surprising, as many of these skill areas may be quite complicated due to their technical nature. Thus, it could be expected that many teachers may see little need to, and thus may have little motivation to procure tools and equipment for these particular skills. However, perhaps more surprising, we found that these teachers also reported low tool and equipment availability associated with the skill area of *Two-stroke engine tools and usage*. Could this be related to a low self-efficacy of ability toward two-stroke engines in general? Moreover, as this population of CTE teachers reported, at best, only modest availability of tools and equipment to teach a majority of the skill areas, could this be indicative of their competency in teaching the content, budgetary concerns, or lack of professional development in these skill areas?

Recommendations

Based upon the findings of the present preliminary study, we have provided several recommendations. Regarding inservice teachers, opportunities to participate in two-stroke engines-related professional development sessions should be taken advantage of as needed and as offered. Such sessions should also, based upon this study, include content related to tool and equipment usage and identification, needs determination and assessment based on planned curricula, as well as methods of procuring high-quality tools and equipment, as also recommended by McCubbins et al. (2016). As mechanics laboratory budgets are often inadequate for many needs (McKim & Saucier, 2013; Saucier et al., 2014), teachers should also work with retailers, wholesalers, and industry to secure the necessary items that fall within their budgets. Industry representatives and entities would be well-advised to take heed of the above recommendations as well in order to better serve the stakeholders (e.g., teachers, students, educational institutions, etc.) involved within two-stroke engines instruction. Such cooperation and investments could yield dividends for the industry in the future, particularly in regard to workforce development.

Regarding industry, trade groups, manufacturers, etc., should work to develop intensive professional development workshops, curricula, and other materials that could serve as a significant aid to teachers who wish to introduce and expand their instruction of two-stroke engines within their respective programs. As described by Shultz et al. (2014), two-stroke engines remains an important topic in the realm of CTE; the availability and quality of industry-led educational programming should reflect this. Moreover, professional development opportunities may provide the opportunity for teachers to expand their course offerings through the creation and addition of high-quality curriculum materials that can be made easily and readily available for teachers. In order to enhance tool and equipment availability and affordability, industry entities should consider offering tools and equipment to educational institutions at cost or at a discount. Expanded opportunities for additional educational offerings, such as the introduction of new courses or sections of courses at the secondary level that incorporate two-stroke engines instruction, may help to provide methods for improving the human capital needed by industry (Slusher et al., 2011).

Because this study was preliminary in nature, several recommendations exist to guide the future body of research. We first suggest that, based on the results of the current study, that this research be replicated on a national level using an online survey delivery system. In addition, data should be collected from a larger sample of CTE teachers nationally to increase the generalizability of the results. We further recommend that a comprehensive list of tools and equipment needed to teach each skill area be developed in order to improve the accuracy of any research results as well as professional practice. As the reliability of each construct within the paper-based instrument was rated as *Excellent* per George and Mallery (2003), this instrument can be used as a method of further assessing and informing the practices associated with two-stroke engines education.

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THE IMPORTANCE OF AGRICULTURAL MECHANICS SKILLS TRAINING: IMPLICATIONS FOR AGRICULTURAL EDUCATION

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Abstract

Through the integration of Science, Technology, Engineering, and Mathematics (STEM) into the secondary school curricula, students should be prepared with the 21st century skills needed to enter post-secondary institutions or a demanding workforce. Agricultural mechanics is instrumental in delivering the skills students need for college and career readiness (Hubert & Leising, 2000). To determine skills most important for secondary content inclusion, Laird (1994) studied secondary agricultural education teachers across the United States to determine the depth in which they taught 60 agricultural mechanics skills, as well as how important those teachers perceived those skills to be in ten years. This study modified Laird's instrument to include 102 agricultural mechanics skills, and distributed the survey to secondary agricultural education teachers in Iowa. Results from this study indicated that teachers perceived all 102 skills to be more important to teach in the future than they were currently being taught. Increased agricultural mechanics importance means there is increased pressure on post-secondary teacher education programs to provide necessary agricultural mechanics training.

Introduction

Current secondary educational programs should be focused on preparing students to enter demanding and needed occupations or post-secondary programs (Chumbley, Haynes, & Stofer, 2015). In order to fulfil this preparation requirement, secondary education has seen a push towards science, technology, engineering, and mathematics (STEM) in recent years. As outlined in the American Association for Agricultural Education's National Research Agenda (Roberts, Harder, & Brashears, 2016) agricultural education programs need to be actively integrating STEM into the curricula. Ricketts, Duncan, and Peake (2006) posited that the constructivist pedagogical backbone of agricultural education provided multiple useful venues to better understand science. Promisingly, biological science scores have shown to be higher among students enrolled in agriscience courses when compared to students enrolled in bioscience courses alone (Whent & Leising, 1988), in addition to students improvement seen within mathematics and other science courses (Stripling & Roberts, 2014). Students enrolled in math-enhanced agricultural power and technology curriculum have seen increased mathematics placement scores (Parr, Edwards, & Leising, 2006) while seeing no significant reduction in technical skills attainment (Parr & Edwards, 2008).

Agricultural mechanics is a popular content area among secondary agricultural education programs and their students (Hubert & Leising, 2000). Research has shown that secondary agricultural education teachers in seven selected states typically teach two agricultural mechanics courses per semester (Hoerner & Bekkum, 1990) and in Iowa these teachers spend approximately 7.48 hours supervising the agricultural mechanics laboratory per week (Byrd, Anderson, & Saucier, 2016). Agricultural mechanics courses offer a variety of skills that actively incorporate all four STEM components (Shultz, Anderson, Shultz, & Paulsen, 2014). In consultation with a mathematics education specialist, Wells and Parr (2012) found that 27 Iowa mathematics standards could be aligned with the state FFA agricultural mechanics career development event requirements. Through a problem-based learning foundation, agricultural mechanics courses challenge students to make meaning of their learning in real world applications (Parr & Edwards, 2004). The realistic problems presented to the students require the use of both academic and technical knowledge which must be applied properly in order to be solved (Wells, Matthews, Caudle, Lunceford, Clement & Anderson, 2015). Improving students' educational and agricultural mechanics skills can help prepare students for college or careers, but it is important that the skills being learned are relevant (Davis & Jayaratne, 2015).

Agricultural mechanics is a content area comprised of numerous skills which have varying levels of importance. Laird (1994) identified 60 skills related to agricultural mechanics instruction, while Shultz et al. (2014) identified 54 skills appropriate for secondary agricultural mechanics instruction in 2014. Separated in time by two decades, skills included in the studies done by Laird (1994) and Shultz et al. (2014) showed the impact made by technological advancements. Skills such as Global Positioning Systems (GPS) and Computer Numerical Control (CNC) Plasma Cutting were not included in the list of agricultural mechanics skills twenty years previous, yet were rated as important by secondary agricultural education teachers in 2014 (Laird, 1994; Shultz et al., 2014). It is vital that the skills taught in agricultural education remain up-to-date in order to prepare students with the proper 21st Century Skills needed for employment (Davis & Jayaratne, 2015). Secondary agricultural education teachers have reported a general inadequacy in regards to the tools and equipment available to them for agricultural mechanics instruction, making it difficult for programs to remain up-to-date (McCubbins, Anderson, Paulsen, & Stremsterfer, 2015). For agricultural education programs to be efficient with the time of their students, skills of greater importance should receive more focus in the curricula. The need for secondary agricultural education programs to remain up-to-date in the skills they are teaching is of utmost importance. To better prepare schools for what they should be teaching, it may also be helpful to look into what skills will be important to teach in the future.

Theoretical Framework

The theoretical framework guiding this study was Fishbein and Ajzen's (1975) attitude theory. More recently, Ajzen and Fishbein (2005) suggested intentions toward an action tend to foretell behavior. Ajzen and Fishbein (2005) further stated that there are three considerations which can result in a person engaging in a specific behavior: "the likely positive or negative consequences of the behavior, the approval or disapproval of the behavior by respected individuals or groups, and the factors that may facilitate or impede performance of the behavior" (p. 193). In connection to this study, secondary agricultural education teachers must consider all three of the factors listed above in determining their instructional behaviors, or what skills they will include in their curricula. Secondary agricultural education teachers need to determine if teaching a particular skill in greater or lesser depth will have a positive impact on their students. These teachers also need to evaluate the perceptions of respected individuals or groups such as administrators or industry leaders to decide if their behaviors will meet the needs and expectations of local programs.

Purpose and Objectives

The purpose of this study was to describe the perceived level of importance in regards to specified agricultural mechanics skills. This research purpose aligns with the National Career and Technical Education Research Agenda (Lambeth, Elliot, & Joerger, 2008) research problem areas (RPA) 2: Curricula and Program Planning and RPA 3: Delivery Methods. These RPAs specifically relate to the research objectives (RO) 2.2 Curricula Designs and RO 3.1 Best Practices. The specific research activities (RA) addressed includes RA 2.2.1 Needs of Future Workforce and RA 3.1.3 Marketing for Rigor and Relevance. This research also aligns with the American Association for Agricultural Education National Research Agenda priority area 5, which is focused on effective and efficient implementation of agricultural education programs (Roberts, et al., 2016). The objectives of this study were as follows:

1. Determine the current depth agricultural mechanics skills are taught by Iowa secondary agricultural education teachers.
2. Determine Iowa secondary agricultural education teachers' perceived importance to teach agricultural mechanics skills in ten years.
3. Determine the direction secondary agricultural mechanics skills' levels of importance are projected, from current to future

Methods

This non-experimental quantitative study used a population of secondary agricultural education teachers in Iowa active during the spring of 2016. The *2015-2016 Iowa Agricultural Education Directory* included a total of 241 secondary agricultural education teachers, of which 202 had valid email addresses. A census was conducted to more accurately describe characteristics of the population and reduce potential error associated with subject selection and sampling.

The two-section data collection instrument used in this study was modified by the researchers from two instruments first developed by Laird (1994), and Shultz et al. (2014). Laird's (1994) instrument was determined to have a Cronbach's alpha reliability coefficient of .97. The instrument used by Shultz et al. (2014) also yielded a Cronbach's alpha reliability coefficient of .97. The researchers merged those instruments into one instrument and modified the new instrument by including additional instructional areas that were unavailable in 1994. The first section listed each agricultural mechanics skill under one of eight constructs. The eight constructs included *Carpentry and Woodworking*, *Metal Processes and Metalworking*, *Electrical Power*, *Farm Structures*, *Farm Power and Machinery*, *Natural Resource Management*, *Shop Safety*, and *Computer and Problem Solving.* Section one consisted of a nine-point summated double-matrix rating scale. The nine-point summated rating scale allowed subjects to respond to each skill area twice; once rating the current depth they taught each skill (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*) and again rating the level of importance they perceived each skill would have in ten years (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important). The second section asked respondents to answer personal and program demographic information.

The new modified survey instrument was reviewed by a panel of experts to determine face and content validity. The panel of eight experts consisted of agricultural education faculty members in different institutions across the United States. The panel also helped to determine additional instructional areas which should be included. Following the expert review, the final instrument included 102 skills related to secondary agricultural mechanics. The modified instrument was then pilot tested for reliability. Using data collected in a pilot study of agricultural teachers (n = 10) from an adjoining state, the instrument's overall Cronbach's alpha was calculated ($\alpha = 0.95$), which was translated as having high reliability (Ary, Jacobs, Razavieh, & Sorensen, 2006). Construct reliability scores can be viewed in Table 1. Constructs with a Cronbach's alpha coefficient 0.90 or higher were determined to be highly reliable, while reliability coefficients less than 0.90 were less reliable (Ary, et al., 2006).

Table 1
Construct Specific Cronbach's Alpha Reliability Coefficients for Current Depth and Perceived Future Importance of Secondary Agricultural Mechanics Skills Taught

Construct	Current α	Future α
Shop Safety	0.84	0.87
Carpentry and Woodworking	0.95	0.95
Computer and Problem Solving	0.86	0.90
Electrical Power	0.96	0.95
Metal Processes and Metalworking	0.95	0.97
Farm Structures	0.93	0.94
Farm Power and Machinery	0.96	0.98
Natural Resource Management	0.94	0.97

$\alpha \geq 0.90$ = highly reliable, $\alpha \leq 0.80$ = unsatisfactory (Ary, et al., 2006)

Data collection steps outlined by Dillman, Smyth, & Christian (2009) was used for this study. First a standard pre-notice e-mail was sent, followed three days later by the invitation to participate which included the survey link. The survey was distributed electronically using the Qualtrics online program. As incentive to complete the survey, participants who completed the questionnaire were entered into a drawing for a three cylinder John Deere diesel engine. A weekly thank you or reminder was sent out for two more weeks and a final thank you or reminder was sent out on the third week before closing data collection. These efforts yielded 64 completed surveys for a 31.7% response rate. Miller's and Smith's (1983) recommendation of comparing respondents' personal and program demographic data to data from the Iowa Department of Education (2015) was used to address potential non-response error.

Results regarding the characteristics of the respondent teachers' and their secondary agricultural education programs, the average respondent demographics were teachers male (55%), who are 39.75 years of age, and have taught fewer than 10 years (54%). The average respondent held a Bachelor's degree as their highest degree obtained and taught in a secondary school with enrollment between 101 and 250 (41%), and enrollment in the agricultural education program was 51 and 100 students (51%).

Results

The second objective of this study examined the depth of agricultural mechanics skills being taught by agricultural education teachers and those teachers' perceptions of the level of importance those skills will have in ten years. Mean scores were calculated using the respondents' current depth and future perception ratings of each agricultural mechanics skill. The 102 skills were organized into eight constructs and the grand mean scores for each construct are listed below, in Table 2.

Table 2
Grand Mean Scores for Each Construct's Current Depth of Instruction and Perceived Future Importance

Construct	Current		Future		Δ *M*
	M	*SD*	*M*	*SD*	
Shop Safety	4.99	1.74	6.89	1.26	1.90
Carpentry and Woodworking	4.08	1.85	5.71	1.73	1.63
Computer and Problem Solving	3.70	1.35	5.89	1.43	2.19
Electrical Power	3.63	2.25	6.29	1.95	2.66
Metal Processes and Metalworking	3.40	1.62	5.56	1.76	2.16
Farm Structures	2.93	1.71	5.69	1.82	2.76
Farm Power and Machinery	2.84	1.70	5.63	1.87	2.79
Natural Resource Management	2.89	1.67	5.68	1.80	2.79

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Table 3 through Table 9 show the calculated mean scores for both current and future importance. Within each construct, the skills are ordered by mean score. To show the predicted change in the teacher's perceived importance of the agricultural mechanics skills over the next ten years, the change in mean scores between current and future perceptions were also calculated. Teachers' perceptions of the current and future importance of *Carpentry and Woodworking* skills are shown in Table 3. The results indicated the skill with greatest current perceived importance to teach at the secondary level was Power Tools (*M* = 5.22). Power Tools (*M* = 6.67) was also rated as the woodworking skill which will have the greatest importance in the future. The greatest positive mean change was found to be in the Concrete skill (Δ*M* = 2.17), which also showed to have the second lowest scores for both current and future perceived importance within the woodworking construct.

Table 3
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Carpentry and Woodworking Skills at the Secondary Level

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Power Tools	63	5.22	2.64	60	6.67	2.14	1.45
Project Construction	63	5.08	2.39	61	6.51	2.01	1.43
Bill of Materials	63	4.89	2.34	61	6.44	2.16	1.55

Project Design	63	4.78	2.23	59	6.51	1.97	1.73
Hand Tools	63	4.52	2.52	61	6.07	2.00	1.55
Selection of Materials	63	4.25	2.24	60	6.13	2.07	1.88
Construction Skills	63	3.97	2.64	61	5.66	2.37	1.64
Fasteners	63	3.75	2.32	60	5.47	2.24	1.72
Pneumatic Tools	63	3.27	2.30	60	5.38	2.31	2.11
Concrete	63	2.95	2.18	60	5.12	2.27	2.17
Painting and Preserving	61	2.10	1.01	59	3.19	1.11	1.09

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Results for secondary agricultural education teachers' perceptions of the current and future importance of *Metal Processes and Metalworking* skills are shown in Table 4. The results showed the skill with greatest current (M = 6.06) and future (M = 7.72) perceived importance to teach at the secondary level was Welding Safety, and was directly followed in perceived importance by Mechanical Safety. Computer Numeric Control (CNC) Plasma Cutting was found to have the greatest positive change between current and future perceived importance (ΔM = 3.94) within the metal processes and metalworking construct.

Table 4
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Metal Processes and Metalworking Skills at the Secondary Level

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	ΔM
Welding Safety	63	6.06	3.13	61	7.72	2.06	1.66
Mechanical Safety	63	5.73	3.10	61	7.44	2.14	1.71
GMAW Welding	62	5.44	2.98	60	7.02	2.16	1.58
SMAW Welding	62	5.10	2.91	60	6.33	2.23	1.23
Project Construction	63	4.87	2.50	61	6.52	2.13	1.65
Project Design	62	4.74	2.44	60	6.48	2.02	1.74
Oxy-acetylene Cutting	62	4.42	2.89	60	5.77	2.55	1.35
Plasma Cutting (Hand)	61	4.34	2.99	59	6.24	2.11	1.90
Metal Grinding	63	4.17	2.26	60	5.25	2.23	1.08
Oxy-acetylene Welding	61	3.34	2.65	59	5.22	2.55	1.88
Tool Conditioning	63	3.29	2.11	60	5.17	2.43	1.88
TIG Welding	62	3.13	2.57	60	6.15	2.40	3.02
Metallurgy and Metalwork	60	3.10	2.35	57	5.33	2.39	2.23
Brazing	61	3.08	2.67	59	5.17	2.51	2.09
Plasma Cutting (CNC)	62	2.74	2.70	60	6.68	2.19	3.94
Cold Metal Work	62	2.55	2.09	60	4.67	2.29	2.12
Metal Machining	63	2.48	2.05	60	4.87	2.49	2.39
Sheet Metalworking	63	2.48	2.26	61	4.64	2.59	2.16
Soldering	62	2.44	2.06	60	5.08	2.41	2.64
Pipe Cutting and Threading	61	2.13	1.71	60	4.45	2.38	2.32
Hot Metal Work	61	2.05	1.83	58	4.43	2.66	2.38

Virtual Reality Welding	61	1.75	1.55	59	5.10	2.44	3.35
Virtual Assisted Welding	61	1.62	1.47	59	5.02	2.39	3.40
Plastic Welding	62	1.61	1.45	60	4.73	2.48	3.12
Oxy-propylene Cutting	60	1.60	1.38	58	4.00	2.37	2.40

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Table 5 shows secondary agricultural education teachers' perceived level of current and future importance to teach skills related to teaching *Electrical Power* at the secondary level. Electrical Safety was found to be the skill with the greatest perceived current (M = 4.70) importance to teach as well as greatest perceived future (M = 7.38) importance to teach at the secondary level. Electrical Controls and Automation Devices was found to have the lowest current perceived importance (M = 2.45), yet had the greatest positive change in mean scores between teachers' current and future perceptions (ΔM = 3.33). Electric Motors was found to have the lowest perceived importance to teach in the future (M = 5.66).

Table 5
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Electrical Power Skills at the Secondary Level (N = 63)

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Electrical Safety	63	4.70	3.14	61	7.38	2.03	2.68
Wiring	63	4.21	2.67	61	6.46	2.09	2.25
Circuits	62	3.87	2.51	59	6.29	2.11	2.42
Electrician Tools	62	3.81	2.51	59	6.22	2.18	2.41
Electric Motors	63	2.73	2.05	61	5.66	2.30	2.93
Electric Controls and Automation Devices	62	2.45	1.91	60	5.78	2.34	3.33

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Results regarding secondary agricultural education teachers' perceptions on the current and future importance to teach *Farm Structure* skills are shown in Table 6. The results indicated the skill with the greatest current (M = 3.61) perceived importance to teach at the secondary level is Energy Conservation. Energy Conservation was also rated as the farm structure skill that will have the greatest importance in the future (M = 6.38). The greatest positive mean change was found to be in the Plumbing skill (ΔM = 3.07).

Table 6
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Farm Structure Skills at the Secondary Level (N = 63)

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Energy Conservation	62	3.61	2.34	60	6.38	2.02	2.77

Environmental Control	62	3.27	2.31	60	6.20	2.14	2.93
Waste Handling Systems	62	3.26	2.28	60	6.22	2.10	2.96
Farmstead Layout	62	3.05	2.37	59	5.29	2.40	2.24
Concrete and Masonry	62	2.79	2.09	59	5.41	2.30	2.62
Framing	63	2.76	2.18	60	5.70	2.16	2.94
Roofing	62	2.56	2.10	60	5.63	2.19	3.07
Fencing	62	2.50	1.98	59	4.93	2.47	2.43
Plumbing	61	2.48	1.87	60	5.55	2.17	3.07

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Results for agricultural education teachers' perceptions on the current and future importance of teaching *Farm Power and Machinery* skills at the secondary level are shown in Table 7. The results showed the skill with greatest current level of importance to teach at the secondary level is Small Engine Safety (*M* = 4.31). Power and Machinery Safety was rated as the skill with the highest level of perceived future (*M* = 6.70) importance to teach at the secondary level, directly followed by Small Engine Safety (*M* = 6.60). The skill with the greatest positive change in between current and future importance mean scores was Transmissions (Δ*M* = 3.61).

Table 7
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Farm Power and Machinery Skills at the Secondary Level (*N* = 63)

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Small Engine Safety	61	4.31	3.10	60	6.60	2.32	2.29
Small Gas Engines	62	4.13	2.88	59	5.92	2.03	1.79
Power and Machinery Safety	62	4.11	2.80	60	6.70	2.24	2.59
4-Cycle Small Engine Service	60	3.95	2.79	59	6.02	2.06	2.07
Preventive Maintenance	60	3.72	2.68	59	6.32	2.14	2.60
Small Engine Overhaul	60	3.55	2.74	59	5.75	2.17	2.20
Tractor Safety	61	3.39	2.78	59	6.76	2.25	3.37
2-Cycle Small Engine Service	61	3.38	2.31	59	5.64	2.14	2.26
Machinery Operation	61	3.28	2.43	58	5.97	2.19	2.69
Manual and Catalog Usage	61	2.77	2.36	59	5.49	2.29	2.72
Multi-cylinder Gas Engines	61	2.59	2.21	59	5.53	2.25	2.94
Tractor Restoration	62	2.55	2.12	60	5.28	2.20	2.73
Tractor Maintenance	61	2.46	2.26	59	5.54	2.40	3.08
Tractor Service	61	2.36	2.07	59	5.37	2.36	3.01
Machinery Management	61	2.36	2.05	58	5.59	2.19	3.23
Tractor Operation	61	2.31	2.04	58	5.66	2.19	3.35
Tractor Driving	61	2.21	1.94	59	5.27	2.38	3.06
Machinery Selection	61	2.20	1.84	57	5.12	2.14	2.92
Tractor Overhaul	61	2.16	1.99	58	5.05	2.27	2.89
Diesel Engines	60	2.12	1.93	59	5.63	2.29	3.51
Tractor Selection	60	2.07	1.78	58	4.95	2.43	2.88

Hydraulics	61	1.97	1.63	59	5.39	2.27	3.42
Electrical Systems and Monitoring Devices	61	1.87	1.70	58	5.33	2.34	3.46
Drive Trains	60	1.63	1.29	58	5.07	2.38	3.44
Transmissions	61	1.56	1.30	59	5.17	2.37	3.61

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Secondary agricultural education teachers' perceived level of current and future importance to teach *Natural Resource Management* skills can be seen in Table 8. Legal Land Descriptions was the skill shown to have the highest level of perceived current (M = 3.90) importance to teach at the secondary level, while Global Positioning Systems (GPS) was shown to have the greatest level of perceived future (M = 6.76) importance to teach at the secondary level. The greatest change between current and future perceived importance within the metal processes and metalworking construct was seen in Alternative Energy (Hydro) (ΔM = 3.19).

Table 8
Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Natural Resource Management Skills at the Secondary Level (N = 63)

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Legal Land Descriptions	60	3.90	2.51	59	6.03	2.02	2.13
Global Positioning Systems	61	3.62	2.35	59	6.76	1.78	3.14
Alternative Energy- Wind	60	3.50	2.54	59	6.47	2.02	2.97
Alternative Energy- Biofuels	61	3.44	2.51	59	6.51	1.84	3.07
Alternative Energy- Solar	59	3.36	2.53	58	6.47	2.01	3.11
Conservation Structures	60	3.08	2.36	58	5.81	2.31	2.73
Alternative Energy- Hydro	58	2.95	2.38	58	6.14	2.04	3.19
Surveying	60	2.73	2.08	58	5.26	2.04	2.53
Differential Leveling	59	2.41	2.25	57	4.54	2.39	2.13
Grading	60	2.22	1.71	57	5.02	2.20	2.80
Profile Leveling	60	2.17	2.00	58	4.62	2.41	2.45
Irrigation Structures	60	2.02	1.72	58	4.90	2.25	2.88
Pumps	58	1.83	1.37	58	4.66	2.28	2.83

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Table 9 shows the results for secondary agricultural education teachers' perceived level of current and future importance to teach *Shop Safety* skills at the secondary level. Teaching Safety Clothing and Protective Devices was shown to be the skill with the greatest level of both current (M = 6.63) and future (M = 7.90) importance to teach. Shop Layout, was the skill with the lowest perceived levels of both current (M = 2.11) and future (M = 3.29) importance. CPR and First Aid had the greatest positive change between the current and future mean scores (ΔM = 3.27) within the shop safety skills construct.

Table 9

Secondary Agricultural Education Teachers' Current and Future Perceptions on the Importance of Teaching Shop Safety Skills at the Secondary Level (*N* = 63)

Instructional Topic	Current			Future			
	n	*M*	*SD*	*n*	*M*	*SD*	Δ *M*
Safety Clothing and Protective Devices	62	6.63	2.34	60	7.90	1.61	1.27
Shop and Tool Safety	62	6.45	2.65	59	7.85	1.51	1.40
Chemical Handling and Storage	61	5.54	2.42	59	7.78	1.40	2.24
CPR and First Aid	62	4.21	2.44	60	7.48	1.96	3.27
Shop Layout	61	2.11	0.97	58	3.29	1.11	1.18

Current (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
Future (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Conclusions, Recommendations, and Implications

The purpose of this study was to describe the perceived current and future importance of teaching secondary agricultural mechanics skills among secondary agricultural education teachers. The average Iowa secondary agricultural education teacher involved in this study was male (55%) of approximately 40 years of age, holding a Bachelor's degree as their highest degree obtained, having taught fewer than 10 years (54%), in a secondary school with enrollment between 101 and 250 students (41%), and enrollment in the agricultural education program was 51 and 100 students (51%). It is possible to assume that due to the average school size and agricultural education program included in this study being relatively small, that these programs find it difficult to offer in-depth agricultural mechanics courses. The reason certain skills are not currently being taught in great depth may not be because teachers do not believe those skill are important, but rather they do not have enough time to teach those skills at the depth they believe is necessary. If secondary agricultural education teachers only teach approximately two agricultural mechanics courses per semester (Hoerner & Bekkum, 1990; Byrd et al., 2016), it becomes nearly impossible to teach all 102 agricultural mechanics skills in great depth.

The second objective of this study was to determine Iowa agricultural education teachers' perceptions regarding the current importance of skills related to agricultural mechanics. Many of the skills rated as being currently taught in greatest depth were skills related to safety. For example, Welding Safety, Mechanical Safety, Electrical Safety, Small Engine Safety, Power and Machinery Safety, Safety Clothing and Protective Devices, and Shop and Tool Safety were all skills that were rated within the top two skills currently taught with the most depth within their constructs. Based on this finding, we can assume that secondary agricultural education teachers are very conscientious of their students' safety. Saucier, Vincent, and Anderson (2014) recommended that professional development facilitators work closely with Occupational Safety and Health Administration to focus on agricultural mechanics laboratory safety. This can be connected with the attitude theory (Fishbein & Ajzen, 1975), where teachers are deciding to teach safety skills based on the positive impact it will have on the students' well-being.

Ajzen and Fishbein (2005) further noted that the action taken by an individual, conceptualized in this study by the content an agricultural educator chooses to include in their teaching, is based upon “the approval or disapproval of the behavior by respected individuals or groups” (p. 193). For agricultural education teachers, industry leaders serve as respected groups to help with curriculum development decisions. Beginning teachers likely do not have the industry connections to know what depth these skills should be taught. Therefore, this data can be valuable in helping beginning teachers focus their efforts immediately on the skills their colleagues have reported to be important for inclusion into the curriculum.

The third objective of this study was to determine the direction secondary agricultural mechanics skills’ levels of importance are projected, from current to future. Notably, all 102 skills included in this study were rated as being more important in the future than the depth they were taught at the time of this study. This result leads the researchers to conclude that even though agricultural mechanics is currently considered to be an important content area for inclusion in secondary agricultural education, it will be even more important in ten years. Burris, Robinson, and Terry (2005) noted that teacher educators are underprepared to teach the agricultural mechanics skills they perceived as important. Based on this conclusion, efforts need to be made immediately to prepare the next generation of agricultural education teachers with the skills necessary to teach agricultural mechanics.

The grand mean scores for each construct showed that the areas of *Electrical Power, Farm Structures, Farm Power and Machinery,* and *Natural Resource Management*, will see the greatest increase in importance in the next ten years. Therefore, professional development should begin to focus heavily on these areas so that agricultural education teachers are prepared to teach the content which is emerging in importance. While *Shop Safety* still remains as the construct with the greatest perceived future importance, *Metal Processes and Metalworking* saw a significant decline in importance relative to the other constructs as it became the construct with the least perceived importance for the future. These findings provide teacher preparation programs and professional development facilitators with a guideline to use so that they may focus the training they provide on the areas of greatest future need.

In almost all cases, the skill that received the highest rating for current depth taught in each construct also received a high rating for future importance. In fact, the only construct in which the aforementioned result was not observed was *Natural Resource Management*, with the current most important skill being Legal Land Descriptions. Legal Land Descriptions then fell to being the sixth most important skill in the future, while the four renewable energy skills, Wind, Biofuels, Solar, and Hydro all saw an increase in their placement n the *Natural Resource Management* construct. This means that when comparing a particular skills’ level of importance to another skill, the relative levels of importance are not perceived to change much in the next ten years. However, preservice teacher training and professional development trainings need to increase their efforts in ensuring teachers are prepared to teach renewable energy skills.

It can also be noted that the current skills which rated lower in depth taught at the time of this study generally saw a greater increase in mean score change between current depths taught and perceived future importance. This could be a result of teachers’ limitations in the depth they are currently able to teach certain skills, even if they do perceive those skills to be very important to teach. Examples of these limitations could be budget or available time for example (Buabeng-Andoh, 2012). It is also possible to assume that the teachers involved in this study foresee a more uniform level of importance among agricultural mechanics skills. Not surprisingly, skills related to emerging technologies saw large increases in mean scores between current and future importance. For example, Robotics, Virtual Reality Welding, Virtual Assisted Welding, and Computer Numeric Controlled (CNC) Plasma Cutting were all skills with a mean change score greater than 3.25. Likely, teachers believe that as technology advances, skills utilizing these technologies will increase in importance. Although CNC Plasma Cutting was not included in the list of skills two decades ago (Laird, 1994), and was rated as important by Shultz et al. (2015), teachers in this study reported little depth in their own teaching of CNC Plasma Cutting. Respondents of this study then reported CNC Plasma Cutting as a skill that will be important in the future, with a 3.94 change in mean score, from current depth taught to future importance. Research has also shown that teachers felt adequate overall in their own ability to teach agricultural mechanics skills (Byrd, Anderson, Paulsen, & Shultz, 2015).

Secondary agricultural education teachers have shown that the tools they have available for agricultural mechanics instruction are often inadequate, as is the technical training they have received to teach agricultural mechanics (Burris, et al., 2005; McCubbins et al., 2015). By noting the generally small size of enrollment for agricultural programs included in this study, it is very possible that teachers simply do not have enough time, knowledge, or adequate facilities to teach all of these agricultural mechanics skills to the depth they desire. The potential barriers of having inadequate knowledge, skills, or equipment can hinder a teachers' ability to teach needed skills in depth (Buabeng-Andoh, 2012).

According to Fishbein and Ajzen's (1975) attitude theory, secondary agricultural education teachers need to analyze and work towards overcoming these barriers. This study relies on secondary agricultural education teachers to be curriculum experts. As outlined in Roberts and Ball (2009), secondary agricultural education teachers should be using industry validated curriculum. However, it is possible to assume that due to the barriers identified which may impede an educator's decision to include a particular skill into the curriculum. Again, we recommend additional training focused on strengthening technical content knowledge among secondary agricultural education teachers, as well as focusing training on how to efficiently manage an agricultural mechanics laboratory that is limited in equipment. There were 25 skills in this study that showed a change in mean scores that was 3.0 or higher. These skills provide an excellent starting point for professional development to address the greatest areas of need.

A recommendation for further research is to determine the depth industry leaders believe agricultural mechanics skills should be taught, and what depth they foresee agricultural mechanics skills needing to be taught over the next decade. This study brings forth evidence of teachers' acknowledgement of their need to know 21st century skills, or soft skills deemed necessary by employers (Roberts, et al., 2016), and is valuable insight into which 21st century skills teachers will need to be trained in order to adequately prepare their students (Davis & Jayaratne, 2015). Additionally, this study provides a platform from which beginning teachers can begin to develop their agricultural mechanics curriculum. Beginning teachers who may have few industry connections, can use the data collected from other agricultural educators to determine what depth their peers are teaching agricultural mechanics skills.

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A Longitudinal Comparison of the Importance of Agricultural Mechanics Skills Taught

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Abstract

Agricultural mechanics is a popularly taught content area among secondary agricultural education programs (Herren, 2015). Unfortunately, post-secondary preparation received by agricultural educators often leaves them feeling unprepared to teach agricultural mechanics content (Stripling, Thoron, & Estepp, 2014). In a content area as broad as agricultural mechanics, it is important to focus teacher preparation on the skills that will be most important to teach at the secondary level (Shultz, Anderson, Shultz, & Paulsen, 2014). In 1994, Laird conducted a study using secondary agricultural education teachers across the United States to determine the depth agricultural mechanics skills were being taught at the time, and how important those skills would be in 2004. The researchers conducted a follow up study in 2016, using secondary agricultural education teachers in Iowa as the population. This research compares the findings from both Laird, and the researchers to form a longitudinal study spanning 32 years between the depth skills that were taught in 1994 and the predicted importance of those skills in 2026. Findings from this study show that the overall depth of secondary agricultural mechanics instruction has decreased. Obstacles such as limited budgets, lack of administrative support, and teacher's knowledge of the skills have been identified as possible barriers that have caused agricultural mechanics content to be taught in reduced depth. Teachers should use this information to prioritize the skills in their curriculum so that the skills with the most perceived importance are being taught in greatest depth.

Introduction

Today's employers are seeking employees with 21st century skills (National Research Council, 2012), and agricultural education plays a crucial role in incorporating and developing these skills (National Research Council, 2009). Agricultural education has proven to be a powerful tool in helping students apply Science, Technology, Engineering, and Mathematics (STEM) skills into real-world situations (Ricketts, Duncan, & Peake, 2006; Shultz, Anderson, Shultz, & Paulsen, 2014). Contrary to the concern noted by Buriak (1992), Miller (1991) posited that agricultural mechanics "is a scientific based curriculum which provides the ideal setting to apply selected principles of physics, chemistry, and mathematics" (p. 4). Specifically in agricultural mechanics, research has shown that secondary agricultural education instructors integrate mathematics content into 23% of their lessons (Anderson & Driskill, 2012).

Data collected from Connors and Mundt (2001) showed agricultural education teacher preparation program's credit requirements for technical agriculture to be 43.4 credits. Burris, Robinson, and Terry (2005) reported the credit requirement specifically related to agricultural mechanics was 9.13, which was slightly higher than the average of 7.3 agricultural mechanics credits required at teacher preparation institutions between 1992 and 1995 (Hubert & Leising, 2000). However, McKim and Saucier (2011) noted a reduction in required agricultural mechanics courses among universities. Byrd, Anderson, Paulsen and Shultz (2015) reported that approximately 29% of agricultural education teachers in Iowa had taken only one post-secondary course in agricultural mechanics and nearly 35% had not taken any post-secondary agricultural mechanics courses, yet active teachers maintained a sense of competence in their agricultural mechanics instruction. Contrary to the competence felt by current teachers, 83.3% of Iowa preservice teachers taught agricultural mechanics content during their student teaching experience, yet still felt unprepared to teach agricultural mechanics content (Stripling, Thoron, & Estepp, 2014). Burris, McLaughlin, McCulloch, Brashears, and Fraze (2010) identified agricultural mechanics as an area of concern among beginning teachers but deemed that over a five year period agricultural mechanics often became a course teachers felt confident teaching. In addition to feeling unprepared to teach, McCubbins, Anderson, Paulsen, & Stremsterfer (2015) also found many secondary agricultural mechanics facilities to be inadequately equipped with the tools necessary to teach effectively.

Despite a lack of post-secondary agricultural mechanics training received by teachers, and uncertainty regarding teachers' perceptions of their own competence to teach the subject, agricultural mechanics remains popular among secondary programs and their students (Herren, 2015). Rudolphi and Retallick (2011) found that nearly 90% of the agricultural education teachers in Iowa included some form of agricultural mechanics instruction into the curricula. In several states, secondary agricultural education teachers averaged two agricultural mechanics courses taught per semester (Hoerner & Bekkum, 1990). Byrd, Anderson, and Saucier (2016) found that, on average, agricultural education teachers dedicated 7.48 hours to agricultural mechanics laboratory instruction per week. Students enrolled in agricultural mechanics courses can explore a vast array of agricultural mechanic skills which are needed in many careers related to agriculture which will prove valuable over a lifetime (Herren, 2015; Shultz, et al., 2014). Regardless of the variety of skills to which students are exposed to during their secondary education, if skills are not learned in preparation for a progressive and rapidly changing future, their learning may be for naught (Davis & Jayaratne, 2015). In order to effectively prepare today's students for gainful employment, educational programs must look towards the future.

In 1994, Laird began to question the relevance of the skills taught in agricultural mechanics at the time. By examining the depth in which secondary agricultural education teachers across the United States taught individual agricultural mechanics skills, he was able to identify skills deemed most important to teach at the secondary level. Laird (1994) also asked the respondents to use their personal knowledge and connections with industry to predict the level of importance those same agricultural mechanics skills would hold in 2004, (ten years into the future). Utilizing the gathered insight into the future of agricultural mechanics allowed teacher education to design their instruction appropriately to meet the upcoming workforce needs.

More recently, we sought to follow up on the data collected by Laird (1994). We narrowed the scope to secondary agricultural programs in Iowa in an effort to generate results which could be more accurately utilized by educational programs in the area for agricultural mechanics curriculum design and professional development training purposes. McKim and Saucier (2011) recommended a longitudinal study of "in-service secondary agricultural education teachers' perceived importance of agricultural mechanics laboratory management competencies" (p. 84). By combining our data with that collected by Laird (1994), a broad, longitudinal view of the trends regarding the importance of secondary agricultural mechanics skills can be observed. This study analyzed the depth at which agricultural mechanics skills were taught in 1994 compared to 2016, the predicted importance of agricultural mechanics skills in 2004 compared to the predicted importance of skills in 2026, and also compares the predicted importance of agricultural mechanics skills in 2004 with the depth those skills were taught in 2016.

Comparing the data from the past with current results will help researchers determine the accuracy of the predictions made by secondary agricultural education teachers. This information could then lead to establishing a comprehensive list of the depth at which individual agricultural mechanics skills should be taught in order to educate students in the most efficient and purposeful manner possible. If secondary agricultural education teachers are currently not teaching skills as in depth as they feel are important, the barriers causing the lack of depth should be identified. In the context of factors influencing teachers' decisions to integrate technologies into their teaching, Buabeng-Andoh (2012), discussed many barriers which may prevent a teacher from adopting new information or technology. Among the barriers discussed were the teachers' attitudes, knowledge, skill level, and support and funding from the school, all of which could have a similar impact on secondary agricultural mechanics programs.

Conceptual Framework

The conceptual framework used in this study was derived from Roberts and Ball (2009) and can be seen below in Figure 1. As described in this model, agricultural education programs deliver content through a combination of social and cognitive constructivism. Through this epistemology, curriculum can be delivered to meet the individual needs of students, whether they remain in the agricultural workforce or not. Roberts and Ball (2009) posited that agricultural education teachers reinforce learning through hands-on interactions resulting in two outcomes: a skilled agricultural workforce, and successful lifelong learners that are agriculturally literate citizens. The curriculum used by agricultural education teachers is crucial to generating the aforementioned outcomes. At the very root of this model is the idea that secondary agricultural education teachers use industry-validated curricula. In this study, secondary agricultural education teachers determined the depth agricultural mechanics skills are taught and to predict the future importance of agricultural mechanics skills based on the idea that they maintain connections with industry leaders in order to teach valid curricula.

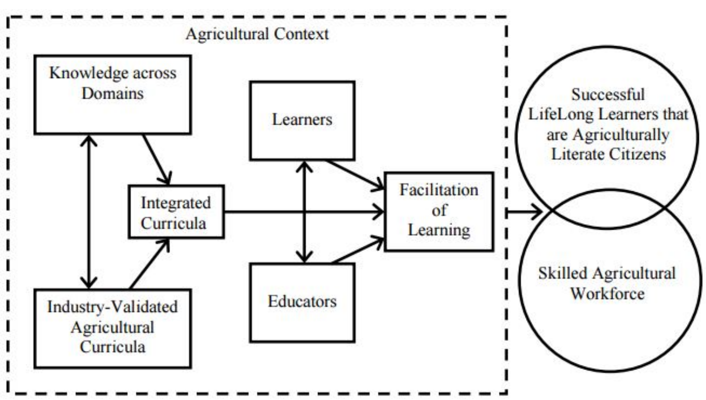

Figure 1. Conceptual model for agricultural subject matter as a content and context for teaching. (Roberts & Ball, 2009, p. 87)

Purpose and Objectives

The purpose of this study was to describe trends regarding the importance of secondary agricultural mechanics skills. This research purpose aligns with the American Association for Agricultural Education National Research Agenda (Roberts, Harder, & Brashears, 2016) Research Priority 3 which calls to determine the competencies needed for a viable agriculture workforce. This study also aligns with Research Priority Areas 2: Curricula and Program Planning, specifically Research Objective 2.1: Curricula Designs, under Research Activity 2.2.1: Needs of Future Workforce (Lambeth, Elliot, & Joerger, 2008). The objectives for this study were as follows:

1. Determine the change in the depth of agricultural mechanics skills taught in the U.S. in 1994 and in Iowa in 2016.
2. Determine the change in perceived importance of agricultural mechanics skills in the U.S. in 2004 and in Iowa in 2026.
3. Analyze the difference in past U.S. secondary agricultural education teachers' predictions about the future importance of secondary agricultural mechanics skills and the depth agricultural mechanics skills are currently being taught in Iowa.

Methods

This descriptive, non-experimental, quantitative study used a longitudinal approach to describe the perceptions of secondary agricultural education teachers regarding the importance of secondary agricultural mechanics skills. Our study and that of Laird (1994) were used to compare data collected over a 22 year span. Laird (1994) utilized a sample survey technique with secondary agricultural education teachers across the United States (n = 253). We used a census survey modified from the survey used by Laird (1994) to collect data from secondary agricultural education teachers in Iowa (n = 64).

Laird's (1994) instrument included 60 skills in nine constructs appropriate for inclusion in secondary agricultural mechanics curricula. One skill identified by Laird (1994), Oxy-Acetylene Welding and Cutting, could not be included in this study because when the instrument was modified Oxy-Acetylene Welding and Oxy-Acetylene Cutting were divided into two separate skills. The instruments designed by Laird (1994) consisted of nine constructs; *Carpentry and Woodworking, Metal Processes and Metalworking, Electrical Power, Farm Structures, Farm Power and Machinery, Soil and Water Management, Safety, Computer and Problem Solving,* and one construct (*Other*) made up of skills that did not fit in any of the other constructs. To determine face validity, Laird (1994) had the instrument reviewed by his major professor and other graduate students in the Department of Agricultural Education and Studies at Iowa State University. The instrument was then pilot tested using a random sample of 20 secondary agricultural education teachers in Iowa. Using Cronbach's alpha, the "overall reliability coefficient was 0. 97" (Laird, 1994, p. 42).

Laird's instrument was then revalidated in 2015 by a panel of eight experts who were agricultural education faculty members with backgrounds in agricultural mechanics at different institutions across the United States. Fink (1995) indicated that 10 people are typically needed to field test an instrument. In order to confirm the reliability of the instrument, another pilot study was conducted in 2016 using ten secondary agricultural education teachers from an adjoining state (*n = 10*). Following the pilot study, reliability was calculated using Cronbach's alpha (α = 0.92) which was determined to be highly reliable (Ary, Jacobs, Razevieh, & Sorensen, 2006). It should be noted that the researchers did not have access to the raw data from the 1994 study. Therefore, a limitation exists on the statistical analysis that could be conducted in this study.

The researchers asked respondents to evaluate a set of agricultural mechanics skills using a nine-point summated double-matrix rating scale. The double-matrix allowed respondents to answer twice; first rating the depth at which they currently teach each skill (1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*), and secondly rating the importance they perceive each skill to have in secondary agricultural education in 2026 (1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important). As a result, data collected showed the depth secondary agricultural mechanics skills were taught in 1994, the importance teachers believed those skills would have in 2004 (Laird, 1994), and the depth those skills were taught in 2016 as well as the importance of those skills in 2026.

To analyze trends relating to the importance of the agricultural mechanics skills included in this study, three major comparisons were analyzed. First, we looked at the change in mean score ratings each skill received for the depth they were taught in 1994 and the depth those same skills were taught in 2016. This comparison shows what changes have occurred in the level of depth agricultural mechanics skills were taught over a 22 year period. Next, we compared teachers' future perceptions of the importance of each skill by looking at what teachers in 1994 thought each skill's importance would be in 2004, and what teachers thought importance would be in 2026. Comparing these two categories gives insight into the changes in future perceptions of the importance of agricultural mechanics. Lastly, we compared the mean score for each of the skills from what the 1994 teachers thought would be important in 2004 with the depth teachers were teaching those skills in 2016. This comparison shows us, within a 12 year period, how teachers' perceptions of the importance of agricultural mechanics skills differs from the depth teachers are actually teaching those skills. Two tables were utilized for each of the three major comparisons. The first table shows the grand mean scores for each construct during the two time periods in question, as well as the change in grand mean scores. The second table shows the mean scores for each skill during the two time periods in question, as well as the change in mean scores.

Results

The first objective of this study was to determine the change in the depth of agricultural mechanics skills taught from 1994 to 2016. Table 4.1 shows each construct's grand mean scores from Laird (1994) and from this study. Constructs within Table 1 are arranged in order of greatest positive change in mean scores to least positive change in mean scores. Table 1 indicates that all constructs are taught in less depth than what they were taught in 1994. Computers and Problem Solving (ΔM = -0.52) showed the least change in mean scores while Others (ΔM = -2.46) showed the greatest change in mean scores.

Table 1

Construct Grand Mean Scores for the Current Depth Agricultural Mechanics Skills were Taught in the U.S. in 1994 and in Iowa in 2016

Construct	1994		2016			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Computers and Problem Solving	3.73	1.90	62	3.21	1.48	-0.52
Metal Processing and Metalworking	4.46	1.69	63	3.57	1.72	-0.89
Carpentry and Woodworking	5.81	2.16	63	4.90	2.21	-0.91
Safety	6.62	1.73	62	5.70	2.03	-0.92
Farm Structures	3.95	1.87	63	2.99	1.73	-0.96
Soil and Water Management	3.44	2.09	60	2.38	1.37	-1.06
Electrical Power	4.42	2.22	63	3.32	2.05	-1.10
Farm Power and Machinery	3.87	1.90	62	2.59	1.64	-1.28
Others	5.36	1.85	62	2.90	0.74	-2.46

(1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)

Table 2 compares the data collected from Laird (1994) with the data collected by the researchers. This comparison shows the depth secondary agricultural education teachers from across the United States taught each skill in 1994 in relation to the depth secondary agricultural education teachers taught each skill in 2016. In this comparison, four skills (Metric System, Robotics, Problem Solving Strategies, and Farmstead Layout) resulted in positive changes in mean scores between 1994 and 2016, while 55 skills resulted in a negative change in mean scores. The four skills with the greatest negative change in mean scores were Brazing, Painting and Preserving, Careers, and Cooperation and Teamwork. The top ten and bottom ten average change in mean scores were reported in Table 2.

The second objective of this study was to determine the change in perceived importance of agricultural mechanics skills in the U.S. in 2004 and in Iowa in 2026. Table 3 shows each construct's grand mean scores from Laird (1994) and from this study. Constructs within Table 3 are arranged in order of greatest positive change in mean scores to least positive change in mean scores. Table 3 indicates that the Farm Structures, and Soil and Water Management constructs saw the greatest positive change in mean scores (ΔM = 0.40), while the construct consisting of remaining skills, Others, saw the most negative change in mean scores (ΔM = -2.33).

Table 2

The Depth Secondary Agricultural Mechanics Skills Taught Across the United States in 1994 (*n ranges from 224 to 240*)*, and in Iowa in 2016 (n = 64)*

Instructional Topic	1994		2016			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Metric System	2.91	2.32	61	3.43	2.12	0.52
Robotics	2.01	2.07	60	2.12	1.91	0.11
Problem Solving Strategies	5.27	2.73	61	5.33	2.34	0.06
Farmstead Layout	3.02	2.12	62	3.05	2.37	0.03
GMAW Welding (MIG)	5.45	2.92	62	5.44	2.98	-0.01
TIG Welding	3.17	2.71	62	3.13	2.57	-0.04
Plastic Welding	1.73	1.75	62	1.61	1.45	-0.12
CPR and First Aid	4.40	2.99	62	4.21	2.44	-0.19
Computer Usage in Ag Mechanics	3.81	2.65	62	3.60	2.32	-0.21
Metal Machining	2.73	2.23	63	2.48	2.05	-0.25
Small Gasoline Engines	5.85	2.57	62	4.13	2.88	-1.72
SMAW Welding (Stick/Arc)	6.84	2.35	62	5.10	2.91	-1.74
Preventive Maintenance	5.46	2.61	60	3.72	2.68	-1.74
Surveying	4.49	2.68	60	2.73	2.08	-1.76
Plumbing	4.24	2.51	61	2.48	1.87	-1.76
Brazing	5.20	2.47	61	3.08	2.67	-2.12
Painting and Preserving	4.26	2.52	61	2.10	1.01	-2.16
Careers	6.26	2.31	62	3.53	1.00	-2.73
Cooperation and Teamwork	6.90	2.27	62	3.84	0.93	-3.06

(1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)

Table 3

Construct Grand Mean Scores for the Perceptions of the Importance of Secondary Agricultural Mechanics Skills Ten Years into the Future from Teachers Across the United States in 2004 (*N ranges from 224 to 240*) *and in Iowa in 2026*

Construct	2004		2026			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Farm Structures	5.29	1.90	61	5.69	1.81	0.40
Soil and Water Management	4.72	2.20	58	5.12	2.01	0.40
Farm Power and Machinery	5.31	1.94	60	5.57	1.99	0.26
Computers and Problem Solving	5.85	2.06	60	6.07	1.79	0.22
Electrical Power	5.90	2.15	61	6.05	2.04	0.15
Carpentry and Woodworking	6.44	1.95	61	6.44	1.83	0.00
Metal Processing and Metalworking	5.59	1.72	61	5.59	1.85	0.00
Safety	7.78	1.40	61	7.75	1.38	-0.03
Others	6.16	1.75	60	3.83	0.72	-2.33

(1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Table 4 compared Laird's data from 1994 which asked secondary agricultural education teachers from across the United States to rate the level of importance they perceived each skill would hold in 2004 with current data that asked secondary agricultural education teachers in Iowa in 2016 to rate the level of importance they perceived each skill would hold in 2026. Table 4.4 shows that all but 20 skills yielded a positive change in mean scores between the 2004 predictions and predictions for 2026. The skills with the greatest positive changes in mean scores were Fencing, Robotics, Transmissions, and Farmstead Layout, while the skills with the greatest negative changes in mean scores were Shop Layout, Painting and Preserving, Careers, and Cooperation and Teamwork. The top ten and bottom ten average change in mean scores were reported in Table 4.

Table 4

Perceptions of the Importance of Secondary Agricultural Mechanics Skills Ten Years into the Future from Teachers Across the United States in 1994 (*N ranges from 224 to 240*) *and in Iowa in 2016*

Instructional Topic	2004		2026			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Fencing	3.44	4.15	59	4.93	2.47	1.49
Robotics	4.52	2.94	58	5.91	2.47	1.39
Transmissions	3.99	2.54	59	5.17	2.37	1.18
Farmstead Layout	4.14	2.49	59	5.29	2.40	1.15
Metric System	4.72	2.91	59	5.75	2.28	1.03
Drive Trains	4.06	2.54	58	5.07	2.38	1.01
Metalworking Project Design	5.54	2.29	60	6.48	2.02	0.94
Metal Machining	4.03	2.58	60	4.87	2.49	0.84
Sheet Metalworking	3.88	2.39	61	4.64	2.59	0.76
Irrigation Structures	4.21	2.80	58	4.90	2.25	0.69
Safety Clothing and Protective Devices	8.25	1.42	60	7.90	1.61	-0.35
Computer Usage in Ag Mechanics	6.72	2.38	59	6.36	2.04	-0.36
Shop and Tool Safety	8.36	1.35	59	7.85	1.51	-0.51
Small Gasoline Engines	6.43	2.30	59	5.92	2.03	-0.51
Brazing	5.70	2.22	59	5.17	2.51	-0.53
SMAW Welding (Stick/Arc)	6.98	2.13	60	6.33	2.23	-0.65
Shop Layout	4.49	2.66	58	3.29	1.11	-1.20
Painting and Preserving	5.32	2.50	59	3.19	1.11	-2.13
Careers	7.33	1.93	59	4.32	0.80	-3.01
Cooperation and Teamwork	7.63	2.01	60	4.48	0.65	-3.15

(1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

The third objective of this study was to compare perceptions regarding the future importance of secondary agricultural mechanics skills from teachers in 1994 with the current depth those skills are currently being taught. Table 5 shows each construct's grand mean scores from Laird (1994) and from this study. Constructs within Table 5 are arranged in order of greatest positive change in mean scores to least positive change in mean scores. All constructs in Table 4.5 have seen a negative change in mean scores. The least negative change in mean scores was seen in Carpentry and Woodworking (*ΔM* = -1.54), and the most negative change in mean scores was in the construct made up of remaining skills, Others (*ΔM* = -3.26).

Table 5

Construct Grand Mean Scores for the Perceptions of the Importance of Secondary Agricultural Mechanics Skills Ten Years into the Future from Teachers Across the United States in 1994 (*N ranges from 224 to 240*) *and the Current Depth Those Skills were Taught in Iowa in 2016*

Construct	2004		2016			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Carpentry and Woodworking	6.44	1.95	63	4.90	2.21	-1.54
Metal Processing and Metalworking	5.59	1.72	63	3.57	1.72	-2.02
Safety	7.78	1.40	62	5.70	2.03	-2.08
Farm Structures	5.29	1.90	63	2.99	1.73	-2.30
Soil and Water Management	4.72	2.20	60	2.38	1.37	-2.34
Electrical Power	5.90	2.15	63	3.32	2.05	-2.58
Computers and Problem Solving	5.85	2.06	62	3.21	1.48	-2.64
Farm Power and Machinery	5.31	1.94	62	2.59	1.64	-2.72
Others	6.16	1.75	62	2.90	0.74	-3.26

(1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
(1 = *not important*, 3 = *of little importance*, 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Table 6 utilizes the predictions made by secondary agricultural education teachers in 1994 about the future importance of each agricultural mechanics skill in 2004 (Laird, 1994) and compares those predictions with the depth secondary agricultural education teachers in Iowa taught those same skills in 2016. The skills with the greatest positive change in mean scores were Safety Clothing and Protective Devices, Shop and Tool Safety, Metalworking Project Design, and Carpentry Project Construction, while the skills with the greatest negative change in mean scores were Irrigation Structures, Plastic Welding, Surveying, and Electrical Systems and Monitoring Devices. The top ten and bottom ten average change in mean scores were reported in Table 6.

Table 6

Perceptions of the Importance of Secondary Agricultural Mechanics Skills would have in 2004 from Teachers Across the United States in 1994 (*N ranges from 224 to 240*) *compared to the depth Those Skills were Taught in Iowa in 2016*

Instructional Topic	2004		2016			
	M	*SD*	*n*	*M*	*SD*	*Δ M*
Safety Clothing and Protective Devices	4.43	1.42	62	6.63	2.34	2.20
Shop and Tool Safety	4.26	1.35	62	6.45	2.65	2.19
Metalworking Project Design	3.44	2.29	62	4.74	2.44	1.30
Carpentry Project Construction	4.06	2.27	63	5.08	2.39	1.02
Power Tools	4.21	2.07	63	5.22	2.64	1.01
SMAW Welding (Stick/Arc)	4.11	2.13	62	5.10	2.91	0.99
Carpentry Project Design	4.14	2.34	63	4.78	2.23	0.64
Hand Tools	3.88	2.24	63	4.52	2.42	0.64
Problem Solving Strategies	5.00	2.49	61	5.33	2.34	0.33
Metal Grinding	4.52	2.31	63	4.17	2.26	-0.35
Manual and Catalog Usage	6.72	2.54	61	2.77	2.36	-3.95
Robotics	6.15	2.94	60	2.12	1.91	-4.03
Machinery Management	6.43	2.56	61	2.36	2.05	-4.07
Careers	7.63	1.93	62	3.53	1.00	-4.10
Drive Trains	5.78	2.54	60	1.63	1.29	-4.15
Applied Physics	7.80	2.86	59	3.34	2.24	-4.46
Irrigation Structures	6.98	2.80	60	2.02	1.72	-4.69
Plastic Welding	6.62	2.85	62	1.61	1.45	-5.01
Surveying	8.25	2.50	60	2.73	2.08	-5.52
Electrical Systems and Monitoring Devices	8.36	2.67	61	1.87	1.70	-6.49

(1 = *no depth*, 3 = *little depth*, 5 = *some depth*, 7 = *much depth*, 9 = *utmost depth*)
(1 = *not important*, 3 = *of little importance,* 5 = *somewhat important*, 7 = *important*, 9 = *very* important)

Conclusions, Implications, and Recommendations

The purpose of this study is to describe trends regarding the importance of secondary agricultural mechanics skills. The first objective of this study was to identify trends in the depth agricultural mechanics skills were taught at the secondary level. The two skills with the highest mean change between the depths taught in the U.S. in 1994 and in Iowa in 2016 were Metric System and Robotics. With the mathematic and technology principals required for Metric System and Robotics instruction, both of these skills can be easily integrated in a STEM based curricula, which could be a cause of the increase in the depth taught. Furthermore, Computers and Problem Solving was the construct which remained most constant from the depth taught in 1994 to 2016. Based on these findings, secondary agricultural education teachers are making efforts to change the skills included in their curriculum based on technological advancements and opportunities for STEM integration. This finding is similar to that of Stubbs and Myers

(2015) who reported secondary agricultural education teachers are making an effort to integrate STEM based content into their curricula.

The remaining 55 skills in Table 2 saw a negative change in depths taught in the U.S. in 1994 and in Iowa in 2016, meaning they are taught in less depth in Iowa than what they were taught 22 years ago in the U.S. Even so, according to our data current teachers believe all 59 skills will be more important in the future. Additionally, each construct in Table 1 saw a negative change in mean scores. It is possible that due to the reduced post-secondary training requirements in the early-to-mid 1990s (Burris, et al., 2005, Connors & Mundt, 2001; Byrd et al., 2015), the current depth at which these skills are being taught at the secondary level has diminished. The current lack of instructional depth could be a result of the educators responsible for delivering the content not receiving proper agricultural mechanics training during their post-secondary training. Skills may also be currently taught in less depth due to programs having inadequate tools (McCubbins et al., 2015). Having inadequate equipment makes it very difficult to teach agricultural mechanics skills at the depth secondary teachers deem necessary.

The second objective of this study was to determine future trends in secondary agricultural mechanics skill's levels of importance in ten years. Table 4 shows that 39 of the 59 skills and seven of the nine constructs were rated as having a higher future importance by Iowa teachers active in 2016 than the ratings received by U.S. teachers in 1994. This aligns well with the researcher's initial findings which showed that teachers perceived each of the 59 skills to be more important in the future. In general, it would seem that current agricultural education teachers in Iowa are optimistic about the important role agricultural mechanics will play in their programs. This also corresponds with the suggestion made by Davis and Jayaratne (2015) that it is important for students to be prepared with new century skills to "be competitive in the globalizing work place" (p. 54). Table 1 through Table 4 shows that teachers' perceptions of the future importance of agricultural mechanics skills has increased overall, yet the depth they are teaching these skills has decreased. Alarmingly, this shows that the gap between what should be taught and what is truly being taught is widening. For this reason it is important for teachers to continue evaluating the purpose behind what they are teaching. Is their current curriculum based on teaching skills they are comfortable with, skills for which they have adequate equipment, or is their curriculum based on what is most important for their students to know?

Objective three sought to compare perceptions regarding the future importance of secondary agricultural mechanics skills from teachers in 1994 compared to the current depth those same skills are taught. Interestingly, 50 skills in Table 4.6 and all nine constructs in Table 5 saw a negative change in mean scores between the predicted importance to teach the skills in 2004 and the depth those skills were taught in 2016. Results from Table 5 and Table 6 show that the teachers' optimistic views in 1994 have not been realized in 2016. This leads researchers to conclude that secondary agricultural mechanics taught in Iowa is taught in less depth overall in 2016 than what was predicted by teachers in 1994. In both this study and the study conducted by Laird (1994), all agricultural mechanics skills were predicted to be more important in the future than the depth they were currently being taught. Therefore, we need to determine why the depth agricultural mechanics skills are being taught does not meet the expectations from teachers in the past.

There are several possibilities as to why agricultural mechanics skills are not currently taught at the predicted depth. One key reason is that it is seemingly impossible to teach all 59 skills at more depth. Common sense would tell us that in order to teach one skill at more depth, another skill as a result will be taught in less depth due to having a limited amount of instructional time.

Based on these results, we can conclude that teachers are struggling to teach industry-validated agricultural mechanics content because the depth at which agricultural mechanics content is being taught has diminished over the past 22 years. According to the conceptual framework for this study, teachers should be working with industry to prepare a curriculum which prepares students to be lifelong learners who are successful in the workforce (Roberts and Ball, 2009). While teachers are not able to teach all agricultural mechanics skills in a depth that fully prepares students for college or careers, at a minimum students are being exposed to those career pathways which can lead to a student driven search for deeper content learning. Due to the decline in the depth of secondary agricultural mechanics instruction, secondary agricultural education teachers, post-secondary teacher educators, and professional development organizers need to work together to ensure the curriculum being taught will be useful to students as they enter the workforce.

For future research, we recommend looking at their realistic expectations regarding the depth they will actually teach those skills by asking teachers what depth they believe they will teach agricultural mechanics skill in ten years. It is also important to continue to research why teachers believe they might not be able to teach agricultural mechanics content in the depth they believe it should be taught. By better identifying the obstacles preventing educators from teaching relevant content, teacher preparation programs will be able to better train preservice teachers with methods for overcoming the restrictive barriers whether it is ways to find funding, stretch tight budgets, or to effectively communicate with administrators.

Findings from this study imply that secondary agricultural mechanics education in Iowa is not at the level teachers from 1994 had hoped that it would be in the U.S. Despite the shortcomings in the depth agricultural mechanics skills are being taught, secondary agricultural education teachers were optimistic 22 years ago, and their optimism is even greater today that agricultural mechanics is important. Teacher preparation programs, active teachers, and industry leaders are going to have to work together and communicate effectively to prioritize the many skills included in agricultural mechanics. For future research, we recommend studying the perceptions of industry leaders and post-secondary professionals regarding what depths they believe agricultural mechanics skills should be taught, and what level of importance they believe agricultural mechanics will have in ten years. Current agricultural education teachers should utilize this data to begin preparing themselves to teach the skills which are becoming increasingly important. Through diligent collaboration, secondary agricultural education students can experience tremendous learning opportunities that benefit themselves as well as the industries and communities in which they work.

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Exploring the Influences of School-Based Agricultural Education on Pre-Service Teachers' Choice to Teach Agriculture

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Abstract

Nationwide, agricultural education has experienced a shortage of qualified secondary school agriculture teachers for over four decades. Students who seek careers as agriculture teachers are often those who participated in agricultural education and FFA in high school. The Factors Influencing Teaching Choice (FIT-Choice) Model was used as the theoretical framework for this phenomenological study which sought to explore how active participation in school-based agricultural education programs influenced students' choice to major in agricultural education and pursue a career in teaching. Seven agricultural education majors who participated in agricultural education and FFA in high school participated in a focus group interview. Transcripts of the focus group interview were analyzed and coded for thematic content using open, axial, and selective coding protocols. Five themes emerged from the data, which included, 1) socializer influencers, 2) social value 3) passion for agriculture, 4) alignment with personal values, and 5) agricultural education factors. The agricultural education factors theme was broken into four sub-themes, which include agriculture teacher encouragement, FFA events, increased self-efficacy through a quality program, and post-high school opportunities. Based on the findings, implications and recommendations for recruitment are discussed.

Introduction and Need for the Study

The agricultural education profession has been plagued with a shortage of teachers for more than 40 years (Kantrovich, 2010). The most recent supply and demand study revealed that in the beginning of 2014 school year, there were 76 full-time and ten part-time agricultural education vacancies yet to be filled (Foster, Lawver, & Smith, 2014). Many agriculture teacher positions go unfilled every year because administrators are unable to find qualified candidates to fill positions. The lack of qualified agriculture teachers also impacts school districts desiring to open new programs. The failure to find sufficient qualified teachers to replace those who leave could mean termination of an entire program.

Solving this teacher shortage in agricultural education is imperative if we are to adequately meet the scientific and professional agricultural workforce demands of this century. Today's agricultural and STEM employers throughout the U.S. report shortages of skilled workers (Goeker, Smith, Fernandez, Ali, & Theller, 2015; U.S. Congress Joint Economic Committee, 2012). Priority area three of the 2015-2020 National Research Agenda of the American Association for Agricultural Education places emphasis on attracting and developing the next generation of agricultural scientists (Stripling & Ricketts, 2016). These publications emphasize the importance of obtaining individuals to fill these positions as well as creating an educated workforce. One way to address these needs is through school-based agricultural education. According to Phipps and Osborne (1988), the most important function of school-based agricultural education is to prepare youth for careers in agriculture. Fraze and Briers

(1987) explained the longer and more involved students become in agricultural education and specifically in the FFA, the more likely they are to pursue an occupation in agriculture.

Solving the teacher shortage problem will require efforts on two fronts: recruitment of more teachers into the profession and retention of those teachers within the profession (Kantrovich, 2007). In this study, our aim was to address recruitment by exploring the factors influencing pre-service teachers' decisions to pursue a career as a teacher in agricultural education. In order to develop recruitment strategies, it is imperative that we understand the factors that influence students to choose agriculture teaching as a career, especially factors within our own school-based agricultural education programs. Despite this need, there is a lack of current literature exploring the agricultural education factors influencing one's choice to pursue a career as an agriculture teacher. Much of the literature exploring the factors influencing the choice to teach agriculture are outdated (Hillison, Camp, & Burke, 1987; Arrington, 1985). Agricultural education and the education profession in general has experienced many changes over the past few decades. The social pressure to attain lucrative employment and a negative stigma surrounding teaching has increased in recent decades. With these changes, it is likely the motives for seeking a career in agricultural education have changed as well. Therefore, more current research exploring the factors of career choice in agricultural education is warranted.

The more recent literature available on factors influencing choice to teach agriculture has not fully addressed the questions: What influences career choice in agricultural education? And how does participation in school-based agricultural education programs influence one's choice to pursue a career as an agriculture teacher? Park and Rudd (2005) conducted a Delphi study with in-service teachers exploring the teaching practices that would increase recruitment of students into post-secondary agricultural education majors. However, they did not survey students, the ones making the decisions. In fact, they recommended, "Future research is necessary to determine the influencing factors associated with the decision to teach from the student perspective (p. 91)." In 2005, this call for research was partially met when Vincent, Henry, and Anderson (2012) explored why students of color choose to major in agricultural education. However, their study was very narrow did not explore the factors from students not of color, the majority of which currently are agricultural education majors (Foster et al., 2014). Furthermore, no research exists exploring how agricultural education and FFA influences students' choice to major in agricultural education. Yet, most of the students who seek to pursue a career in agricultural education participated in agricultural education and FFA in high school. What factors and what experiences within agricultural education are motivating factors for deciding to teach agriculture? This research seeks to answer that question.

One of the most significant decisions a student will make during his or her high school and college years is which academic major and career to pursue. Choosing the right career that aligns with one's values and goals has implications for a lifetime of rewards and happiness. Recruiting students with skills and values that align with the career of teaching agriculture is paramount in working to solve the teaching shortage crisis. Students with matching skills and values would most likely be found within secondary agriculture programs. A variety of factors influence what students will major in and what career they will choose. According to Bandura (1986), students are more likely to choose a career in which they believe they can be successful, have their needs met and be able to influence others. Self-efficacy, espoused as the concept of self-perceptions in the FIT-Choice model, is an important motive in selecting a major or career.

Theoretical Framework and Literature Review

The Factors Influencing Teaching Choice (FIT-Choice) Model was used as the theoretical framework for this study (Watt & Richardson, 2007). The FIT-Choice model is based on the expectancy-value theory (EVT), which has been used to understand the motivations that triggers individuals' behaviors, including the behavior of choosing a career (Eccles et al., 1983; Eccles & Wigfield, 2002). Based on the EVT, the FIT-Choice model was developed from themes emerging from both the teacher education literature as well as the career choice literature to explain why individuals choose teaching as a career (Watt & Richardson, 2007).

The FIT-Choice model framework consists of five influences on one's choice of a teaching career: *socialization influences, task perceptions, self-perceptions, values, and fallback career*. Watt and Richardson (2007) described *socialization influences* as positive teaching and learning experiences as well as significant people in the lives of individuals. Previous positive teaching and learning experiences can also include having good teachers. Significant individuals such as family, friends, teachers, and colleagues may influence an individuals' choice to teach as well. *Task perceptions* consist of two factors: task demand and task return. Task demand factors relate to the perceptions of teaching as a highly demanding and highly technical career requiring very specialized and technical knowledge. Task return involves the perceptions of teaching as a well-respected, high-status occupation, where teachers feel valued by society and salary is fair and good. *Self-Perceptions* are described as an individual's perceptions of their ability to teach. The FIT-Choice model separates *values* into three expectancy-value components: intrinsic, personal utility and social utility values. Intrinsic value describes an individuals' interest and desire for teaching as a career choice. Personal utility values relate to the quality of life teaching offers. These values might include time for family, job security, more secure income, opportunities to travel, and other benefit considerations such as length of the working day and frequency of school holidays and breaks. Social utility value describes the idea that individuals often choose to become teachers because of their strong desire to make a social contribution, enhance social equity, positively influence the lives of youth, or give back to society. The final component of the FIT-Choice model is fallback career which accounts for individuals who were not accepted in their first career choice, and who may have chosen teaching as a fallback career. Utilizing the FIT-Choice framework, we seek to explore the motivations of agricultural education students to become agriculture teachers. Furthermore, we seek to explore how the influences of agricultural education programs influence students' decisions to major in agricultural education and pursue a career in teaching.

A variety of factors have been identified in the literature as influencing an individual's decision to become a teacher. Altruistic motives, such as making a contribution to society and being a role model for youth have been identified as motivating factors influencing students' choices to pursue teaching as a career (Kyracou & Coulthard, 2000; Lortie, 1975; Reid & Caudwell, 1997). According to the FIT-Choice framework, these are identified as social utility values. Intrinsic motives, such as opportunity to express creative abilities and the ability to engage in an enjoyable subject matter have been identified as factors to pursue teaching as a career (Hayes, 1990; Lyons, 1981; Reid & Caudwell, 1997). These influencing factors are captured in the FIT-Choice model as intrinsic and personal utility values. The literature has also identified extrinsic motives, such as a good salary as influencing students' decision to choose teaching as a career. In agricultural education, Harms and Knobloch (2005) identified that students were motivated to teach agriculture because of the salary, the benefits it provided, and the opportunity for advancement. Vincent et al. (2012) found students of color were motivated to major in agricultural education because of the perception of financial stability it provided.

Social factors also influence one's career choice to teach. Key people such as family, friends, and former teachers have been identified as primary influences on choosing a career in teaching (Hayes, 1990; Hillman, 1994; Reid & Caudwell, 1997). Park and Rudd (2005) stated secondary agriculture teachers influence many decisions about a student's career and further education through teacher actions, comments, and instruction. Park and Rudd suggest these positive and encouraging interactions can also lead to a career in agricultural education.

Prior teaching and learning experiences can also influence a student's decision to teach. In agricultural education, research shows high school agricultural education courses and FFA experiences as the most influential factors in students' choice of career (Arrington, 1985; Edwards & Briers, 2001; Hillison, Camp, & Burke, 1987). Cole (1984) concluded that agriculture students who were actively involved in SAE and FFA activities were more encouraged to choose agricultural education as a college major than those who were not actively involved in those type of learning experiences. Despite these findings, literature in agricultural education has not examined *how* FFA and SAE activities influence students' choice of major.

Purpose and Research Questions

The purpose of this phenomenological research study was to explore reasons students who were active participants in secondary agricultural education programs select agricultural education as their academic major and plan to pursue a career in teaching. This analysis addresses National Research Agenda priority three which calls for research exploring the development of a highly qualified agriculture workforce and, recognizing the importance of agricultural educators (Stripling & Ricketts, 2016). The research questions guiding this research were: 1) what factors influence the choice to major in agricultural education and pursue teaching, and 2) in what way do experiences in the secondary agricultural education program influence one's choice to major in agricultural education and pursue teaching as a career?

Methods

This qualitative study used a phenomenological research design to obtain information regarding the motivation of students seeking a career in agricultural education. Phenomenological research seeks to describe the meaning of individuals' experiences of a phenomenon (Creswell, 2007). The phenomena of interest, shared by all the participants, is their major in agricultural education and shared interest in becoming secondary agriculture teachers.

Students participating in this study were accessed based on their participation of an online survey of a random sample of students in the College of Agriculture and Applied Sciences at Utah University in which they indicated willingness to participate in the focus group interview. We selected participants from the accessible population through purposive sampling for maximum variation in an attempt to develop a wide picture of the phenomenon (Patton, 2002). Seven agricultural education majors who participated in agricultural education and FFA in high school participated in the study. Polkinghorne (1989) suggested between five and 25 subjects who have all experienced the phenomena of interest should be interviewed. Four participants were male and three were female and all reported to be White. Six of the students were between the ages of 19 and 23 while one of the students was over the age of 25 and considered a non-traditional student. One participant was a freshman, five were juniors, and one was a senior in the middle of the student teaching practicum. Three participants had changed their major to agricultural education after first seeking degrees in other disciplines. Four of the participants came from large multi-teacher agriculture programs in suburban areas while three originated from single-teacher and more rural programs.

The semi-structured interview consisted of a series of questions addressing topics about reasons for choosing agricultural education as a major, FFA, SAE, and agricultural education participation. Broad questions were asked that addressed topics of interest with some follow up questions to elicit more details (Denzin & Lincoln, 2011). Sample questions included, "Why did you choose to major in agricultural education?" and "How did FFA influence your decision to major in agricultural education?" with a follow up question: "What specific FFA events or activities had an influence on your decision and how?" The lead researcher served as the moderator for the focus group interview while another researcher took observational notes. The interviews lasted for 70 minutes and took place at the agricultural education facility.

The focus group interviews were audio-recorded and transcribed verbatim. The data collected were analyzed and coded for thematic content using coding protocols outlined by Auerbach and Silverstein (2003). Two separate researchers performed the coding process with constant checks for accuracy and reliability in coding. The process of coding was performed using open, axial, and selective coding (Auerbach & Silverstein, 2003). We used open coding to identify and describe the repeating ideas found in the text with consideration to the research focus and the theoretical framework of the study. We grouped these repeating ideas into logical and coherent groups. We then conducted axial coding, in which we examined how the categories might be related to each other. During this phase, we connected categories with subcategories. The final step in the analysis was selective coding where we renamed the themes and situated them within the theoretical framework of the study.

Rigor and trustworthiness were established for this study through measures of credibility, transferability, dependability, and confirmability (Harrison, MacGibbon, & Morton, 2001). To establish credibility, we used an outside source to review the transcription and coding for validation. We also utilized member checks and used a reflective journal to help identify any research biases. Transferability was attended to through the use of purposive sampling for maximum variation of characteristics of the participants as well as the use of rich, thick descriptions of the participants and their context (Maxwell, 2005). Finally, dependability and confirmability were established through an audit trail, the use of a reflective journal throughout the process, and receiving approval of the findings from participants (Denzin & Lincoln, 2011).

Findings

Participants identified several motivating influences regarding their decision to major in agricultural education. Five themes with corresponding sub-themes developed through the analysis of the data which included, 1) socializer influencers, 2) social value 3) passion for agriculture, 4) alignment with personal values, and 5) agricultural education factors.

Theme 1: Socializer Influencers

Most of the participants spoke about key individuals who influenced their decision to pursue agricultural education. Each of the participants talked about key individuals, most of which they had close relationships with, encouraged them to pursue agricultural education. The encouragement was not always verbal, however, as many participants spoke about how they experienced or witnessed an agriculture teacher's impact on others, instilling a desire to be that same type of person. These key influencers that were spoken of by the participants included spouse, FFA advisor, extension agent, former teacher, and close relative.

Despite encouraging influences, participants also spoke of social pressure from individuals discouraging them from pursuing a degree in agricultural education. The participants shared that others had a negative opinion of teaching as a profession, mostly because of the lack of pay. One participant said, "That is always what you hear, you don't want to be a teacher, you don't make any money." Despite the social pressures discouraging these participants from pursuing a degree in agricultural education, other factors seemed to outweigh the opinions about teachers' salaries. One participant stated, "Regardless of cash that comes in or everybody else's opinion of educators, I'm going to be a teacher, I don't care what they think of it." The same student continues, "Regardless of the people that told me don't do it, I thought of it representing something big or something better, like agricultural education can be." This altruistic attitude emerged in the data as the second theme.

Theme 2: Social Value

A second theme emerging from the data was social value. The participants seemed to all convey a sense of altruism as they talked about why they want to become agriculture teachers. To the participants, being an agriculture teacher means exerting a positive influence in the lives of young people. This idea is what drives them to pursue a degree in agricultural education. The following participant statements support this theme:

- "As an agriculture teacher, you're also an advisor so you get to develop those relationships, you're more than just a teacher, you get to have an influence."
- "Being a part of something huge but still being able to make a difference, an impact on an individual level was probably what influenced me to become a teacher."
- "Agriculture teachers are not teachers, they're advisors, they're life coaches, they're mentors, they're always there for you. That's why I want to teach agriculture."

Students mentioned they didn't want to teach any other subject because agricultural education provides unique relationships and better opportunity to impact students' lives than any other subject. One student stated, "…The opportunities we get to spend with our students. We get to do professional development with our high school students. A lot of high school students don’t get to experience that just through their classes. They get that through FFA, they get that through hands-on agriculture courses. We get to know our students better, we spend more time with them and we get to know their families.” Another reason these participants are motivated to teach agriculture is because of their passion for it, which is the third theme.

Theme 3: Passion for Agriculture

A third theme that emerged from the data was the participants’ passion for agriculture and their desire to share that passion with others. Because of their passion for agriculture, many of the participants described themselves as advocates and explained the best way to be an advocate was by teaching youth about agriculture. The following statements support this theme:

- “It’s [agriculture] my passion. How cool is it that I can share my passion every day? I get to teach agriculture; I get to be a part of agriculture every day in the classroom.”
- “I can share my passion for agriculture with others through being a teacher and get just as much enjoyment as any other profession can bring while moving agriculture forward and bettering the world and our community.”
- “I want to be an advocate for agriculture, and that’s why I changed my major.”

Theme 4: Alignment with Personal Values

A fourth theme that emerged was alignment with personal values. This theme describes how teaching agriculture seems to fit nicely within the goals and values of each of the participants. The participants spoke about job security and the opportunities for family and leisure as an agriculture teacher. Many of the participants shared their feelings about their future and the type of life they want to live. They spoke mainly about their hopes to spend time with their future families as well as hobbies they can enjoy while working as an agriculture teacher. Most of the participants felt that being an agriculture teacher would allow them to pursue a lifestyle that aligned with their personal values and goals. Participants stated:

- “How many teachers get to bring their kids to activities? And you get to do fun things over the summer and your family is invited.”
- “I could be an agriculture teacher, have a career, and still keep all of those things I worked hard for in high school and still keep them going as hobbies.”
- “My agriculture teachers showed me how their career worked so well with their goals and hobbies and all their other stuff that they do, which made me realize I could do it too.”

Theme 5: Agricultural Education Factors

A fifth and final theme that emerged was the influence of agricultural education factors, which shaped the participants’ perceptions about teaching agriculture. One of the questions guiding this study was the way in which participation in the high school agricultural education program influences students’ motivation to pursue agricultural education as a major. Participants in this study continually referred to specific instances from experiences related to their participation in agricultural education in high school. This theme and sub-themes help to explain how participation in school-based agricultural education programs influenced these students’ decisions to pursue a degree in agricultural education. This theme was broken into four subthemes, which include agriculture teacher encouragement, FFA events, increased self-efficacy through a quality program, and post-high school opportunities.

Agriculture Teacher Encouragement. Most participants spoke in some way how their agriculture teacher was influential in their decision to pursue a degree in agricultural education. Though these participants went through agriculture programs that were vastly different, their experiences of their agriculture teachers encouraging them and talking to them positively about agricultural education as a career was a unifying characteristic among the participants. Participants were encouraged by their agriculture teachers in many ways including explicitly encouraging them to consider becoming an agriculture teacher, speaking positively about their jobs as agriculture teachers, showing students the joy that comes from teaching, and taking personal interest in their students' lives. The following participant statements support this idea:

- "It was originally my ag teacher who put the idea of agriculture education in my mind."
- "I spent a few afternoons, a few days chatting with my advisor and talking to him about his experience as a teacher, and it was at that point that I decided that I wanted to be an agriculture teacher, and I've stuck with it ever since."
- "My agriculture teacher related it to me that I could be an agriculture teacher…"

Despite these positive encouraging teachers, some of the participants shared moments from their high school experiences that were not so positive in nature. The participants shared how some of these moments or experiences made them think to themselves, "If I became a teacher, I would not do it like this…" At the time, some of the participants never thought about becoming an agriculture teacher, but as they entertained the thoughts of how they would do things differently, they seemed to open a window of opportunity for a career in agricultural education. One student recounts, "I saw where the program could be and I lived through what it wasn't and I wanted to change that in another kid's life." Another student stated, "If you have a crummy agriculture teacher like mine, you lose that opportunity and that potential to influence a kid to do good and be successful in life…I want to be able to make that difference in that kid's life, so they don't have the experience I did, so that they would have a better experience."

FFA events participation. Many participants identified specific moments in their life when they made the decision to become agriculture teachers, or when they decided agricultural education could be a possible career path for them. Many of these moments happened at FFA events away from the local school. Participants mentioned the State FFA Convention, National Convention, CDE events, and Teach-Ag workshops as catalysts for their motivation to pursue a career in teaching agriculture. For some, these events completely changed their perception of agricultural education. The following participant statements support this idea:

- "I also think the bus rides to and from conventions and contests—getting to know my agriculture teacher—that has just really solidified it all for me."
- "I was sitting at National Convention…and they did this campaign on Teach-Ag…and it just hit me at that moment that teaching agriculture is what I was supposed to do."
- "The big thing that got me was my ninth grade year when I went to nationals as an Agriscience fair participant. And then as soon as I saw nationals I was hooked because it was something so big, it was an organization that was huge that each person in the organization can make a difference in."

Self-efficacy through a quality program. Participants shared how their agricultural education program provided them with skills, experiences, and confidence that would enable them to be successful as agriculture teachers. One student said, "The things I learned, the growth that I saw in myself, prepared me to be an agriculture teacher. If it wasn't for that, I don't think I would have the public speaking skills or the necessary requirement for this kind of a career." For some students, participating in learning experiences through the FFA instilled in them a desire to share those same learning experiences with others. One student talking about his SAE experiences with showing livestock at the fair stated, "I learned what I needed to learn in class to make my SAE successful…and I really wanted to share it with people, I wanted to give that type of opportunity to other folks." For some students, a quality agricultural education program helped them develop a personal connection, a deeper appreciation, and passion for agricultural education, which then spurred their desire to stay connected with agriculture and agricultural education in the future. Although there was little evidence in the data to suggest SAE had a direct impact on students' choice to become agriculture teachers, it did seem to influence their decision to stay connected to agriculture. One student stated, "Because I loved my SAE project, you know, it directed me towards a career in agriculture."

Post-high school opportunities through agricultural education. Participants spoke about the many doors that were opened to them after high school graduation because of their participation in agricultural education. The post-high school opportunities these participants spoke of included an internship with a local extension agent, serving as an FFA state officer, and working with the local agriculture program during the summer as an intern. These opportunities helped keep the students connected to agricultural education in some way. Most of these participants hadn't made up their mind to teach agriculture until they participated in these post-high school experiences. Each of the participants shared how the opportunities to teach and do what agriculture teachers do were the solidifying moments. One student who served as a state officer spoke about the opportunity to teach other students in a classroom. He stated, "I had the opportunity [to teach] and to see that half-second gleam in their eyes, the fact of seeing that light bulb moment behind that kid's eye… in the classroom, that made it worth it for me, that really drew me in completely. That solidified my decision." Another student recounted how her internship with the local agriculture program over the summer solidified her desire to be a teacher. She said, "That [summer internship] made me one hundred percent sure that I knew that's [teach agriculture] what I wanted to do." Finally, one student speaks of her internship with an extension agent who had taught agriculture for a time, she said, "He's [extension agent] just what changed my mind. He told me how good of an experience he had while he was an agriculture teacher." These opportunities to interact with others in an agricultural education context were available to these students because of their agricultural education participation.

Discussion, Conclusions and Recommendations

This research study is limited in scope because of the small number of participants, limiting the generalizability of the findings (Maxwell, 2005). While this study may have the potential to be transferable to other settings, we make no attempt to generalize beyond the seven agricultural education students in this study. Based on the findings of this study, we discovered five primary reasons participants were motivated to pursue a career teaching agriculture. These included: (a) the encouraging influence of individuals within their social structure; (b) a strong desire to be a positive influence in the lives of students; (c) passion for agriculture and a desire to share that passion with others; (d) recognition of an alignment of teaching agriculture with personal values; and, (e) the influence of agricultural education program factors.

Participants in this study indicated key individuals, including their agriculture teachers, provided encouragement to select agricultural education as a major and to enter the teaching profession. Similarly, Park and Rudd (2005) found that encouragement from agriculture teachers is a positive factor in agricultural education career decisions. These findings are also congruent with those of previous studies on teaching career decision making (Hayes, 1990; Hillman, 1994; Reid & Caudwell, 1997). Some participants indicated feeling social pressure not to teach and encouragement to pursue a more lucrative profession. The influence of significant individuals on career decision identified in this study, both encouraging and dissuasive, align with the *socialization influences* component of the FIT-Choice model framework (Watt & Richardson, 2007). Personal encouragement of students to become agriculture teachers, speaking positively about the job, and showing students the joy that comes from teaching agriculture are important in influencing potential teachers. We echo the recommendation of Park and Rudd (2005) to agriculture teachers that "employing encouraging attitudes and behaviors, agriscience teachers could help recruit new teachers into the profession" (p. 91). Further, we recommend agriculture teachers identify students who show potential for becoming good agriculture teachers and then explicitly encourage them to consider agricultural education as a career

A strong desire to be a positive influence in the lives of students surfaced as a primary factor in the career decision making process for the participants in this study. Participants shared their desire to make a difference in lives of students, their desire to make a social contribution, and their excitement to work with youth in order to positively impact their lives. Hillison et al. (1987) also found that a desire to work with young people was a significant factor in the decision to teach agriculture. The FIT-Choice model framework (Watt & Richardson, 2007) described this factor as a *social utility value* in which individuals have a strong desire to make a social contribution, enhance social equity, positively influence the lives of youth, or give back to society. The opportunities provided to agriculture teachers to positively influence the lives of students should be highlighted to those who are exploring a career in agricultural education. Agriculture teacher educators must be honest with students about the challenges of the profession but also remind them of the benefits including the potential impact on next generation, opportunities for a good lifestyle, and opportunities to fulfill personal goals and values. This can be accomplished by sharing examples and by inviting current teachers to serve as guest speakers highlighting the positive aspects of the profession. These practices should also be included in teacher induction programs to help in-service teachers maintain their focus on why they chose the profession, even though at times it is challenging and discouraging.

Participants expressed a passion for agriculture and a desire to share that passion with others. Several participants mentioned a desire to be an advocate for agriculture. Vincent et al. (2012) found students of color were motivated to choose agricultural education as a major for similar reasons. This factor is congruent with the *intrinsic value* component of the FIT-Choice model framework (Watt & Richardson, 2007). Because these students enjoy the subject matter in agriculture and enjoy being a part of the agricultural industry, they are intrinsically motivated to be involved with it as a career.

The realization that teaching agriculture aligned with participants' personal values, particularly related to lifestyle, family, and hobbies, emerged as a factor influencing the decision to teach agriculture. The FIT-Choice model framework (Watt & Richardson, 2007) described this factor as a *personal utility value* in which individuals find value in job security, time for family, and job transferability. Participants in this study primarily indicated concern about time for family and personal interests and hobbies. Job security and job transferability were not mentioned by the participants. These students decided to teach agriculture because they saw modeled by their agriculture teachers that they could have time for family and hobbies while teaching. These are potentially important values to many students and should be highlighted as a benefit of being an agriculture teacher.

Participants' own experiences in agricultural education changed their perceptions about teaching agriculture and were identified as key factors in career decision. These findings are supported in the agricultural education literature (Arrington, 1985; Cole, 1984; Edwards & Briers, 2001; Hillison et al., 1987). The influence of prior teaching and learning experiences aligns with the *socialization influences* component of the FIT-Choice model framework (Watt & Richardson, 2007). Further, these prior experiences in agricultural education helped shape the participants' *self-perception* or self-efficacy of their ability to teach agriculture. Park and Rudd (2005) found program quality was key to recruiting students. Therefore, agriculture teachers should try to develop programs that are well-rounded and give students a variety of opportunities. Our findings support this idea because participants spoke about the influence of out-of-school FFA events, post high school opportunities that were available to them, and personal development through participation in various FFA activities on their career decision. It is especially crucial to get as many students to district, state, and national FFA events, as these were identified as catalysts and key moments in participants' motivation to select agricultural education as a career. Additionally, we recommend agriculture teachers, state staff, and agriculture teacher educators provide post-high school opportunities connected to agricultural education. These opportunities might include working in schools as a paraprofessional in agricultural education or volunteering to help prepare students for competitive events.

Involvement in agricultural education programs influenced the other themes identified. Examples of this include: (a) putting them in contact with key individuals who encouraged them to become agriculture teachers; (b) making them self-aware of the positive impacts agricultural education had on their lives; (c) teaching them the value of service towards others; (d) helping them develop a deep-rooted passion for agriculture; and (e) helping them see how being an agriculture teacher aligns with their own personal values and goals and could be a worthwhile and rewarding profession to pursue. State and national FFA leaders are encouraged to add components to state and national conventions that encourage students to consider agricultural education as a career. Activities might include workshops to encourage teaching as a profession or an agricultural education career development event. These opportunities can help students experience positive aspects of agricultural education teaching as a career and can show how the career may align with their personal values and goals.

Some components of the FIT-Choice model framework were not discussed by the participants in this study, including *task perceptions* (e.g., task demand and task return) related to teaching agriculture. Although agricultural education is a demanding and highly technical field, this area was not mentioned as a reason participants chose to pursue agricultural education. Social status and salary were not mentioned as reasons for choosing agricultural education as a career. Disparately, Vincent et al. (2005) found that the perception of financial stability and status as an agriculture teacher were key reasons for selecting agricultural education as a major. The selection of agricultural education as a *fallback career* was mentioned by participants and the fact that three of the participants changed their major from something else to agricultural education further substantiates this factor. However, it did not emerge as a central theme. Using the findings and conclusions of this study, we have developed a conceptual model for factors influencing agricultural education students' choice to pursue a career in agricultural education with implications for recruitment (Figure 1). This conceptual model is based on the FIT-Choice model framework (Watt & Richardson, 2007) and adapted for agricultural education. Based on this model, we recommend future research towards the development of a quantitative instrument.

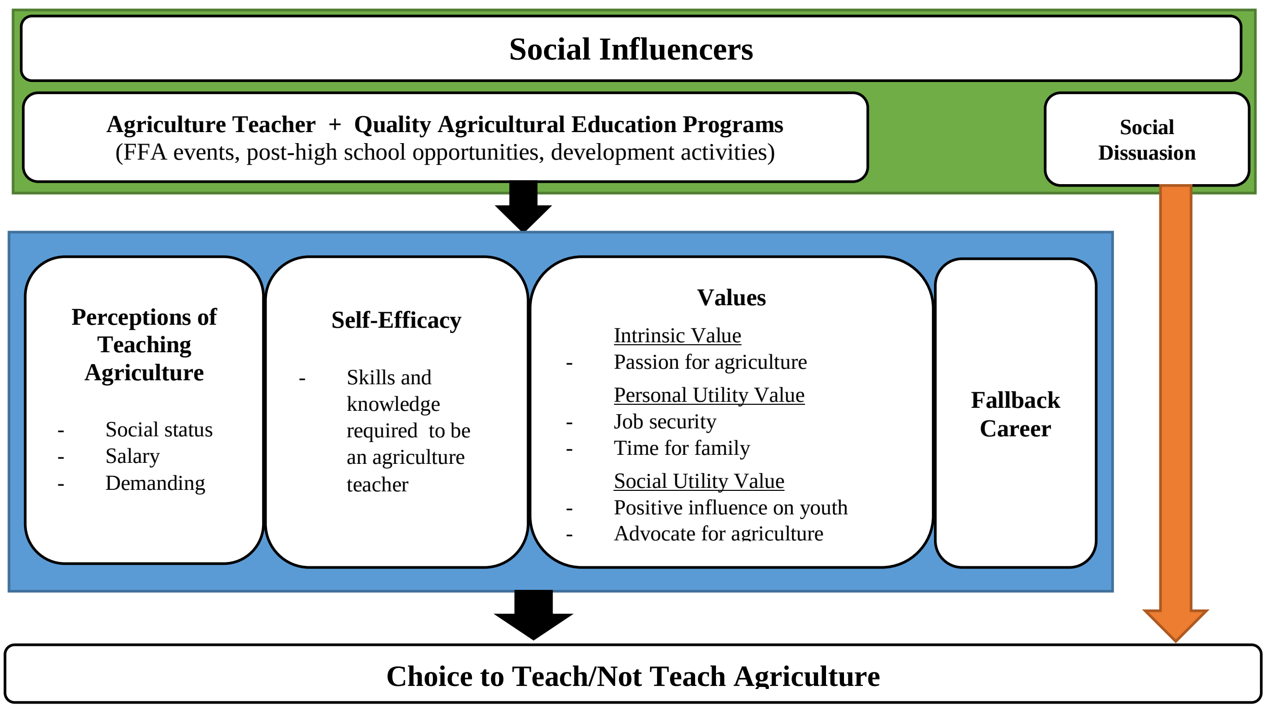

Figure 1. Conceptual model for career choice in agricultural education

We recommend additional research be conducted on the influence of SAE programs in the decision to teach agriculture. While the SAE program was not identified as a theme directly influencing the career decision, it did seem at least secondarily related as part of the complete program of agricultural education. Several additional questions could be asked, including whether or not SAEs have a greater influence on students not raised in production agriculture. We further recommend that additional studies be conducted that include students from more diverse backgrounds. Vincent et al. (2012) looked only at students of color. The participants in this study all had backgrounds in rural or suburban school-based agricultural programs and were all FFA members. What influences students who come from more urban schools or students with little agricultural education background to choose agricultural education as a career? These are pertinent questions if agricultural education is to be more representative of the population and able to serve a more diverse student population with less traditional background in agriculture.

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Personal Resilience as a Predictor of Professional Development Engagement and Career Satisfaction of Agriscience Teachers

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Abstract

The purpose of this study was to determine if personal resilience is a predictor of professional development engagement and career satisfaction of agriscience teachers. A quantitative descriptive correlational research design, utilizing a purposive stratified sample of states and a census of teachers in those states was used. Data were collected using the Tailored-Design Method, using multiple points of contact with various modes to minimize survey error. The overall response rate was 72.5% (n = 892). The linear combination of independent variables in a stepwise backwards regression model explained 13.7% of the variance of professional development engagement and 21.4% of the variance of career satisfaction. These findings suggested that increasing the resilience of agriscience teachers, specifically in the areas of positive: world and focused, could lead to an increase in engagement in professional development and career satisfaction, which has been shown to be a factor that increases teacher efficacy. Further research is need to explore how to increase resilience for agriscience teachers and the relationship between teacher resilience student outcome variables.

Introduction

Teachers should have a certain set of professional commitments, or set of personal traits, that cause them to strive to constantly improve their practice and grow as a professional (Bransford, Darling-Hammond, & LePage, 2005). Teachers should also base their practice on a body of scholarly knowledge, ground their practice on experience and improvement through reflection, and develop a professional community to foster their growth (Shulman, 1986). Achieving consensus for the ideal professional practice of teachers is somewhat straightforward. However, little is known about the variables that contribute to ideal teacher practice. In the book *Mindset: The New Psychology of Success*, Dweck (2006) explored the difference between a fixed and a growth mindset. According to Dweck, some individuals are more apt to believe that they can grow, learn and improve, whereas others tend to become more static in their thinking. While the main crux of Dweck's work has been applied to child and student behavior, the idea of mindset could be telling for teacher professional development. According to Dweck, individuals do not typically have one mindset but instead fall on a continuum. Dweck also postulated that an individual's mindset could be changed if he/she is in the right environment.

The idea of a fixed vs. growth mindset has been based on the notion that the ability to perform and improve is innate and amenable. Similarly, resilience is an innate characteristic that is related to how individuals cope with stressful or difficult situations. Resilience, or the ability absorb high levels of disruptive change while displaying minimal unproductive behavior, may provide some explanation for how teachers respond to change as it relates to professional development (Henderson & Milstein, 2003; Hoopes & Kelly, 2004).

The idea of resilience began by examining children who were successful, despite being labeled as at-risk. According to Werner and Smith (2001), some individuals are innately more resilient, and therefore, are able to overcome disruptive life change. Henderson and Milstein (2003) applied the concept of resilience to teachers. They indicated that resilient teachers might be better able to cope with stressful situations common to the profession of teaching. Just like the at-risk children who were successful, some teachers are better able to cope with the stress of teaching and create a meaningful impact for their students. According to Bobek (2002), teacher resilience can enhance teacher effectiveness, improve career satisfaction, and better prepare teachers to adjust to changing conditions.

Richardson, Neiger, Jensen, and Kumfer (1990) explained that resilient individuals are able to reintegrate, or bounce back, and function at a high level after experiencing a finite disruptive event. Gu and Day (2013) purported that normal teaching environments are inherently stressful and disruptive, and thus, require resilience. This view of resilience rests on two assumptions, teaching is a chronically stressful and taxing career, and some teachers are better than others at dealing with this stress. Some researchers (Gu & Day, 2013; Henderson & Milstein, 2003; Hoopes & Kelly, 2004) have purported that resilience is not a fixed trait, but can be improved and changed.

Most of the work in the area of teacher resilience is qualitative in nature. According to Howard and Johnson (2004), teachers rely on agency and a strong professional and personal support system to be able to persist, despite being described as high risk for burnout. Gu and Day (2013) reported that resilient teachers had a calling to teach and loved their students, were more connected with their students and their colleagues, worked to improve their self-efficacy, and had positive relationships with the school leadership. Further, teachers in socioeconomically disadvantaged schools were less resilient than their peers in other schools. Gu (2014) noted that when comparing resilient and non-resilient teachers, the resilient teachers reported having a positive support influence at a higher rate than non-resilient teachers.

The research on the resilience of agriscience teachers has been limited (Thieman, Henry, & Kitchel, 2012). Thieman et al. conducted a synthesis of literature related to resilient agriculture teachers. According to their review, teachers who are more resilient are better able to manage their professional relationships and balance personal relationships. The researchers also stated resilient teachers might be more adept at time management, dealing with difficult students, and responding to difficult relationships. Similarly, Clark, Kelsey, and Brown (2014) found career agriculture teachers relied on professional support and work-life balance to remain in the profession. According to Hoopes and Kelly (2004), positive: self is closely related to high self-efficacy. There is also evidence in the literature of the link between self-efficacy and career commitment (McKim & Velez, 2015), outcome expectations and interest (Bunch, Robinson, & Edwards, 2012), and coping mechanisms that can lead to resilience (Kelsey, 2006).

Theoretical/Conceptual Framework

This study was guided by the theory of resilience, specifically the characteristics of resilient teachers as described by Henderson and Milstein (2003). These characteristics were operationalized using the factors of resilience described by Hoopes and Kelly (2004) and Conner (1993). While the resilient factors described by Conner (1993) are intended to describe individuals in the context of organizational change and are not specific to teachers, schools, or teacher professional organizations, the description of resilience has implications for teachers and their capacity to deal with change. Teaching is a stressful environment with constant change from a myriad of sources (Gu & Day, 2013). Hoopes and Kelly (2004) described resilient individuals as having a capacity to deal with difficult change in a stressful environment. Further, Conner's (1993) personal resilience characteristics, measured using the Personal Resilience Questionnaire (PRQ), have been used in research in the education field (e.g., Isaacs, 2003). Resilience theory seeks to explore commonalities of individuals who are successful, despite difficult situations, and how others can develop similar characteristics, so they too, can be successful.

This study drew from resilience in the context of organizational change (Conner, 1993). Conner studied individuals' reactions to change situations. He noticed that individuals either focus on the risk associated with change or with the opportunity of change. According to Conner, resilient individuals are able to see the opportunity in change situations, and thus tend to be more successful. These individuals possess similar characteristics. Conner (1993) purported these characteristics to be positive, focused, flexible, organized, and proactive. The positive characteristic was further described as positive (world), or being positive towards the environment around the individual, and positive (self), or being positive about one's own skills and abilities. Flexible was also divided into flexible thoughts, which involves being open to new ideas, and flexible social, which describes a person's ability to draw on resources from others.

This study was guided by a conceptual model that describes the relationship between resilience, career satisfaction, and teacher change (see Figure 1). The characteristics of resilient teachers are explored at the top of the model. The traits of personal resilience in the fields of organizational change management, as described by Hoopes and Kelly (2004), and resilience in schools, as described by Henderson and Milstein (2003), were used in this study. Characteristics of resilient teachers described in the literature were also explained in the model (Huisman, Singer, and Catapano, 2010; Johnson, Down, Cornu, Peters, Sullivan, Pearce, & Hunter, 2015; Mansfield, Beltman, and Price, 2014). Professional development engagement is explained by the teacher change process described by Clarke and Hollingsworth (2002). Fessler & Christensen (1992) also explored the impact of career stage on professional development engagement and informed the model. The actions of participation, value, and implementation were used to describe the process of full engagement in professional development, which embody the actions in the Clarke and Hollingsworth model. The components of career satisfaction described by Lester (1987) were described in the career satisfaction portion of the model. The focus of this inquiry was to explore the relationship between resilience, career satisfaction, and teacher change.

There is evidence in the literature to suggest a link between professional development engagement, career satisfaction, and resilience. Patterson, Collins, and Abbott (2004) found resilient teachers placed a high premium on professional development and served as mentors for others. Castro, Kelly, and Shih (2010) described being engaged in professional growth as a manifestation of resilient behavior. Leroux and Theoret (2014) found a relationship between teacher reflection and resilience. Tait (2008) found resilient teachers had a high level of career satisfaction through their first year teaching despite reporting high levels of stress. Sorensen and McKim (2014) found a relationship between job satisfaction and professional commitment for agriscience teachers. There is also evidence to suggest demographic factors could influence resilience (Rutter, 1979; 1985).

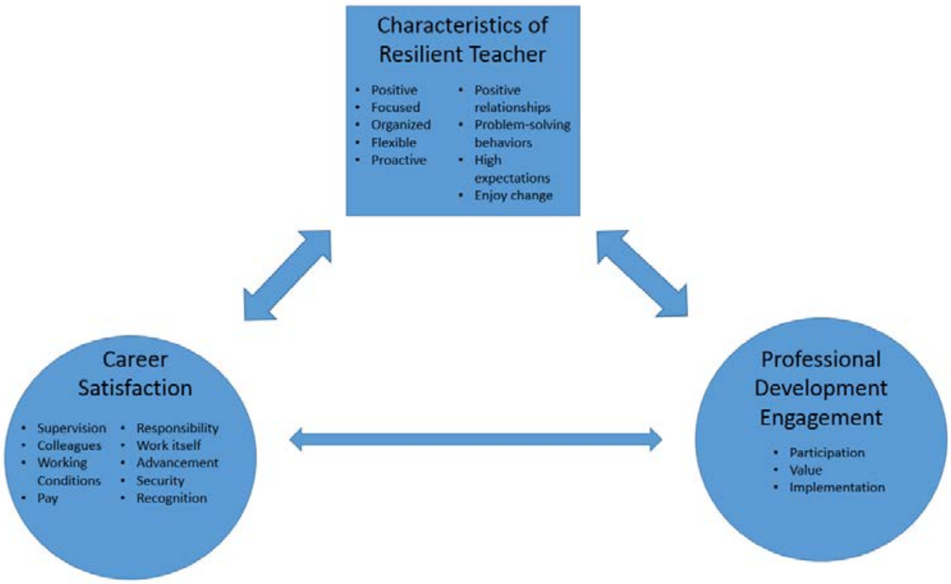

Figure 1. Conceptual model exploring the relationship between resilience, career satisfaction, and professional development engagement.

Purpose and Objectives

The purpose of this study was to determine if personal resilience is a predictor of professional development engagement and career satisfaction of agriscience teachers. This study explores research in research priority 5: efficient and effective agricultural education programs, specifically improving program development, deliver, and evaluation of professional development programs (Thoron, Myers, & Barrick, 2016). The study was guided by the following objectives:

1. Describe the personal resilience of agriscience teachers, based on personal and professional demographic factors.
2. Describe the relationship between personal resilience, professional development engagement, career satisfaction, and demographic variables.
3. Determine if personal resilience predicts professional development engagement.
4. Determine if personal resilience predicts career satisfaction.

Methods

The population of interest for this study was middle school and high school agriscience teachers in the United States. Four states were purposefully selected to participate in this study. These states were chosen to represent the agriscience teachers in the United States. Geographical diversity was the primary selection factor. The American Association for Agricultural Education regions were used to define the regions. Two states, Florida and North Carolina, were in the southern region. Minnesota was in the North Central region, and Colorado was in the Western region. Multiple states were also selected by the researcher to represent variations in professional development opportunities and dynamics in the teacher groups that could exist from state to state and could have an impact on professional development participation. The states were also utilized in this study because of the working relationship between the researcher and the state staff in each state. A census of agriscience teachers was taken in each state. There were 127 teachers in Colorado, 400 teachers in Florida, 243 teachers in Minnesota, and 483 teachers in North Carolina. The sampling frame was obtained from the state agriculture education coordinator in each state. The instrument was piloted to 110 teachers in West Virginia.

The instrument contained three sections. The Personal Resilience Questionnaire was a preexisting scale that used 70 questions with a six-point Likert-type scale with response options ranging from strongly disagree to strongly agree. There were 10 questions per construct. The proprietary scoring system yielded responses for each construct that ranges on a scale of 0-100. Missing scores were imputed based on the average responses from those scales where more than half of the answers in the scale were available (Enders, 2010). Cronbach's alpha coefficients on the pilot test were .83 for positive: the world, .81 for positive: self, .82 for focused, .71 for flexible: thoughts, .74 for flexible: social, .68 for organized, and .65 for proactive. According to Nunnally (1978), the acceptable levels of reliability must be above .70. Since two of the subscales fell below the recommendation of Nunnally, Cronbach's alpha coefficients were calculated *post hoc*. The subscales positive: world (.80), positive: self (.75), focused (.77), and organized (.71) were found to be in the acceptable range.

The professional development engagement scale was developed by the researchers. Since the objectives of the study required an investigation of professional development participation for agriscience teachers, scales developed by researchers in other fields did not provide enough detail. Moreover, a preexisting scale was not found in the agriscience teacher literature base. The scale was created using the definition of professional development and core conceptual framework for studying the effects of professional development proposed by Desimone (2009). The definition of professional development provided by Desimone (2009) provided 10 unique areas of professional development practice, which included (a) workshops related to agricultural education, (b) workshops in the school/district, (c) coaching and/or mentoring, (d) serving in leadership roles, (e) professional reading, (f) formal coursework, (g) informal dialogue, (h) professional learning communities, (i) observing others teach, and (j) feedback from others observing their teaching. The proposed core conceptual framework for studying the effects of professional development on teachers and students provided three levels for each item. The first level measured participation in each type of professional development, the second measured the teacher's perceived value of professional development, and the final measured the level of integration of the professional development practice into their teaching. The instrument contained 30 items designed to measure one construct. The instrument was determined to be a valid instrument by a panel of experts, including a full professor in teacher education, an assistant professor in extension education, and an associate professor in education. The internal reliability was determined to be above the acceptable range with a Cronbach's alpha of 0.91. Personal and professional demographic data were also collected.

The professional development engagement scale was a five-item semantic-differential developed from the Teacher Job Satisfaction Questionnaire (Lester, 1987). The TJSQ and the five-item scale were given to the pilot group. The Cronbach's alpha for the five-item scale was .97 for the pilot group and was found to have a strong positive correlation ($r = .68$) with the TJSQ. Because the researcher-developed semantic differential career satisfaction scale was found to be a valid and reliable instrument, the TJSQ was not included in the instrument.

A mixed-mode e-mail preference survey method was delivered according to the Tailored Design Method (Dillman, Smyth, & Christian, 2014). A pre-notice letter with a $1.00 incentive was provided to the Florida, Minnesota, and North Carolina teachers. Store coupons, including a certificate for a free hat from Murdock's, were provided to the Colorado teachers. E-mail contacts with a link to survey were used after the initial contact. A thank-you/reminder post-card was sent after three rounds of e-mail contacts. A mailed paper questionnaire was sent to the non-respondents with a business reply envelope after a fourth e-mail contact was made. The usable response rate was 72.5% (n = 892). A Chi-square test was not found to be significant to compare the distribution of non-respondents and respondents by state ($X^2 = 2.92$; $p = .57$). Differences in demographic variables were further compared between early and late respondents (Lindner, Murphy, & Briers, 2001). There were 513 early respondents who responded to the first two contacts. There were 355 late respondents who responded after the first two contacts. There were no significant differences for age with a X^2 value of 38.46 and a *p-value* of .74. There were also no significant differences in the number of years of teaching experience with a Chi-squared value of 32.36 and a *p-value* of .35.

According to Agresti and Finlay (2009), the assumptions of multiple linear regression are a linearity between the variables, little or no collinearity, normality, and homoscedacity. Correlation coefficients were calculated to ensure collinearity did not exist in the model. Hoyt, Imel, and Chan (2008) explained that a correlation above .70 should be examined for collinearity. A correlation between the variables Positive: The world and Focused, both from the personal resilience questionnaire, was $r = .76$ and was beyond the threshold. The Pearson's r was above .50 for several other variables in the overall PRQ scale as well, which was described by Miller (1998) as a substantial correlation. Collinearity diagnostics were used post-hoc in the linear regression analysis using tolerance and Variance Inflation Factor (VIF) values. Both values were established *a priori* and followed the recommendations of Agresti and Finlay. The assumption of normality was examined by analyzing histograms and by using the indexes of skewness and kurtosis. The assumptions of collinearity and normality were not found to be violated. Skewness and kurtosis were determined to be with the acceptable bounds for inclusion in linear regression models (George & Mallery, 2010). Scatterplots were examined and the assumption of linearity was not violated (Miller, 1998). Residual scatterplots showed no evidence of homoscedacity or heteroscedacity.

Results

The characteristics of resilience of agriscience teachers based on personal and professional demographic factors was determined. Since the subscales that measured flexible: thoughts, flexible: social, and proactive were not found to be reliable, the mean scores were not calculated for those variables. Each characteristic of resilience was calculated as a value from 0-100, which represents the range of possible scores. The overall resilience measured for the four subscales was 68.9 (SD = 12.9) for positive: the world, 76.6 (SD = 11.0) for positive: yourself, 73.1 (SD = 11.9) for focused, and 60.8 (SD = 13.3) for organized (see Table 1).

The PRQ is a widely used instrument with over 50,000 completed PRQ instruments. Because of the size of the data, standardized percentage (percentile) scores were available for the respondents in this study. These standardized percentage scores show the characteristics of resilience as compared to the general population. The mean standardized percentage scores for the personal resilience characteristics were 41.3 (SD = 28.3) for Positive: world, 59.7 (SD =

27.2) for Positive: self, 46.1 (SD = 27.8) for focused, and 45.0 (SD = 29.3) for organized. The standardized percentages showed that the agriscience teachers had moderate levels of personal resilience compared to those who have taken the PRQ. The standard deviation scores were fairly high for these areas, especially when compared to the standard deviations of raw scores, which indicates a more erratic distribution of the standardized scores.

Table 1. Mean Scores for Personal Resilience Characteristics

	M	SD
All Participants (*n* = 892)		
Positive: World	68.9	12.9
Positive: Self	76.6	11.0
Focused	73.1	11.9
Organized	60.8	13.3

Note: Characteristics of Personal Resilience are on a scale from 0-100

The purpose of objective two was to describe the relationship between the characteristics of resilience, professional development engagement, career satisfaction, and demographic variables. Pearson's r correlations were used for comparisons between continuous variables. Point-biserial correlations were used for comparisons that included dichotomous variables, including the categorical variables that were dummy-coded for entry in the regression model. While several of the correlations were significant, Miller (1998) explained that there is a difference in statistical significance and practical significance. Therefore, significant correlations were not reported. The relationship between the personal resilience characteristics ranged from $r = .76$, which is considered very high between the variables Focus and Positive: self, and .23, which is considered a low correlation between the variables Positive: world and Organized. Positive: world had a substantial correlation with the variables Positive: self ($r = .66$) and Focused ($r = .64$).

Professional development engagement and career satisfaction had a moderate correlation ($r =$ 34). The relationship between the personal resilience characteristics and professional development engagement and career satisfaction ranged from $r = .41$ (Positive: world and career satisfaction) to $r = .16$ (Organized and professional development engagement).

There was a moderate relationship between those teachers who teach middle school students and those who teach high school students ($r_{pb} = -.34$), where teachers could indicate yes and/or no for both options. There was a moderate relationship between sex and years teaching ($r_{pb} = -.34$), which showed that more new teachers were females. Years teaching was also correlated to teaching a subject other than agriculture ($r_{pb} = -.29$), where teachers with less experience were more likely to teach other subjects. There was a substantial correlation ($r_{pb} = -.34$) between the dummy-coded variable that compared those who earned \$40,000-\$59,999 in their household to those who earned less than \$40,000 with the variable that compared single individuals and married individuals.

A stepwise backwards multiple-linear regression model was used to determine if the personal resilience characteristics and demographic factors served as predictors for professional development engagement. This type of regression modeling was determined to be the most appropriate because of the exploratory nature of this study (Agresti & Finlay, 2009). The multi-collinearity diagnostics did not indicate any violations of the assumption of multi-collinearity.

The regression model contained 26 variables, which included the categorical demographic variables as dummy-coded variables. The 18th model was the most parsimonious model and was significant [F (11, 824) = 12.85; $p < .01$]. The linear combination of all of the independent variables in the final model predicted 13.7% of the variance in professional development engagement as indicated by the adjusted R^2. The standardized beta coefficients are displayed in Table 2. Since standardized beta coefficients were used, the model should be interpreted using z-scores. As the z-score for each of the variables increased by the amount of each beta coefficient, the predicted professional development engagement score increased by one. The personal resilience characteristics Positive: world ($\beta = .18$; $p < .01$) and Focused ($\beta = .20$; $p < .01$) were both significant predictors of resilience. The professional demographic characteristics that were significant were years of teaching experience ($\beta = -.09$; $p < .05$), and Florida agriscience teachers ($\beta = -.08$; $p = .02$). The significant personal demographic variables included in the final model were female ($\beta = .09$; $p < .05$), having one child ($\beta = -.07$; $p < .05$), and non-white and Hispanic ($\beta = .11$; $p < .01$). The model indicated that as Positive: world increased by 12.9, the predicted professional development engagement increased by 2.41. The model also indicated that as Focused increased by 11.9 the predicted professional development engagement increased by 2.68. As years of teaching increased by 9.46 the predicted professional development engagement decreased by 1.20. The model also indicated Florida agriscience teachers, individuals with one child, and white/non-Hispanic individuals are less likely to be engaged in professional development than their comparison groups.

Table 2. Backwards Multiple Regression of Professional Development Engagement on Selected Factors

	Standardized β	p
Constant	81.88	
Positive: World	.18	<.01**
Focused	.20	<.01**
Years of Teaching Experience	-.09	.02*
Colorado Agriscience Teacher[a]	-.02	.63
Florida Agriscience Teacher[a]	-.08	.02*
Minnesota Agriscience Teacher[a]	.07	.06
Female	.09	.01*
One Child [b]	-.07	.03*
Two Children[b]	-.05	.14
Three Children[b]	.00	.99
Non-white and Hispanic	.09	<.01**

Note: Adjusted $R^2 = .137$

[a] North Carolina served as the comparison group. [b] No children served as the comparison group.

*$p < .05$. **$p < .01$

Objective 4

A stepwise backwards multiple regression model was used to determine if the personal resilience characteristics and demographic factors served as predictors for career satisfaction. The multi-collinearity diagnostics did not indicate any violations of the assumption of multi-collinearity. There were 26 variables in the initial regression model, which included the categorical demographic variables as dummy-coded variables. The 24th model was the most parsimonious model and was significant [F (3, 802) = 73.61; $p < .01$]. The linear combination of the variables in the model predicted 21.4% of the variance in career satisfaction as determined by the adjusted R^2. The standardized beta coefficients are displayed in Table 3. The personal resilience characteristics Positive: world ($\beta = .22$; $p < .01$) and Focused ($\beta = .25$; $p < .01$) were both significant predictors of resilience. The professional demographic variable of years of teaching experience was also a significant predictor in the model ($\beta = .11$; $p < .01$). The standardized beta coefficients describe the change in predicted career satisfaction score in terms of standard deviation increases in the predictor variables when controlling for the other variables in the model. This model predicted as individuals' Positive: world increased by 12.9, the predicted career satisfaction increased by 0.97, as Focused increased by 11.9, the career satisfaction increased by 1.10, and as years of teaching experience increased by 9.46, the career satisfaction increased by 0.48.

Table 3. Backwards Multiple Regression of Career Satisfaction on Selected Factors

	Final Model	*p*
Constant	7.10	
Positive: World	.22**	<.01
Focused	.25**	<.01
Years of Teaching Experience	.11**	<.01

Note: Adjusted $R^2 = .214$; $^{**}p < .01$

Conclusions and Recommendations

The purpose of this study was to determine if personal resilience was a predictor of professional development engagement and career satisfaction of agriscience teachers. The results revealed the linear combination of personal resilience characteristics Positive: world and Focused, along with the demographic variables, explained 13.7% of the variance in professional development engagement. Thus, as these personal resilience characteristics increases, the predicted professional development engagement increases. If personal resilience were a static variable, these findings would not hold implications for agriscience teachers. However, since personal resilience can be improved, so too can professional development engagement. Over 86% of the variance is professional development engagement is explained by other variables. Determining these variables should be the focus of future studies. It is important to note only four personal resilience characteristics were included in this model, and only two were significant. For an individual to improve their resilience, Conner (1993) recommended that individuals focus on the weak areas in their own resilience profile and improve those areas. The implications for this finding should be examined on several levels. First, those who are planning and implementing professional development should consider ways to improve the resilience of the agriscience teachers in the areas of Positive: world and Focused. Second, agriscience teachers should consider ways to improve their own resilience and work to become more resilient individuals.

Years of teaching experience served as a significant predictor of professional development engagement and career satisfaction in the regression models. These findings indicated teachers who are later in their careers may be less engaged in professional development. Further research is needed to determine the types of professional development that are appropriate for teachers in different times in their career. Fessler and Christensen (1992) proposed similar practices for professional development.

Florida agriscience teachers was a significant predictor in the model, where Florida teachers had lower scores in their professional development engagement when compared to North Carolina teachers. The possibility of professional development differences was a reason multiple states were selected in the study. An analysis of the effective characteristics of professional development that lead to engagement would illuminate these findings and is recommended. Making comparisons between states was not the purpose of this study. Future studies should be conducted to determine how differences in state professional development structures impact engagement and ultimately impact student learning.

Female agriscience teachers, compared to males, served as a predictor variable in the model. The beta for the variable was positive, which indicated females were more likely to be resilient than males. The mean score for professional development engagement was three points higher for females, which was not tested for significance. The point-biserial correlation between males and females and years teaching was -.33, which matched the findings of Foster, Lawver, and Smith (2014) that showed females are entering into the profession at a much higher rate than males. Werner and Smith (2001) and Rutter (1979, 1985) found females tend to be more resilient than males, which was not indicated by the means of the personal resilience characteristics used in this study. However, since sex served as a significant predictor, there is evidence of a possible interplay amongst the variables.

Having no children compared to having one child under 18 living in the household was a significant predictor of professional development engagement in the model. It is interesting to note that comparisons between no children, two children, and three or more children were not significant predictors. Fessler and Christensen (1992) theorized that a significant life event may lead to change in professional development participation. While the age of the children was not part of the instrument, the inclusion of this variable in the model raises questions about the impact of having a child on professional development engagement. Further studies should be conducted to determine what effect significant life events have over professional development engagement, and more importantly, what support could be provided to help agriscience teachers grow and develop. Resilience affects an individual’s ability to maintain a high level of performance despite difficult or stressful events. Further research is needed to determine if resilience is useful during times of family change or if a decrease in professional development engagement is temporary and should be expected.

The mean scores for professional development engagement were slightly higher for the non-white and Hispanic group than the rest of the population. While there was a low number (n = 43) for this group, these findings showed that non-white or Hispanic agriscience teachers may be more likely to engage in professional development practices, particularly as their resilience increases. Further research in needed to explore the relationship between resilience and ethnicity.

The linear combination of personal resilience characteristics Positive: world, Focused, and years of teaching experience predicted 21.4% of the variance in career satisfaction. Because this model explains 21.4% of the variance in career satisfaction, resilience can be counted as a factor in explaining career satisfaction. This study did not establish time order; therefore, it cannot be concluded that an increase in these personal resilience characteristics will cause an increase in career satisfaction. It does however, point to the relationship between these variables.

These data showed that more experienced teachers are more likely to be satisfied in their career. However, it is reasonable to assume that those who enjoy teaching agriscience are more likely to remain in that career over a long period of time, and those who are not satisfied in their career are likely to seek other career opportunities. This does suggest that career satisfaction could be a predictor of career exit or burnout, and drawing conclusions about these variables is beyond the scope of this study.

The areas of Positive: world and Focused are particularly telling for agriscience teachers. Positive: world describes an individual's optimism about the world around them. Individuals who are resilient in this area are able to see the positive aspects of disruptive change. Teachers are faced with a high level of change and uncertainty (Henderson & Milstein, 2003). Teachers should be encouraged to develop strategies to cope with disruptive change and to see the positive possibilities that come from change. While change may seem frustrating and bring about unknowns, it could have positive implications for students. Focused refers to an individual's ability to have a purpose or direction that guides their actions and is defined by clear goals. Because agriscience programs are so diverse and have so many opportunities for students and teachers, it is imperative that teachers have a level of focus that guides their program. Without this focus, it is easy for agriscience teachers to become overwhelmed by the myriad of available opportunities. Agriscience teachers should be encouraged to set clear, long-term goals and priorities that guide their actions. Organizations that provide support for agriscience teachers should also provide support and structure for helping teachers to establish these goals.

The literature showed that resilience could be enhanced for teachers, in general, through collegial and collaborative support (Gu, 2014), positive relationships, work-life balance (Gu & Day, 2013), and participation in professional development (Huisman et al., 2010). This study provided quantitative support to these qualitative findings. Thieman et al. (2012) provided a cursory investigation of the promise of resilience for agriscience teachers. This study echoed their call for more research on the resilience of agriscience teachers. Agriscience teachers are faced with unique and challenging career responsibilities (Phipps, Osborne, Dyer, & Ball, 2008). Further, they operate in a complex web of professional development and growth systems (Greiman, 2010). Because of these challenges, the individuals involved in these systems, including teachers, teacher educators, school staff, FFA staff, state agricultural education leaders and state and national NAAE leaders, should be encouraged to provide quality professional development offerings and work with teachers to improve their resilience in hopes of making them more satisfied in their career.

The PRQ was used because it was an established instrument in an emerging field. However, only four constructs of the instrument were deemed reliable. The PRQ has great value as a commercial instrument to help individuals and groups become aware and improve their resilience. However, because of the issues encountered in this research, new measures of resilience should be developed that accurately measure resilience for agriscience teachers. Because the Flexible: thoughts, Flexible: social, and Proactive were not included in the model, one can only speculate as to their predictive power as they are related to the major variables in this study. Further research is needed to develop an instrument that provides a valid and reliable measure of resilience for agriscience teachers.

Further research is needed in the area of resilience as it relates to agriscience teachers. This study found that two of the characteristics of resilience were predictors for professional development engagement and career satisfaction. Further investigation using various measures of resilience could be informative. Since research in this area is still emerging, further research is needed to develop an instrument that effectively measures resilience for agriscience teachers. Research related to personal resilience should determine the utility of resilience for agriscience teachers. The data in this study suggested resilient agriscience teachers tend to be more engaged in professional development and more satisfied in their careers. However, resilience could lead to other factors for agriscience teachers. Future studies should examine if resilience is related to student learning outcome variables.

Research related to resilient agriscience teachers should also examine the nature of resilience for agriscience teachers. Hoopes and Kelly (2004) proposed that resilience is amenable. However, how often or how much resilience changes over a person's career is not known. Future research should investigate how resilience changes for agriscience teachers over their career. Research should also be conducted to determine effective ways to improve resilience for agriscience teachers throughout their careers. The literature showed that positive relationships could have an impact on resilience (e. g., Johnson et al., 2015). The findings of this study suggested teachers value mentor/mentee relationships and informal dialogue with peers. Research should be conducted to determine the effects, particularly as they relate to the development of personal resilience, of programs that foster the development of mentor/mentee relationships and informal dialogue between agriscience teachers. Since Henderson and Milstein (2003) postulated that resilience is amenable, further research is needed to determine other ways to improve the resilience of practicing and preservice agriscience teachers.

Agriscience teachers are often confronted with change. National school policy, local school initiatives, state agricultural education groups, and national and state FFA associations are just a few of the agents that can introduce significant change into the practice of teachers. The findings of this study suggested teachers are more satisfied in their career if they can focus on the positives of disruptive change. Agriscience teachers should be encouraged to develop collaborative support systems to help them manage change and focus on the positive impacts of change for themselves and their students.

The data in this study also showed a connection between the personal resilience characteristic of focused and professional development engagement and career satisfaction. Agricultural education began with the simple purpose of educating boys to be more productive on their farm or in specific agriculture vocations (Phipps et al., 2008). Today, the focus of the programs has changed, and agriscience teachers are charged with providing education for diverse students to prepare for a number of careers in the agricultural industry, as well as provide education to create an agriculturally literate citizenry (Roberts & Ball, 2009). The opportunities for students have multiplied, which can create a burden on teachers to provide as many opportunities for their students as possible. The findings of this research showed that agriscience teachers may benefit from focused goal setting for their program and themselves. Having a clear goal for their program and students could encourage teachers to focus on the opportunities that help meet the overall goals and avoid becoming overcommitted. Mentor relationships or informal dialogue could provide this support. Advisory councils and FFA Alumni chapters could be a source of this support for agriscience teachers.

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Investigating the Motivational Changes of Pre-service Agricultural Education Teachers During a Six-Week Project-Based Learning Experience

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Abstract

The Planning the Community Program in Agricultural Education course exists to provide pre-service teachers in agricultural education with experiences in FFA and SAE. As such, pre-service teachers embarked on a six-week project-based learning experience in Spring 2016 in which they raised a pen of broilers from a one-day old chick to harvest ready (42 days). The broilers were used as the context to learn about data management and Supervised Agricultural Experiences (SAEs). In this case study, we examined pre-service teachers' motivation regarding their self-reported beliefs and perspectives for participating in the six-week project-based learning experience. As a result of the study, three themes emerged: (a) initial self-ambition, (b) achievement stagnation, and (c) stabilized self-concept. Students began the project with high motivation and excitement. However, toward the midway point of the project, students' motivation waned, due to monotony and challenges. Finally, during the last two weeks, pre-service teachers' motivation stabilized, as their self-concepts and reflection abilities matured. The study holds important implications for how teacher educators in agricultural education should design and deliver future project-based learning experiences regarding students' motivational processes. Specifically, this study indicates that, although student motivation may fluctuate at various stages, it is developed and sustained in a successive manner over time.

Introduction

Agricultural education exists, as a discipline, to enable students to learn valuable life skills necessary for employment in various sectors of the agricultural industry through rich, experiential learning opportunities (Baker, Robinson, & Kolb, 2012). However, creating such opportunities, where students are expected to apply their knowledge and skills in various contexts, can be a difficult yet imperative task (Arnold, Warner, & Osborne, 2006). To be deemed effective, agricultural education teachers are expected to be quality classroom instructors, have a solid understanding of and be able to advise students in the FFA program, and operate, maintain, and utilize all school-based laboratories (Roberts & Dyer, 2004) by providing rich experiences across the comprehensive agricultural education model (Baker et al., 2012).

Agricultural education teachers face a myriad of challenges regarding their professional role. Among them is a lack of student motivation for learning or experiencing agriculture (Boone & Boone, 2009). Fewer people than ever before rely on farming as their livelihood (Environmental Protection Agency, 2012). As people have become further removed from the family farm (Sayers, 2011), so too has their basic knowledge about (Jones, Robinson, & Edwards, 2014; Wingenbach, McIntosh White, Degenhart, Pannkuk, & Kujawski, 2007), and motivation and appreciation for agriculture, food, fiber, and natural resources (Boone & Boone, 2009; Dyer & Breja, 2003; Stair, Warner, & Moore, 2012).

Sadly, today's college students know very little about agriculture. Colbath and Morrish (2010) revealed that incoming freshmen students enrolled at a higher education institution in central Texas failed (54%) a basic agricultural literacy test, where 70% was deemed *acceptable*. Unfortunately, students majoring in agriculture do not fare much better. In a study of the entire freshmen body at Oklahoma State University, it was found that students in the College of Agricultural Sciences and Natural Resources possessed barely a passing grade (61%) on a similar 100-point test regarding their knowledge of basic agricultural concepts (Jones et al., 2014). This lack of basic knowledge has implications for pre-service agricultural education teachers, as they come to the university with a dearth of rich, lived experiences in agriculture. It becomes the role of teacher preparation programs and educators to provide the adequate human capital, such as knowledge and experiences, pre-service teachers need before entering the profession (Mundt, 1991; Robinson & Baker, 2013).

Fortunately, teacher preparation programs of agriculture exist to provide coursework and experiences that enable students to learn technical agricultural skills and improve their confidence to teach them (Leiby, Robinson, & Key, 2013). Kennel (2009) stated, "because teachers are the single most important influence on student achievement, teacher education programs need to provide learning experiences for pre-service educators to impact their confidence to teach pertinent subject matter . . . ." (p. 2). One such area of need is supervised agricultural experience (SAEs) programs (Rubenstein, Thoron, & Estepp, 2014).

Rubenstein et al. (2014) stated,

> Since its inception, school-based agricultural education in the United States has utilized the home project method, later known as a supervised agricultural experience program (SAE), as a way to provide students with contextual, hands-on learning experiences outside of class that complement classroom learning. (p. 72)

Although SAEs are a fundamental component of the agricultural education program (Croom, 2008; Ramsey & Edwards, 2012) and have been since Stimson's Farm Project Method was introduced in the early 1900s (Boone, Doerfert, & Elliot, 1987), teachers spend the least amount of time teaching students about them in comparison to other aspects of their job (Robinson, Krysher, Haynes, & Edwards, 2010; Terry & Briers, 2010). Therefore, a decline in student participation in SAEs at the secondary level exists (Croom, 2008). Although the reasons for the decline are largely unknown (Bird, Martin, & Simonsen, 2013), it could be due to teachers' lack of knowledge regarding SAEs (Lewis, Rayfield, & Moore, 2012).

It is widely recognized that, although agricultural education consists of a balanced and integrated three-circle model including classroom and laboratory instruction, FFA, and SAE (Phipps, Osborne, Dyer, & Ball, 1988), the SAE component appears to be the weakest among the three (Croom, 2008; Rubenstein et al., 2014; Wilson & Moore, 2007). In addition to being the weakest component, Dyer and Breja (2003) revealed that SAEs actually serve as "obstacles" to recruiting students into agricultural education programs (p. 84).

Part of the reason SAE participation has decreased over time is due to historical issues. Stimson's vision of SAE "became in actuality a mission statement of agricultural education.

Many teachers soon realized, however, that education in agriculture must encompass more than only one home project, and initiated broader SAE programs . . . .” (Dyer & Osborne, 1995, p. 6). The Vocational Act of 1963 was intended to improve the broader aspect of what constituted an SAE. However, it came with unintended consequences and “de-emphasize[d] the need for SAE programs” (Dyer & Osborne, 1995, p. 7), which had a negative impact on SAE activity in the US (Boone, Doerfert, & Elliot, 1987). The decrease in students’ SAE participation eventually had a ripple effect, resulting in teachers being less experienced in and knowledgeable about teaching SAEs (Dyer & Osborne, 1995).

To increase participation, teachers have tried to motivate and encourage students to participate in SAEs through extrinsic rewards (Bird et al., 2013). Specifically, teachers use FFA awards as the motivation to participate in quality SAEs (Wilson & Moore, 2007). However, the spirit of SAEs may be more intrinsic than extrinsic for students in secondary programs (Bird et al., 2013).

Motivation can be impacted by the types of experiences students have (Baker, Robinson, & Terry, 2015). Kolb (1984) recognized the need for establishing concrete learning experiences in which students reflected, drew conclusions, and then retried their new ideas for experiencing a novel situation. It is important that an expert be present to guide the novice learner through a novel learning experience (Kolb, 1984).

Teacher educators should provide the expert guidance to pre-service teachers regarding the skills and experiences they need to be successful in the classroom (Stair et al., 2012). Teachers have indicated that ensuring SAE quality and effectiveness is one of the most important and difficult tasks associated with teaching school-based agriculture (Dyer & Osborne, 1995; Ramsey & Edwards, 2012; Robinson & Haynes, 2011; Rubenstein et al., 2014). Therefore, including SAEs in teacher preparation programs is imperative (McLean & Camp, 2000). Further, “teacher preparation programs in agriculture [should] provide authentic, relevant instruction to preservice teachers on developing, implementing, maintaining, sustaining, evaluating, and supervising an SAE program” (Rubenstein et al., 2014, p. 72). For SAEs to be relevant, viable, and impactful for secondary students, teachers must be well equipped, as they play an integral role in the development and delivery of student SAEs (Rubenstein & Thoron, 2015). Given the importance that motivation plays in shaping quality SAEs (Bird et al., 2013), a need existed to understand how pre-service teachers experienced motivation as they engaged in experiences designed to enhance their instructional knowledge and skills to facilitate SAEs.

Theoretical Framework

Through our analytic procedures, we decided Maehr’s and Zuscho’s (2009) achievement goal theory (AGT) served as the most appropriate theoretical lens to describe how pre-service agricultural education students experienced motivation during a six-week SAE project focused on raising broilers. Although scholars have theorized the link between motivation and learning from multiple perspectives (Schunk, 2016), AGT emphasizes the importance that *motivational processes* play in students’ learning experiences. Motivational processes affect the way students acquire, transfer, and use new knowledge and skills (Dweck, 1986). Further, AGT scholars (Senko et al., 2013; Senko & Hulleman, 2013) conceptualize motivational processes as the *goal-directed behaviors* students’ exhibit over time. Goal-directed behaviors involve social cognitive processes such as motives, strivings, achievements, concerns, and action. As a consequence, Maehr and Zuscho (2009) argued that motivation should be examined in terms of students' shifting perspectives, beliefs, and behaviors throughout the *life* of learning activities.

Therefore, we discerned motivation through students' self-reported beliefs and perspectives regarding their goal-directed behaviors. For example, we analyzed how participants articulated their choice to engage in particular activities, quality of engagement, performance, and resolve. In other words, we used this *a posteriori* theoretical lens to make sense of the *motivational shifts* participants experienced during their six-week broiler project. However, AGT also positioned us to consider the role that *cultural* and *individual* factors might have played in shaping the motivational processes of participants. For example, through the lens of AGT, we analyzed the influence that factors such as the culture of learning activities, individual tasks, and as well as the laboratory environment might have played in affecting students' motivation. Therefore, AGT served as underlying theoretical scaffolding to which the study's findings are anchored.

Theoretical Perspective, Purpose, and Rationale

From this study's early conception, we nested our decisions in Koro-Ljungberg's, Yendol-Hoppy's, Smith's, and Hayes' (2009) position that qualitative researchers' philosophical perspective and methodological choices should be aligned. Therefore, we grounded this study in the worldview of *constructionism* (Crotty, 1998). Constructionists consider knowledge to be ". . . contingent upon human practices, being constructed in and out of interaction between human beings and the world, and developed and transmitted within an essentially social context" (p. 42). Grounded in this perspective, we developed the purpose of this study, which was to describe how pre-service agricultural education teachers experienced motivation during a project-based learning assignment that used broilers as a context for teaching data management (i.e., record keeping) and SAE concepts. Consequently, we also were positioned to address Priority 4 of the National Research Agenda, which calls for "meaningful, engaged learning in all environments" (Roberts, Harder, & Brashears, 2016, p. 37). Next, we will outline the background of this study.

Background of the Study

Planning the Community Program in Agricultural Education is the second in a sequence of courses taken by agricultural education students at Oklahoma State University. Per the 2016-2017 Oklahoma State University Course Catalog, the *Planning the Community Program in Agricultural Education* course exists to help students improve their human capital regarding their "FFA chapter advisement, planning and managing the instructional program, [and] identification and completion of records and reports required to be a teacher of agricultural education in Oklahoma" (p. 199). The course is designed to assist and equip students with the tools needed to conduct quality SAE programs at the secondary level. The aim of this course is to allow students to gain a theoretical and practical understanding of the FFA and SAE components of agricultural education's integrated three-circle model. In Spring 2016, the course's lead instructor introduced record keeping and SAE concepts through a project-based learning approach. Through this project, 34 pre-service teachers partnered to care for approximately 200 one-day-old broilers over a six-week period. As an additional requirement for the course, students designed broiler experiments, tested interventions, collected and maintained accurate records, and rotated between student and advisory roles to gain insight into facilitating such experiences.

Specifically, each student was provided "five (5) broilers to raise and collect data for the last six weeks of the semester" (Name, 2016, p. 5). Students were paired with a partner, so as to have 10 birds between them, to design an experiment and role-play the teacher and student during the project's duration.

To assist pre-service teachers with making learning connections, they were required to submit weekly reflections, photos, and data collection records. Further, the pre-service teachers were required to create and deliver a final presentation of their experience to their peers. In the design of this project, our personal beliefs about teaching and learning influenced its conceptualization. Therefore, to be transparent about our influences, the reflexivity section details our position in the design, collection, and analysis of data associated with this study.

Reflexivity

It is crucial for qualitative researchers to reveal the biases and perspectives influencing their decision-making (Patton, 2002). As a consequence, we constructed the following reflexivity statement as a way to promote *honesty* and *sincerity* before offering an interpretation of the study's findings (Lincoln & Guba, 1985).

> *Both researchers were involved directly with the course under investigation. For example, the lead researcher is a doctoral student in agricultural education and was a teaching assistant for the course. The second author is a Professor at Oklahoma State University and served as the course's lead instructor. It also is important to note that both researchers are former school-based, agricultural education (SBAE) instructors in Oklahoma. Because we consider Oklahoma traditional in regard to agricultural production, we also held biases concerning the importance of using animals as a context for teaching and learning. This bias influenced our decision to use poultry (i.e., broilers) to facilitate the teaching of record keeping and SAEs for this project-based learning assignment.*

Given these experiences and perspectives, we recognize our influences on this study. However, we attempted to mitigate our biases whenever possible. Consequently, the following section outlines our methodological decisions, analytic moves, and discoveries as we sought to understand this phenomenon.

Methodology

We chose to ground this study, methodologically, in Stake's (1995) instrumental case study approach. Due to its roots in the interpretivist paradigm (Stake, 1995), this choice allowed us to bring our theoretical and methodological decisions into philosophical alignment (Koro-Ljungberg et al., 2009). For example, instrumental case studies can offer rich understandings into bounded systems (Stake, 1995). However, this qualitative approach's strength lies in the context-rich description of *specific issues* that may have transferability to similar circumstances (Creswell, 2013; Stake, 1995).

In this study, *time* and the *unit of analysis* bounded the case. For example, we limited the project-based learning assignment to a six-week period and analyzed data for only one particular laboratory section of the course. Our reason for bounding this case during this time period is because the broilers are typically harvested at Oklahoma State University after 42 days (Name, personal communication, January 17, 2016). We offer a deeper insight into participant characteristics and selection criteria next.

Participants

Each participant (n = 14) was enrolled in Laboratory Section 001 of the *Planning the Community Program in Agricultural Education* course at Oklahoma State University in Spring 2016. Our decision to mobilize data from this particular *unit of analysis* was threefold: (a) it was the largest laboratory section, (b) it reflected student demographics best, and (c) the lead researcher was immersed in all of the section's major activities throughout the duration of the project. As a consequence, we purposefully selected (Patton, 2002) seven female and seven male pre-service agricultural education teachers from this bounded system.

Data Sources and Analysis

In this study, we collected multiple sources of data to triangulate findings. For example, written reflections, student photographs, record keeping submissions, field observations, summative presentation materials, and video of participants' final presentations all furnished sources of data. Analysis was an ongoing process as we began to engage data sources (Saldaña, 2015). To make sense of our analytic work, we used memoing techniques to mobilize findings, empirical assertions, and analytic shortcomings. Because data becomes fragmented in qualitative analysis, we followed Saldaña's (2015) recommendations to continually return to the data corpus to minimize misrepresentations, thus improving the transferability of the findings.

Data were analyzed using the constant comparative method (Corbin & Strauss, 2015). Both hand coding and NVivo ® qualitative analysis software were used to explore and manage the data. To initiate analysis through the constant comparative method, we used Saldaña's (2012) coding suggestions consisting of the following techniques: (a) open, (b) axial, and (c) selective. Through two distinct rounds of open coding and multiple coders, we identified initial codes (Saldaña, 2012). Then, we scrutinized the relationships of the open codes in the axial coding phase. When analyzing these relationships, we considered the study's context and the consequences of reducing data units into particular categories through a negotiation phase (Patton, 2002). Ultimately, the resulting product was used to develop evidentiary warrants (Corbin & Strauss, 2015). To mobilize the evidentiary warrants, we reengaged the data through selective coding (Saldaña, 2012). The use of selective coding allowed us to develop an analytic story line that we chose to narrate through the three themes (Saldaña, 2015).

Rigor and Trustworthiness

Before offering our interpretation of the findings, it is important to discuss our strategies for building *rigor* and *trustworthiness* into this investigation. From this study's inception, we allowed Lincoln's and Guba's (1985) four standards of qualitative quality – credibility, transferability, dependability, and confirmability – to drive our ethical decision-making. Strategies for upholding each standard are outlined below.

Credibility refers to the production of trustworthy findings (Lincoln & Guba, 1985). We addressed credibility in this study through three major strategies: (a) persistent observations, (b) triangulation of data sources, and (c) peer debriefing sessions. We also stressed the importance of the study's findings in providing meaning to other contexts, or *transferability*. To accomplish this, we provided a rich description of the setting and participants while also being frank about the limitations of this study. The third standard, *dependability*, represents the stability of the investigation. We emphasized dependability in three major ways: (a) only collecting data that connected to the purpose of this study, (b) clearly describing each researchers' role in the study, and (c) outlining the philosophical paradigms influencing this investigation's design. Finally, the extent to which the study's findings could be linked to data, or *confirmability*, was addressed through using direct quotes from participants and regularly comparing claims against relevant data sources. Through our efforts to uphold standards for rigor and trustworthiness, we gained confidence in our interpretations of this investigation's findings.

Findings

Through our analysis of the data, three processes emerged that describe how participants experienced motivation in the project-based learning assignment under investigation. Using Maehr's and Zuscho's (2009) AGT as theoretical lens, we narrated the processes through three themes: (a) *initial self-ambition*, (b) *achievement stagnation*, and (c) *stabilized self-concept*. The processes provide new insights into the role that motivational shifts can play in shaping learning outcomes for pre-service agricultural education teachers. Using relevant examples from the data, each theme seeks to distinguish how participants experienced these *motivational processes* throughout the six-week broiler project, which provided a context for teaching record keeping and SAE concepts.

Initial Self-Ambition

Through the lens of AGT, individual goals and ambitions could serve as powerful motivators (Maehr & Zuscho, 2009). In accordance, participants in this study articulated the *ambitions* they held regarding the broiler project were connected largely to building their professional capacity. Typically, participants expressed these sentiments in the *early stages* of the project. For example, Participant 11 revealed his ambition was to gain a deeper understanding of teaching the scientific method in the context of agriculture. In his first journal entry, he wrote:

> I feel like there a lot of valuable things that can be learned and taught by doing this assignment. For example, you can learn to teach the scientific method and the importance of being consistent and responsible. The scientific method is crucial in the agriculture industry.

Meanwhile, Participant 13's early goal was to hone her pedagogical skills to keep students engaged in laboratory settings. She explained, "This type of project is one that most students will be excited and motivated to complete." On the other hand, Participant 7 saw value in the project due to its focus on animals. He explained, "The livestock side of teaching Ag is something I'm excited for, yet nervous for at the same time." Consequently, his ambition was to gain more knowledge about facilitating such experiences for his future students.

In the project's introduction, participants also were optimistic about learning to facilitate record keeping for SAEs. In the first week, many pre-service teachers expressed their ambitions to gain proficiency in this particular technical area through the project. For instance, Participant 4 found this element of the project "thrilling and exciting." Several participants even submitted photos after week # 1 that depicted elements of the record keeping process (see Figure 1).

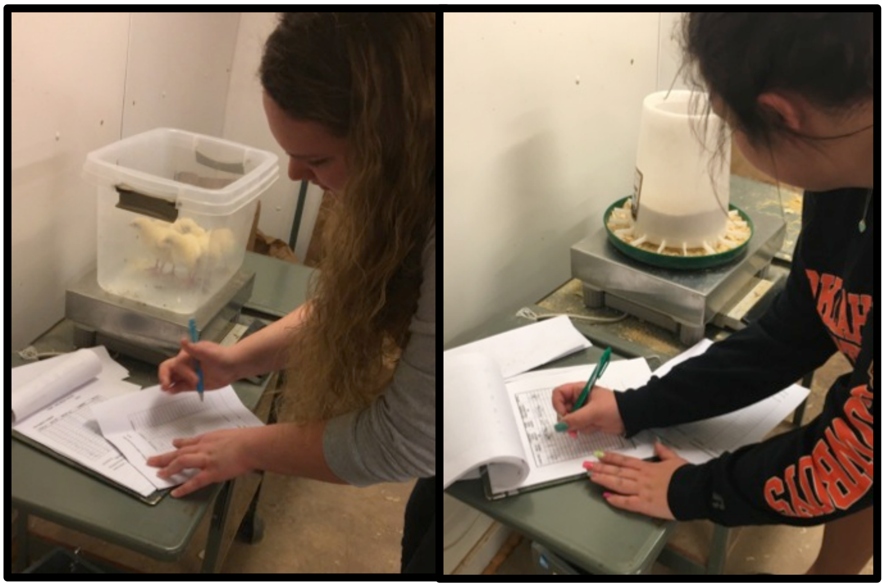

Figure 1. Participant 1's (Left) and Participant 2's (Right) photo submission from week # 1 of the broiler project. Photos depict pre-service agricultural education teachers in various phases of the record keeping process.

In the first theme, we outlined the *initial self-ambitions* experienced by participants in the broiler project. This motivational process appeared to be manifested through the pre-service teachers' early goals and ambitions to gain proficiency in various pedagogical and content-specific areas, such as animal husbandry and record keeping. However, as participants gained experience and competence with the broilers, these positive views often became stagnated, as achievement appeared to stall.

Achievement Stagnation

After several weeks of caring for the broilers, participants appeared to lose sight of their initial ambitions. Further, their motivation for the project seemed to become *disconnected*, *narrow*, and *stagnant*. AGT scholars (Huang, 2011; Linnenbrink-Garcia, 2012; Putwain, Larkin, & Sander, 2013) argued that *stagnation* occurs as individual challenges and concerns begin to overpower learners' goals and expectations. For instance, Participant 2 did not perceive growth in her abilities; consequently, she struggled to make sense of how to engage her future students in similar projects. She explained:

> I feel that I am satisfactory. I myself am a little tuned out from this project. This project to me is the same routine. I feel I can't engage students if I myself am not engaged. This particular project isn't something I have found passion in and until I find that spark I

don't really know how excited I will really be. I feel maybe it will be more interesting as the project goes on but right now I have no clue how to engage my students.

Other participants articulated their struggles with staying motivated were due to the demanding and monotonous tasks associated with the project. For example, Participant 10 explained, "keeping motivated can be a hard task." Similarly, Participant 9 voiced that he experienced "little growth" during this phase of the project. Interestingly, participants' photo submissions also appeared to lack a sense of motivational and skill development. For example, in photo submissions for week # 3 several participants submitted photos illustrating their unwillingness to test new boundaries and work toward achieving their initial goals for the project. Instead, their submissions depicted rudimentary skills, such as weighing broilers (see Figure 2).

Figure 2. Participant 4's (Left), Participant 11's (Center), and Participant 12's (Right) photo submissions from week # 3 of the broiler project. Photos depict participants' weighing broilers – a low-level skill for this phase of the project.

The second theme, *achievement stagnation*, demonstrated a substantial shift in participants' motivational schemes. For instance, they seemed to lose sight of the importance of their early ambitions as they engaged in monotonous and tedious activities associated with the broiler project. This motivational disengagement also appeared to influence their learning outcomes, as numerous participants refrained from making important pedagogical and content knowledge connections.

Stabilized Self-Concept

Over the final weeks of the project, students began to encounter more complex problems. For example, in the project, many of the participants faced issues such as "sickness" (Participant 12), "disease" (Participant 6), "irregular growth patterns" (Participant 8), and the "death" of one or more of their broilers (Participant's 7, 10, and 14). Interestingly, after confronting these difficulties, participants began to articulate more *complex*, *integrated*, and *stable* perspectives. In this regard, AGT conjectures that as learners persist through the trials of learning activities, their motivation often stabilizes as they begin to *make meaning* of how these difficulties helped them to grow and mature (Maehr & Zuscho, 2009). The maturation of one's self-perspective, therefore, holds substantial implications for the study of motivation.

In the literature, Schunk (2016) defined *self-concept* as the self-perspectives individuals hold of themselves. As a consequence, one's self-concept is formed by the confidence a person maintains as a result of his or her experiences (Shunk, 2016). In this study, participants' self-concept appeared to stabilize in the later stages of the broiler project. This factor also appeared to positively influence the pre-service teachers' motivation to gain quality professional benefits from the assignment.

For example, as the broiler project came to a conclusion, we asked the pre-service teachers to reflect deeply on their professional growth and development. To facilitate this process, we required each student to develop and deliver a final presentation (Name, 2016). Through this process, participants seemed to *make sense* of their experience, which also appeared to help them crystallize their beliefs about the role the project had in shaping their pedagogical and technical development. We captured the final presentations and resulting discussions on video; therefore, we were able to use these moments of explanation, clarification, and co-construction of knowledge as important data points in this study.

In students' final evaluation of their learning, they seemed to make important connections in regard to the value the broiler experience might provide as they transitioned into teaching in a real-world laboratory setting. Participant 3 explained,

> Towards the end we became more comfortable with the project and began to learn what needed to be done to help out the animals and make their life easier day-by-day. For example, we had to move the feeders up and down. This is part of the learning process and will help us solve problems when we are in the real world as ag teachers.

Other participants perceived they had matured professionally through the project as well. For example, they espoused they could "provide recommendations" to future students (Participant's 10 and 14), " plan successful laboratory experiences" (Participant's 8 and 9), overcome "unexpected challenges" (Participant's 2 and 5), and "manage students" in a laboratory setting (Participant's 4 and 6) better than they could before engaging in the experience. Therefore, the final theme detailed how the pre-service teachers in agricultural education began to move beyond the motivational stagnation experienced in the mid-stages of the broiler project. Further, by confronting complex issues and reflecting deeply on their experiences, numerous participants' *self-concept* seemed to stabilize in the project's final stages, which encouraged positive professional growth.

Conclusions

In this study, we sought to describe how pre-service teachers in agricultural education at Oklahoma State University experienced motivation during a project-based learning assignment that used broilers as a context for teaching concepts related to data management and SAEs. By interpreting the findings through the theoretical lens of Maehr's and Zuscho's (2009) AGT, three themes emerged: (a) initial self-ambition, (b) achievement stagnation, and (c) stabilized self-concept. The themes represent the motivational processes participants underwent during the six-week broiler project. To situate these findings in the literature, conclusions are provided for each process.

The first theme, *initial self-ambition*, illuminated the importance of participants' early goals and expectations regarding the broiler assignment, which mainly seemed to reflect their desire for professional growth and development. For example, participants articulated enthusiasm to enhance their knowledge and skills about facilitating the *scientific method*, *livestock projects*, as well as *record keeping* for SAEs. These early ambitions appeared to drive the motivational processes experienced by participants. As a consequence, we conclude that identifying participants' individual self-ambitions is central to understanding how motivational shifts might occur at the individual level during project-based learning assignments. Although this literature on motivation and learning supports this finding (Dweck, 1986; Maehr & Zuscho, 2009), scant evidence exists in the context of agricultural education.

In the mid-stages of the broiler project, pre-service teachers seemed to experience *achievement stagnation*. For instance, participants reported the *challenges*, *demands*, and *monotony* of certain tasks associated with the assignment caused them to lose sight of its intents and purposes. As a result, participants' course submissions also appeared to lack a sense of pedagogical and content-specific growth. Existing evidence across disciplines suggests that challenges in learning endeavors may result in students lacking the motivation needed to attain their educational and professional goals (Huang, 2011; Senko et al., 2013). However, findings from this investigation hold new insights for the motivation literature by providing a basis for how *contextual, emotive*, and *visceral* dimensions of learning might affect students' motivation.

The final theme demonstrated how participants' motivation appeared to *stabilize* in the latter phases of the assignment. This stabilization seemed to occur through the maturation of participants' self-concept through reflective strategies that required participants to consider how they grew professionally during the project. The view that *reflection* serves as a crucial element of learning process is situated firmly in the agricultural education literature (Baker, Brown, Blackburn, & Robinson, 2014; Epler, Drape, Broyles, & Rudd, 2013; Lambert, Sorenson, & Elliot, 2014). However, the notion that reflection may be used as a technique to stabilize the self-concept of pre-service teachers has not been addressed explicitly.

Discussion, Implications, and Recommendations

Recently, the construct of motivation appears to have been operationalized as a quantitative variable in the agricultural education literature (Baker et al., 2015; Chumbley, Haynes, & Stofer, 2015; Roberts, Terry, Brown, & Ramsey, 2016). However, by approaching this study from the qualitative paradigm, this study's findings hold important implications for agricultural education in regard to future research, theory, and practice.

First, existing research in agricultural education largely attempts to measure students' changes in motivation using pre-determined outcomes through treatments that are both short-term and novel in design (Baker et al., 2015; Chumbley et al., 2015; Roberts et al., 2016). However, by using an emergent design that was more longitudinal in nature, this study's findings illuminated three existing motivational processes while also providing empirical evidence of a theorized, sequential relationship among them. Additional research is needed to explore the parameters of this relationship and whether more nuanced motivational processes need to be *discovered* and more evocatively *defined*. Researchers exploring the motivation of pre-service teachers also should consider the findings to examine whether the motivational process identified might influence the design, collection of data, and resulting outcomes of their studies.

The three motivational processes also warrant future research. For example, *initial self-ambitions* appeared to influence the major motivational shifts experienced by participants. Consequently, future work should attempt to identify pre-service teachers' goals and expectations more extensively as they engage in project-based learning throughout teacher preparation training. Additional research is needed to explore the *stagnation* participants experienced in regard to achievement. In this case, *monotony* and the *demands* associated with the project seemed to have influenced participants' motivation negatively. To this point, we recommend that future investigations test various interventions throughout project-based learning assignments to determine whether learners' motivation could be maintained at a more consistent level. Finally, although the agricultural education literature is rife with evidence concerning the importance of reflection (Baker et al., 2014; Epler et al., 2013; Lambert et al., 2014), more research is needed to identify the types of reflective strategies that might be most useful in assisting pre-service teachers' self-concept to *stabilize*.

In this investigation, we used Maehr's and Zuscho's (2009) AGT as an *a posteriori* lens to make meaning of the study's emergent findings. Therefore, we allowed AGT to assist in organizing our understanding of how participants experienced motivation during the broiler project. As a result, we were able to more intimately grasp and explain each motivational process. Nevertheless, we believe the study's findings could offer a crucial expansion to AGT. For example, participants in this study appeared to experience the motivational processes in a successive manner. Consequently, more theory-building efforts should be undertaken to generate a clearer conceptual explanation for how AGT might unfold in praxis.

In an era where less people are exposed to agriculture (Environmental Protection Agency, 2012; Jones et al., 2014; Sayers, 2011; Wingenbach et al., 2007), this course was focused on providing concrete experiences in which students could participate and reflect over time (Kolb, 1984). However, providing such experiences came with a *cost*. The broiler project under investigation required *time*, *money*, and *human capital* to be successful. In practice, therefore, university officials should deeply consider whether they are willing to dedicate the time and resources necessary to ensure that students gain a quality learning experience. We also recommend that practitioners consider whether broilers might be the most appropriate context to facilitate learning the principles of data management (i.e., record keeping) and SAEs. For example, perhaps a horticulture project could be a more cost-effective and less controversial alternative given the rise of animal advocacy legislation in recent years. Moving forward, we recommend that university officials consider the *motivational processes* identified in this study in the design and delivery of project-based learning assignments for pre-service teachers in agricultural education. By integrating strategies to promote consistent motivational behaviors purposefully, perhaps greater learning outcomes can be achieved.

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Previous Experience Not Required: Contextualizing the Choice to Teach School-Based Agricultural Education

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The purpose of this study was to identify key career choice items which lead students without previous experience in school-based agricultural education (SBAE) to pursuing agricultural education. The Ag Ed FIT-Choice® model adapted by Lawver (2009) and developed by Richardson and Watt (2006) provided the investigative framework to design this study. Findings were organized around categories of the Ag Ed Fit-Choice Model (Lawver, 2012) with the exception of one additional category, believed unique to this group. Two focus groups were assembled to include ten participants. A myriad of experiences led participants to consider SBAE as a career. Certainly, it can be concluded that a passion for agricultural education does not solely stem from prior SBAE experiences. The intrigue toward the varied content associated with agriculture played a substantial role in participants' choice to teach agriculture. Participants' reflections revealed a distinct interconnectedness of domains within the Ag Ed Fit-Choice® model and the way in which this group of future teachers reflects upon career decision. Further, participants engaged in near constant value-checking and introspective career evaluation resulting through field experiences. The present study generated additional questions on the most effective ways to recruit future SBAE teachers who are non-traditional SBAE students.

Introduction

The shortage of school-based agricultural education (SBAE) teachers across the United States is not a newly emerging issue. In fact, Camp (2000) reported a shortage of SBAE teachers has been a prevalent concern, even as early as 1921. More recently, within the past decade, an average of 71% of qualified SBAE teacher candidates choose teaching as their career with remaining graduates choosing alternative professions (Kantrovich, 2010; Foster, Lawver, & Smith, 2015). Efforts to expand the profession and meet the needs of local programs should focus on the recruitment of more qualified candidates into agricultural teacher education programs (Ball & Torres, 2010; Kantrovich, 2010).

Summary data from each iteration of the national supply and demand studies for teachers of agricultural education spanning the last 50 years have informed the profession of consistent annual shortages (Camp, 2000; Kantrovich, 2007; 2010; Foster, Lawver, & Smith, 2016). Within the profession, recommendations consistently indicate the necessity for stakeholders in agricultural education to recruit our own and positively portray the profession of teaching. Lawver and Torres (2011, 2012) recommended recruitment efforts and strategies focused on populations outside of SBAE and further study of agricultural education majors and current teachers who do not possess the typical SBAE background found amidst SBAE teachers. It appears that expecting current SBAE programs to produce all future teaching candidates is not realistic. Certainly, such a narrow approach to recruitment ignores the opportunity for connecting with prospective teachers outside of SBAE. As such, how might we reconfigure the recruitment process for SBAE to attract and invite a more diverse candidate population?

Review of Literature

A few minutes spent scrolling through the Teacher Shortage Area Nationwide List (Cross, 2016) will reveal a diverse inventory of shortage areas within specific teaching fields across the most recent 25 year period. Several fields are consistently found on this list year in and out, among the membership is agricultural education. Within our profession we have diligently tracked and reported the disparity between the demand from local program openings to the supply of teacher candidates from our universities through the supply and demand studies (Camp, 2000; Kantrovich, 2007; 2010; Foster, Lawver, & Smith, 2016). The shortfall of initial graduates who choose the SBAE classroom is only one piece to the puzzle. Ball and Torres (2010) offer summative perspective to our perennial challenge and suggest that "regardless of the source of the problem, the solutions to the teacher deficit are recruiting and retaining teachers of agriculture" (p.270).

In order to create effective mechanisms and evolve current recruitment methods of teachers, it is important to recognize how people come to choose teaching as a career. Extant literature primarily addresses teacher career choice beneath the umbrella of motivation. In particular, reasons for pursuing teaching are identified through altruistic, intrinsic, and extrinsic motivations (Kyriacou & Coulthard, 2000). Lawver and Torres (2011) reported intrinsic factors and drive to pursue teaching demonstrated the greatest predictive power toward describing career choice. Bastick (1999) concluded motivations to enter into the teaching profession including job security, salary, and work schedule according to a study of Jamaican pre-service teachers. Kyriacou and Coulthard (2000) buttressed those findings in a study of undergraduates who were identified into groups as pro-teaching, undecided, and anti-teaching. The pro-teaching camp approached the decision from an altruistic and intrinsic desire to serve as an educator. The anti-teaching camp did not view the same career characteristics as advantageous. The undecided group however, offered the most room for recruitment tactics as tailoring strategies toward the areas they found important in a career could sway them toward teaching as a professional choice (Kyriacou & Coulthard, 2000).

In addition to getting candidates to choose the profession in the first place, we also must contend with teachers leaving the profession early in their career for myriad reasons. Recent data from the National Center for Educational Statistics (Golding, Taie, Riddles, & Owens, 2014) indicates nationwide on average, eight percent of teachers within their induction years (1-3 years) left the profession during the measurement periods of 2004-2005, 2008-2009, and 2012-2013. Amounting to over 250,000 teacher openings beyond retirements. These findings are in contrast to figures Ingersoll (2003) reported in the range of 40-50 percent attrition within the induction years. Pertinent to SBAE within the Golding et al. study, they reported slightly higher attrition rates among teachers in rural areas (8.4 %) and those with a base salary of less than $30,000 (14.8%) as compared to attrition among all other teachers.

Research and writing within agricultural education indicates the secondary agriculture teacher positively influences their students' career decisions in general (Esters & Bowen, 2005; Fraze, Wingenbach, Rutherford, & Wolfskill, 2011; Priest, Ricketts, Navarro, & Duncan, 2009; Marx, Simonsen, & Kitchel, 2014; Wildman & Torres, 2001), but more important to the present study, students' decisions to pursue teaching (Ball & Torres, 2010; Lawver & Torres, 2012; Park & Rudd, 2005). Lawver and Torres (2011, 2012) recommended recruitment efforts and strategies with populations outside of SBAE. Further, they recommended pursuing research among agricultural education majors and current teachers who do not have the typical SBAE background most often studied. Additionally, we need to devise ways to recruit more candidates into agricultural teacher preparation programs (Ball & Torres, 2010). Existing SBAE programs are a bountiful source of prospective teachers, however what other sources exist that may supply a more diverse body of SBAE teachers to the profession? The present study will attempt to provide a greater understanding of the context to choosing SBAE as a career focusing specifically on pre-service students majoring in agricultural education without firsthand experiences as a secondary student in SBAE.

Conceptual/Theoretical Framework

The Ag Ed FIT-Choice® model adapted by Lawver (2012) and developed by Richardson and Watt (2006, 2007) provided the investigative framework to design this study. Designed within the context of the expectancy-value theory of motivation (Wigfield & Eccles, 2000), the Ag Ed FIT Choice® model provides a guide for describing why people choose the career of teaching in SBAE. Expectancy-value theory of motivation proposes, relative to goal achievement, that a positive relationship exists between the degree to which people place expectation to succeed and the value placed on the goal. These expectancies and values in due course influence the person's effort and their willingness to perform and persist toward their goals. Expectancy-value theory aligns more closely to an efficacy construct, a belief in one's self, than solely an outcome construct (Wigfield & Eccles, 2000).

The FIT Choice® model as developed and validated by Watt and Richardson (2007) aligns directly with the major premises of expectancy-value theory of motivation. The domains within the model of Task Return, Self-Perception, Value, and Fallback Career are flanked by the socialization influences (experiences) and the choice decision (outcome) at the right. The task return domain is comprised of the individuals' perceptions of the career of teaching and the level of expertise required, the demands of the profession, alongside the evaluation of the social acceptability of teaching. Further, morale is the perception of how valued they feel teachers are by society and salary involves perceptions of income potential of the career. The self-perception domain involves the perceptions of their ability to be a quality teacher and if they perceive themselves as being a good candidate for teaching. Intrinsic career value involves an individual's interest in the specific teaching subject area. Personal utility value addresses how the career fits personal career goals and the perception of ease in the profession (bludging). Social utility value describes the "desire to provide a service to society and make a worthwhile contribution" (Watt & Richardson, 2007, p. 175). Lastly, fallback career parses out how teaching emerged as a career choice for the individual.

Purpose of the Study

The purpose of this study was to identify key career choice items which lead students without experience in the field of school-based agricultural education toward pursuing agricultural education. This study addresses Research Priority Area Five: Efficient and Effective Agricultural Education Program within the American Association for Agricultural Education's National Research Agenda (Roberts, Harder, & Brashears, 2016). Specifically, the study addressed the following research questions:

1. What mechanisms lead those without a background in or previous exposure to SBAE engage in SBAE as a career choice?
2. What personal factors guided decision making toward SBAE?
3. What previous knowledge about SBAE influenced decision making?
4. What aspects of SBAE captured interest in the profession?

Methods

The intent of this study was to provide rich description to the career choice process of those currently enrolled in a SBAE teacher preparation program but without first-hand exposure to school-based agricultural education as a secondary student. Therefore this study employed a single-category focus group design (Krueger & Casey, 2009). The purpose of this focus group design is to attempt to reach theoretical saturation through the incorporation and preliminary analysis of separate homogeneous groups. Saturation is reached once no new insights are observed with the addition of groups (Krueger & Casey, 2009). Groups are analyzed across groups seeking patterns and themes prevalent throughout. Procedures and materials for the focus groups were organized according to the design recommendations of Krueger and Casey (2009). In an effort to establish common ground amongst the researchers, we created a written plan to further articulate and clarify study objectives, number of groups to be conducted, participants to invite, plan of action, and a timeline. Ten (n = 10) guiding questions were decided upon designed around the Ag Ed Fit-Choice® Model along with a script to ensure consistency of instructions and delivery of prompts to the participants (Figure 1). Face and content validity of the guiding questions and script was established after thorough review by the three researchers and a panel of experts familiar with focus group research and the guiding model of this study. A critical incidents approach to analytic design (Krueger & Casey, 2009) was incorporated in this study whereby the key task was to identify the crucial events, actions, or situations of the individuals. In this case, the mission was to provide context to the events which led each participant to choose school-based agricultural education as a career.

Sample, Data Collection, and Analysis

Participants for this study were selected through purposeful means by the researchers. The process of screening involved criteria established by the researchers which included; a) a current student (undergraduate/graduate path) enrolled in a traditional licensure agricultural teacher education program, b) no previous school-based agricultural education exposure/experience as a secondary student. Focus groups were scheduled for the early evenings in the spring of 2016. The researchers incorporated a hybrid approach to data collection whereby a virtual meeting room was created for participants who were currently student teaching or located at an unreasonable distance from the in-person focus group site, allowing for those individuals' involvement in the focus group. Collaborating researchers located off site also participated by virtual means. The virtual room allowed for constant two-way communication between all participants and researchers within a classroom equipped with appropriate technology. Interview sessions were scheduled for up to 45 minutes. Krueger and Casey (2009) recommend between five and eight participants in each focus group. However, complexity of the researched topic can warrant fewer participants (four to five total) to help ensure all participants have the opportunity to adequately delineate their experience. Two focus groups were assembled to include 10 (N) participants. Focus group one included six (n=6) participants and four (n=4) in group two.

Figure 1
Interview Question Alignment with FIT-Choice Model

	Interview Question	**FIT-Choice Connection**
1	Tell us a little about yourself. Please share your academic program (undergraduate/graduate) and academic level.	
2	What are your career plans following graduation/degree completion? Describe the type of community/school/agricultural education program you envision serving.	Choice of Teaching
3	School-based agricultural education offers students a broad variety of content areas related to agriculture, food, and natural resource science. What life experiences or activities contributed to your interest in these areas?	PTLE, TDR, IV, PV*
4	How (or from whom) did you learn that school-based agricultural education was a career option?	PTLE, FC, SP
5	What led you to pursue teaching agriculture as a career?	PTLE, FC, SP, PV, SU
6	Who, if anyone in particular, has encouraged you or supported your decision to pursue teaching school-based agricultural education?	SP, PV, SU
7	Can you identify any factors that have discouraged or challenged your decision to teaching pursue school-based agricultural education?	SP, PV, SU, TDR
8	From a career perspective, what aspect(s) of school-based agricultural education are particularly appealing to you? Why?	SP, PV, SU, IV, TDR
9	What aspect(s) of school-based agricultural education are least appealing to you? Why?	SP, PV, SU, TDR
10	Considering the following list of potential "influences" on teaching agriculture as a career choice, which would you say have been the greatest encouragers/discouragers to your decision to become a school-based agriculture teacher: And Why?	PTLE

Note. *PTLE=Prior teaching and learning experiences, TDR=Task demand and return, SP=Self-perception, IV=Intrinsic career value, PV=Personal utility value, SV=Social utility value, FC=Fallback career.

This study was designed and analyzed through a post-positivist lens and epistemology whereby we focused on more pragmatic approaches for description and application as opposed to purely extrapolative conjecture. All researchers participated in each iteration of data collection and met following the focus group to verify interview notes, provide oral summary, and offer closure to each data collection as recommended by Krueger and Casey (2009). We created pseudonyms for each to aid in protecting their anonymity in the reporting of findings. Following the data collection, the three researchers separately completed open coding of verbatim focus group interview transcriptions and interview notes through the lens of the Ag Ed Fit-Choice Model theoretical model (Lawver, 2012). Prefigured categories (Crabtree & Miller, 1992 in Creswell, 2013) according to the theoretical model were implemented. Codes were grouped and categorized into the constructs analogous to the Lawver (2012) model for teacher career choice. Trustworthiness of data was established using recommendations from Creswell (2013) through triangulation of data sources and the use of multiple investigators to provide consensual validation of the analysis and dimensionality to the data itself. Separate findings were ultimately reconciled by the researchers to appropriately represent the experiences of the participants. Finally, participants were asked to review the findings in an effort to provide a confirmable and dependable reporting.

Findings

The findings were organized around categories of the Ag Ed Fit-Choice Model (Lawver, 2012) with the exception of one additional category, believed unique to this group. This section represents the participants' experiences and pathways toward selecting agricultural education with preliminary intentions to teach.

Prior Teaching & Learning Experiences (and Influences)

Prior experiences with teaching, whether in a formal, non-formal, or informal environment help shape the choice to teach and the interest in the specific profession. Considered with the experiences are the people who helped encourage or dissuade our participants from teaching SBAE. Within our interview transcript, questions three, four, five, and ten supported content for this construct. Related to prior teaching and learning experiences, many of our participants reported receiving positive encouragement from those within the teaching profession throughout their academic career. In many cases, participants commented that one or more teachers had stated that he or she may "be a good teacher". The simple statement then planted the seed, nudging them to consider the teaching profession, when otherwise they likely would not have considered it. Jon indicated that certain teachers including his university advisor made him "feel as if I belonged in the education field, just because of the way I can connect with people."

Participants reflected upon a variety of non-formal teaching experiences which built efficacy for pursuing teaching. The experiences were as broad as instructing youth as a camp counselor to overseeing adult education in nutrition. These experiences were instrumental in guiding participants towards the career path of pursuing Agricultural Education. No matter the path to SBAE, preservice teachers in this study largely expressed a prior vision to teach which was continually reinforced by positive experiences working with youth.

While the passion for working with youth lead participants to teaching, their passion for agriculture was often propelled by a previous experience in an agriculture field. These experiences ranged from family involvement in production agriculture, 4-H, work regarding community garden or nutrition, and agriculture development team with the military. These past experiences provided a solid foundation regarding enthusiasm for agriculture and participants often spoke of the desire for others to share similar experiences that agriculture can provide. Ashley recalled her military experience on an agriculture development team training Afghan women to raise and preserve their food: "They were eating what they were growing and they had pride, I was actually doing some good for that population which translates into "I can come back and possibly teach"." First-hand experiences with others who had limited knowledge in agriculture or nutrition were often cited as an important catalyst to teach about agriculture. Lauren detailed her experience working with immigrant populations in [Large City] promoting consumption of fresh fruits and vegetables:

> [after preparing a strawberry and spinach salad for a program], I had a lot of people come through and they asked, "What do strawberries taste like on their own?", and so it was just like a really eye-opening moment for me. Then I thought, you know, talking about nutrition

> isn't really about fruits and vegetables it's about access and availability. And so that is really where my interest in agriculture came to be.

Further, participants asserted that educating others to help "stomp out (agriculture) ignorance" was deemed a noble and worthy cause.

Tasks of Teaching

The Task Perceptions construct related to an individual's choice to teach agriculture is divided into Task Demand (expert career, highly demanding) and Task Return (social status, teacher morale, and salary). Questions three, seven, and eight in our interview transcript addressed this construct. Participants in this study identified both areas influenced or encouraged them to pursue SBAE. In spite of anecdotal beliefs about diminishing societal views of the teaching profession, focus group participants commented on the positive outlook and perspectives among the profession, and were encouraged by observing and experiencing strong teacher morale. Lauren offered, "in this program... you've got people saying, 'Oh, this [profession] is wonderful! And, this is how you make it work in your current life situation.'"

Beyond the positive encouragement, the welcoming nature of the "Agricultural Education family" helped to nurture participants' development as future teachers. The support network of people our participants found within SBAE during early field experiences in SBAE helped to solidify participants' choice to teach. Ginny commented, "I have received so much support from other Ag teachers in [state]." Participants shared a positive perception of professional connectedness, feeling as if they were already a part of an existing community of practice. Kasey shared that she found support and comfort interacting with current female SBAE teachers, stating, "Once I met some female teachers I kind of had the mindset of, if they can do it, I can too." Participants shared an overall positive perception of professional connectedness with current SBAE teachers and colleagues, as if they were already officially a part of an existing community of practice.

At the same time, SBAE was acknowledged as a high demand task requiring commitment and hard work. Erin summarized this belief, stating, "There's so much we have to know. And, there's so much to teach in the four short years you have [with students]." "Doing it all" in terms of lesson planning, handling classroom management issues, and promoting and marketing an SBAE program will inevitably be challenging and participants recognized those characteristics. However, they also recognized that the ever-changing nature of the agricultural industry and variety of content areas included in agriculture, food, and natural resource education ensure that a career in SBAE will never be monotonous or boring. Numerous participants elaborated on this, with Kasey offering, "It's constantly changing… like, 15 years ago they weren't teaching about GMOs." More collectively, others added, "I like how in Ag classes there is always something new going on. You get up, you get out of your seat and do hands-on activities and labs." Jon noted a strong affection for the science of agriculture, stating, "Agricultural education has so much science in it. And, I'm a big fan of science."

Self-Perception

A perceived professional fit is an important aspect in choosing a career. The Self-Perception construct is the simplest in terms of dimensionality. Self-Perception is a person positioning themselves around the perceived ability to teach in both a holistic capacity as well as subject specific. Additionally, this construct involves how they view themselves as a potential teacher. Evidence supporting Self-perception was drawn primarily from questions six, seven, and eight. This construct was ultimately expressed through their desires to teach and images of their future within the profession. Participants' perceived abilities were first expressed as a longtime desire to teach. Kasey and Erin stated "…teaching was always going to be a good career option (for me) …," and many other participants were of the same mind.

While the longing to teach was evident for many preservice teachers, the type of content was often less clear. The desire to teach was met with a lack of passion for other subject areas, Erin and Mary similarly styled that "there was never a subject that I got super passionate about" or in some cases, even interest in core subject classes as Jon described; "I was going to be an English teacher, but I got bored of that really quick." The participants discussed the challenges regarding teaching they believed to be most evident once they had their own program. Their own lack of experience with school-based agricultural education was an underlying concern. The participants expressed this void of association made it more difficult to connect with classmates (peers) within the teacher preparation program. Heather pointed out that "when over half your class has been state FFA officers, and they're like all talking about [their experiences] and you're like sitting there like, cool, I have no idea what we are talking about, cool." However, the participants extrapolated that they don't need previous school based agricultural education to be successful in their teaching endeavors. Margo reasoned; "just because your dad was like an FFA advisor or you did this in your chapter doesn't mean you're going to be a better teacher than I will, just because you had those experiences."

Teacher candidates discussed the type of school they imagined themselves teaching in the future. Most often they expressed a desire to teach in an environment similar to the school where they grew up. Heather stated "I grew up in a small community and that's what I've always known." Other participants articulated a need for agricultural education in a particular area matched their vision. "I think a lot of kids in the city could definitely learn so much from agriculture…", noted Jon. The teacher candidates expressed their vision of the role agriculture played in the society and yearned to teach in a setting that would easily translate this perception.

Teacher candidates also mentioned interest in beginning a new program. Lauren was in contact with a school to begin a new program. "I told him about my interest and excitement with [Large City] public school." Many participants indicated that starting a new program would allow them to make a direct impact in a way that was fulfilling for them. Mary concluded: "It was always kind of the plan to go back and start a program (at home) because I always wanted one when I was in high school."

Values Toward SBAE

Alignment of values toward a career area comprises a substantial proportion of a person's decision process. Within the Ag Ed FIT-Choice model, it is posited that the career seeker finds intrinsic value in the career of teaching agriculture. Meaning, they are motivated by the career and inherently value teaching as a career. Teaching aligns with their goals and their past. Questions three, five, six, seven, eight, and nine from our transcript of questions addressed this construct. Several participants cited the connection between teaching agriculture and their farm rearing and content interests as a propellant toward seeking this career path: "It [teaching SBAE] fits well with my passion for agriculture…" stated Heather. Others articulated that SBAE combined other interests for them, Jon reflected: "I'm great with people, [SBAE allows me to] be able to teach them something really cool. Ultimately, just "being able to work with kids" seemed value enough for the majority of the participants.

Alongside the intrinsic value felt toward the career, utility value was expressed richly throughout our conversations. The participants articulated their perceptions of a secure and transferable career which offered them the ability to seek out and live the type of life they ultimately envisioned for themselves. In particular, a few recognized the nationwide need for agriculture teachers as a sense of security for them and their family as Leslie stated; “My mom [is] reassured that I’ll have a job after college.” A broad applicability of a degree in agricultural education was an attractant for many of our participants. Kasey discussed her previous thoughts about entering into another Career and Technical Education (CTE) area and questioned: “What am I going to do with this degree [in another CTE area] if I don’t want to teach in the end?” Ashley, earning her teaching license via a graduate degree, described; “[While] doing the general agriculture degree path, I kind of got to the point where I graduated and said great, I know this stuff, now what do I do with it?” Our participants felt SBAE offered a diverse set of outcomes and preparation for whatever career opportunity was presented to them. Although, the inexorable fact that a teaching job may not be available near their family home did pose a sense of uncertainty within the participants. A further attractant which weighed in on a few of the female participants’ decision process is the flexibility the career of teaching offers for their future family life as Kasey discussed; “…maybe one day having a family and still being on the same schedule that your kids would be on.”

The most influential factor with this group's’ outlook toward SBAE seemed to revolve around their perceived social utility value of the career. In particular, the influence agriculture teachers have on their students was resoundingly encouraging across the board. Through field experiences Lauren reflected, “I watch the [ag] teachers have an opportunity to get a closer relationship with the students in ag than in other programs [or parts of the school].” Further she articulated, “I think ag is really good at capturing those students [who don’t fit in] and helping get them into something that would work for them, and help them to be successful outside of school.” Their outlook on the influence of the agriculture teacher spilled over into their overall view of the contribution to youth and society through working in SBAE. Agricultural education offers these future teachers the opportunity to teach in diverse ways, both methodologically and in content. “[What’s encouraging is] inspiring them to learn about the natural world instead of having them looking at a computer screen all day,” countered Jon. Others were ignited by “the hands-on learning aspect of it.” Each participant was nearing the final year or final requirements of their program and communicated an intentioned responsibility toward their future roles as teachers. Ashley articulated her observations and reflections on the program at her former high school:

> If he [the ag teacher at her former high school] had promoted animal sciences or different plant sciences, or something, I might have gotten more interested in it. As a future ag teacher that’s probably one of my biggest goals is to make sure that I don’t just pigeon-hole an ag program.

Others identified additional responsibilities which encouraged them; “being a [ag] teacher I can try to rid the [misinformation] spread by the media about agriculture.” Further, they challenged themselves to “overcome society's view [of SBAE], they [students] don’t have to be from a farm to do it.”

Fallback Career

The Fallback Career construct was defined as teaching being a default choice divergent from the initial career choice. Questions four and five of our interview transcript aligned with this construct. Watt and Richardson (2007) stated that this construct is represented the "possibility of people not so much choosing teaching, but defaulting into it" (p.175). However, with the present group of pre-service teachers not so many of them defaulted into teaching as much as teaching may have chosen them. Participants often lacked knowledge about the existence of SBAE when initially seeking career options at the onset of college, therefore teaching agriculture was a fallback career for most. Many stumbled across the degree program, which initiated their interest in SBAE. Jon mused "I love the chemistry, but it didn't love me, I had to try and find something else." Wrestling with these career disconnects led many participants to seek out other opportunities. In searching, participants expressed they stumbled upon agriculture education by "just going to the University's website and searching up some degree options" and sought to learn more on the field. Others found agricultural education earlier as Margo described:

> I was involved with 4-H, but ...a local [FFA] chapter let some of us participate with some of their FFA events through like general livestock judging and showing and that's basically where my FFA experience started and ended. But, one day I was sitting in a college health class and the teacher is telling us about how the meat from pigs is only white meat. And that just kind of really irritated me and I argued my point, and she didn't listen. And that's … why I think Ag Ed is important. That's kinda what I wanted to is kind of do is guide people from animal to plate on how their food gets there.

Although she didn't have the opportunity to directly engage with SBAE as a secondary student Mary reported "I always wanted one [an SBAE program] when I was in high school. Then I came here and I kind of got introduced to it, and it all fell into place..." Many discovered the major as a result of prior career experience. Participants had worked with other organizations or companies and as a result found the major based on career interest. Ashley had been involved in the military for 18 years and had an agricultural background. Through her military experience, she recounted her deployment experience during which she helped Afghani women raise their own food and subsequently found the opportunity to pursue SBAE. Lauren was laid off from the extension educational program she worked with due to major budget cuts. She recounted:

> we were given a two-year scholarship to the [University] and the last day I was on the job, my coworker and I were talking about what classes are you take. And I said well I don't know what I'm taking. And she said well obviously you're taking something because you got this two-year scholarship, so she sat me down and looked through all the possible programs and that is where I learned that Ag Ed was a thing. Because I told her, I said, "I think agriculture is cool, and I ultimately would like to do something with agriculture." So, she helped me discover that that was a thing.

Detractors - Intercultural Dynamics

Throughout the focus groups and through analysis of the interview transcripts a new category or potential construct to the Fit-Choice model emerged, which didn't appear to be fully addressed previously. We viewed the instances and attitudes which support this added construct as potential detractors toward candidates choosing SBAE as their career. The elements of this theme run somewhat counter to elements described within previous themes. However, we decided it was important to collect the participant's observations which may be important things to consider separate from the other themes. The experiences our participants recalled seemed to fit rather cohesively into a new construct to explore further. They identified a professional culture with which they were unfamiliar and at times seemed excluding of their newness to the fraternity. Although participants did rationalize their lack of experience could be overcome, lack of experience with SBAE and the agricultural life in some instances created a degree of self-doubt related to the candidate's perceived ability to succeed in the profession. Leslie offered; "I find that some of the classes are more difficult since I don't have a background and I didn't grow up on a farm or have those hands-on prior experiences." Discussion from several participants who cited related thoughts led to wondering if this lack of experiences would ultimately impact their ability to perform as a quality teacher and accomplish the triadic model of SBAE.

Participants identified many components of Agricultural Education specifically, regarding in-group lingo and behaviors, which posed challenges or potential barriers. Participants perceived that individuals with specific prior SBAE experiences comprised the in-group. "It definitely feels cliquey here and if you're not a part of that group you feel left out...like the FFA lingo. There's so many things, I still don't know what Parli is really" discussed Ginny. Participants articulated a belief that this in-group believed they have a predetermined skillset for being successful in SBAE. Mary sarcastically recalled "when they refer to their 'state officer year', I just roll my eyes." Margo shared, "It is discouraging talking with my classmates at time. They talk about all their success… I didn't really have any of that." Further, participants identified a lack of contemporary cultural competence in programs. Lauren stated, "FFA culture… prayers at meals exclude some students. How do we fit all of this in and make this inclusive program [especially] when looking at it in terms of doing something (SBAE) in an urban setting?"

Conclusions, Implications, & Recommendations

The premise of this study was to provide context to the career choice process of a group of preservice teachers without experience in school-based agricultural education at three Midwestern land-grant universities. As such, unique participants in these focus groups presented important considerations for teacher preparation programs. As we reflected on the research questions of the study, we found as somewhat expected, that each individual trod a unique path to declaring agricultural education as a college major. Certainly, this study helps to shed light on new possibilities for recruitment venues for SBAE teachers. Although, the shared experiences discussed by our teacher candidates illuminated areas of internal reflection for our profession.

A myriad of experiences led participants to consider SBAE as a career. Certainly, it can be concluded that a passion for agricultural education does not solely stem from prior SBAE experiences. Membership in 4-H, military training on Agricultural Development Teams, or dietetics and nutrition training may each provide for diverse pathways to SBAE and have far-reaching implications for program recruitment (Calvin & Pense, 2013). To that end, how should programs and the profession be better promoted, so more prospective students are career aware and fewer "stumble upon it"? Recruitment activities should be aligned to reach non-traditional audiences. Members of such populations may be instrumental in advancing SBAE, particularly in urban and suburban areas. Possible activities could be as simple as promotion of teaching in SBAE through 4-H clubs across the state.

Participants expressed a variety of factors visible within the Ag Ed Fit-Choice® model, depending on their personal and programmatic experiences. Consistently, participants seemed to wrestle with personal and social intrinsic career value, similar to findings in See (2004). This could be due to participants looking at how they will balance time with family, job security, and shaping a professional future. Further, within the Ag Ed Fit-Choice® model there is an interconnectedness of domains and the way in which future teachers reflect upon career decision. Participants engaged in near constant value-checking and introspective career evaluation resulting from field experiences. Engaging with the SBAE family through field experiences was recognized as an encouraging factor, as in other studies (Lawver & Torres, 2011; Park & Rudd, 2005). Through this study a new viewpoint of the professional culture emerged. Our participant's perceptions of the profession and ultimate feelings of acceptance is shaped by their interactions with peers as well as current teachers. Peers within the post-secondary programs served as exclusionary roadblocks and was oftentimes off-putting. Teacher educators should be aware of how this impacts students without SBAE experience. Critical conversations involving all teacher preparation students and attention to professional attributes of each candidate may be helpful in addressing this challenge. Further, making purposeful decisions for field experience placements is essential toward creating an identity as a future agricultural educator. These pre-service candidates described herein have specialized needs for acclimation into the profession. They should be deliberately placed with cooperating educators who will support their development as pre-professionals.

We learned from this group that agriculture and food production and processing are cool topics which clearly draws a diverse pool of pre-service teacher candidates. Therefore, the intrigue toward the varied content associated with agriculture played a substantial role in our participant's choice to teach agriculture. The role FFA plays within the SBAE program was not the impetus or really included in the equation for these candidates. In fact, FFA gave several concern of how to fully include and implement it alongside the curriculum. Participants talked about teaching agricultural content, they were motivated yet somewhat overwhelmed, by the content. As teacher educators this is an idyllic image, but is also fraught with implications. In order to operate as a total program each area within the triad needs considered and included. If not done so, the sustainability and identity of SBAE programs could be at risk. However, it may be worth the gut check in our profession to discuss whether we are first developing agricultural teachers or FFA coaches and which is most important to the sustainability of SBAE?

While it is undoubtedly important to value and engage SBAE teachers in the process of professional recruitment, is it too much to expect our current SBAE programs to produce all future teacher candidates? Beyond current teachers, options for improvement do exist in the amalgam of recruitment approaches teacher education programs currently employ (Calvin & Pense, 2013). Certainly we know the long term needs for qualified SBAE teachers will continue to place demand on existing SBAE programs to aid in producing potential post-secondary teacher candidates. However, this seemingly narrow recruitment approach ignores the recruitment of those potential candidates outside of SBAE. Those individuals who may be involved in and passionate about agriculture. Therefore, how can we inform and recruit those potential SBAE teacher candidates to pursue SBAE teacher preparation?

Future research involving the Ag Ed Fit-Choice® model and SBAE teacher career decisions could begin by replicating and expanding the present study. Similarly, comparing the choice to teach SBAE among those without SBAE experience to those with SBAE experience would provide further insight into influences and the decision process. Given the extreme shortage of teachers we continue to experience, alternative certification teachers proliferate within our profession. What things draw them to SBAE and further, why didn't they choose teaching in the first place? We suppose there are many current teachers in service who likely fit with the description of our current participants. What drew them to SBAE and what has retained them in the profession to this point? Do their programs focus more heavily on the classroom and laboratory than their peers? The present study generated additional questions on the most effective ways to recruit students who are non-traditional SBAE students. As stewards of SBAE, we must better understand the needs of all prospective SBAE teachers in order to recruit and retain more diverse teacher candidates.

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Crowdsourcing change: An analysis of Twitter discourse on food waste and reduction strategies

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Abstract

Food waste has emerged as a major issue in the United States as the nation collectively sends more than 133 billion pounds of food to its landfills every year. In September 2015, the USDA and EPA announced an initiative to cut U.S. food waste in half by 2030. Between 2015 and 2016, nearly 100,000 posts about food waste have been published on Twitter, a microblogging platform that has been a hub of "slacktivism" since its inception in 2006. Using a conceptual framework of social cognitive theory, online activism, and crowdsourcing, we analyzed food waste conversation participants' demographics, online communities, and proposed solutions. Data analysis was conducted with listening software Sysomos MAP and a qualitative content analysis of conversation content. The analysis revealed that more than 2,000 U.S. users engaged in the conversation, forming four discrete conversation communities led by influencers from government, news media, and environmental organizations. Proposed solutions to the food waste crisis included domestic or household behavior change, food-waste diversion and donation, recycling and upcycling, consumer education, and governmental action and policy. We recommend using Twitter to mine, test, and deploy solutions for combating food waste; engage with influential users; and disseminate materials for further research into the behavioral implications of online activism related to food waste.

Introduction/Purpose

"Food waste is like the band Rascal Flatts: It can fill a surprising number of football stadiums even though many people consider it complete garbage."

So quipped the eponymous host of *Last Week Tonight with John Oliver*, HBO's late-night news program, in a 17-minute-long segment aired on July 19, 2015 (Saad, 2015, para. 5). Oliver's seriocomic takedown of the United States' food waste crisis was viewed live by 1.04 million people (Bibel, 2015) and went viral online, having been played more than 6.8 million times on YouTube (LastWeekTonight, 2015) by September 2016.

The show brought to public attention the vast amount of waste generated by the production, manufacturing, and consumption of foodstuffs in the United States. Americans collectively throw away some 133 billion pounds of food, or one-third of the nation's food supply (Moodie, 2015; USDA, 2015), leading to hundreds of billions of dollars' worth lost to landfills and costing U.S. consumer households approximately $936 per year (Buzby & Hyman, 2012). In response to these damning statistics, federal agencies vowed to tackle the issue head on. On September 16, 2015, the United States Department of Agriculture (USDA) and Environmental Protection Agency (EPA) announced an initiative to reduce U.S. food waste by 50 percent over a 30-year period (USDA, 2015).

John Oliver's segment seems to have been a catalyst for online discussion about the U.S. food waste problem. The hashtag #foodwaste began trending on Twitter within hours of the show's airing (Sanderson, 2015), indicating a sharp uptick in conversation on the social-media platform. Twitter, a microblogging tool, has been identified as a means of influencing users' perceptions of and subsequent behaviors toward topics ranging from health and wellness to social justice (Kende et al., 2016; Moscato, 2016; Centola, 2013; Korda & Itani, 2013) since its launch in 2006 ("Twitter milestones," n.d.). Because of social media's power to influence—as well as their ubiquity—they are increasingly being harnessed to advance the human condition. In the realm of health promotion, researchers have leveraged Twitter and other social media platforms to encourage habits that improve individual and collective wellbeing. In a meta-analysis of health-promotion research, Korda and Itani (2013) identified social-media and Web interventions applied to weight loss, cessation of tobacco-product use, and increasing physical activity. Evidence suggests that these platforms empower and engage patients by building online "communities" (Korda & Itani, 2013; DeBar et al., 2009).

Twitter has also been studied as a potential *predictor* of real-world collective behavior: Abbasi et al. (2012) note that researchers have found strong correlations between Twitter sentiment and stock market trends (Bollen, Mao, & Zeng, 2011) and Twitter discussion and films' box-office earnings (Asur & Huberman, 2010). Calling social media a form of "collective wisdom" (p. 492), Asur and Huberman (2010) analyzed "tweet-rates," or the number of tweets referring to a film posted per hour, in relation to opening-week earnings. Their study reported a positive and predictive relationship (r=0.90; R^2=0.80) between tweet-rate and movies' box-office receipts.

Social media are important agents for change in an increasingly computer-mediated communications environment. Undertaking this research, we sought a deeper understanding of how perceptions and behavior change regarding food waste were promoted via Twitter. The purpose of this study, therefore, was to describe the social-media conversation surrounding the U.S. food waste crisis in the wake of the USDA's announcement of its food waste reduction initiative. We outlined the following research objectives to guide the study:

> RO1: To describe the demographic and psychographic characteristics of Twitter users engaged in food waste-related discussions;
>
> RO2: To identify communities of Twitter users engaged in food waste related discussions and influential members of those communities; and
>
> RO3: To describe specific solutions to the food waste crisis produced or shared by those users.

To address these objectives, we constructed a conceptual framework that includes social cognitive theory, online activism, and crowdsourcing.

Social Cognitive Theory and Collective Agency

Albert Bandura's social cognitive theory posits that individuals' attitudes, beliefs, and behaviors are influenced, but not caused by, "personal factors in the form of cognitive, affective, and biological events, behavioral patterns, and environmental events" (Bandura, 2001a, p. 266)—that is, people possess the agency necessary to make decisions within the context of their sociocultural milieu. According to Bandura (2001b), "To be an agent is to intentionally make things happen by one's actions. Agency embodies the endowments, belief systems, self-regulatory capabilities and distributed structures and functions through which personal influence exercised" (p. 2). Exposure to social media can influence individuals' perceived personal agency:

> The revolutionary advances in electronic technologies have transformed the nature, reach, and loci of human influence. These new social realities provide vast opportunities for people to bring their influence to bear on their personal development and to shape their social future. (Bandura, 2001b, p. 17)

As individuals become empowered to make decisions, so too can *groups* of individuals (Bandura, 2001a; 2001b; 1997). Collective agency, "people's shared belief in their collective power to produce desired results," is the product of "the interactive, coordinated, and synergistic dynamics of their transactions" (Bandura, 2001a, p. 13). Collective agency relies on environmental factors, including the agency of the group's individual members:

> The more efficacious groups judge themselves to be, the higher their collective aspirations, the greater their motivational investment in their undertakings, the stronger their staying power in the face of impediments, the more robust their resilience to adversity, and the higher their performance accomplishments. (Bandura, 2001b, p. 270)

Citizen Participation and Social Media

Social media have in some ways democratized mass media, increasing both the personal and the collective agency of individual media users. Ordinary citizens can now participate in the broad dissemination of information within society, a task formerly reserved by news outlets and broadcast networks. This empowerment of individuals has led to the advent of online activism, or the use of social media and other Web platforms to promote social change via "fundraising, community building, lobbying and organizing" (Lee & Hsieh, 2013, p. 818). Sometimes dubbed "slacktivism" or "hashtag activism" by critics (Fatkin & Lansdown, 2015; Moscato, 2016), this form of citizen participation is able to "leverage audience interest to amplify messaging. Retweeting, for example, allows a movement's members not present at an event or rally to still participate in the distribution of information and thus the shaping of public opinion (Moscato, 2016, p. 5; Penney & Dadas, 2014). Online activism is low-cost, low-risk, and low-effort, allowing more individuals to participate (Lee & Hsieh, 2013).

Despite some concerns that online activism reduces real-world collective action, the use of social media to encourage change may in fact encourage prosocial behavior and collective change. Perhaps the most famous example is the rise of the online opposition movement in Egypt in the early 2000s, which culminated in the Tahrir Square revolt that toppled the country's authoritarian regime in 2011 (Lim, 2012). The Google employee who created the first anti-government Facebook page dubbed the uprising "Revolution 2.0" (Lim, 2012, p. 232). Lee and Hsieh (2013) found that "slacktivism" actually increased the likelihood of individuals engaging in charitable activities: After signing an online petition, study participants were more likely to donate to a charity than their peers who were not asked to sign the petition. Online activism, therefore, may act as a priming activity that promotes prosocial behaviors outside the confines of a social-media platform. Likewise, Fatkin and Lansdown's (2015) findings suggest that social media coverage of natural disasters can spur prosocial collective action, including charitable donations to aid organizations and actual involvement in rescue and recovery efforts.

Crowdsourcing

In 2006, *Wired Magazine* writer Jeff Howe used the term "crowdsourcing" to describe labor—in this case, photography—previously completed by trained professionals that had been overtaken by the work of technologically savvy amateurs. Crowdsourcing is a "web-based business model that harnesses the creative solutions of a distributed network of individuals" (Brabham, 2008, p. 76). Unlike outsourcing, which takes advantage of lower costs by exporting labor, crowdsourcing takes advantage of the "hobbyists, parttimers, and dabblers [who] suddenly have a market for their efforts, as smart companies in industries as disparate as pharmaceuticals and television discover ways to tap the latent talent of the crowd" (Howe, 2006, p. 2).

Crowdsourcing takes a variety of forms, including crowd funding, crowd labor, crowd research, and creative crowdsourcing (Parvanta, Roth, & Keller, 2013). Creative crowdsourcing, which Parvanta et al. (2013) link to endeavors like Pillsbury's famous bake-off, may be used by private or public entities to brainstorm new products, services, or ideas from large audiences. The formula is relatively simple: "A problem, or creative brief, is posted online, and Internet users are challenged to respond with their best work" (Parvanta et al., 2013, p. 165). Brabham (2008) describes the creative process as "collective intelligence," noting that the Internet is an ideal vehicle for "aggregating millions of disparate, independent ideas in the way markets and intelligent voting systems do" (p. 80).

Using this conceptual framework, this study will outline the convergence of collective agency, online activism, and creative crowdsourcing in the context of Twitter-mediated food waste discussion and solution generation.

Methods

The research team undertook this study to describe the Twitter conversation surrounding food waste in the United States following the USDA's announcement of its food waste reduction initiative in September 2015. The study consisted of a qualitative content analysis of food waste-related Twitter content, as well as an analysis of participant demographics, communities, and influencers.

Data Collection

Researchers undertook data collection using the subscription service Sysomos Media Analysis Platform (MAP), a "listening" tool that allows users to identify, analyze, and archive social media, news media, blog, and video content related to keywords, hashtags, and individual pages or users. Agricultural communications scholars have previously used Sysomos MAP and other similar platforms to investigate conversations regarding water quality, foodborne illness, and extreme weather events (Seeloff & Specht, 2016; Wickstrom & Specht, 2016; Wagler & Cannon, 2015). The Sysomos MAP search function uses Boolean queries to identify content containing the search terms and also allows the user to refine results based on demographic information (geographic location, user gender) or specific timelines. For this study, the query "food waste" was used, with results narrowed to content posted in the United States between October 1, 2015 and September 1, 2016.

The Sysomos service has access to the Twitter Firehose, or a 365-day archive of all public Twitter content. Users can download Twitter content in the form of comma-sorted variable (.csv) spreadsheets; this data can be drawn in order of posting or randomly sampled by Sysomos MAP. The "food waste" search resulted in 90,391 tweets, a random sample of 3,000 of which were downloaded in .csv format and opened in Microsoft Excel 2011 for Mac for further filtering. A preliminary review of the data found 1,967 tweets that were not relevant to the search at hand, that had been deleted, or that teased but did not directly suggest a solution; these tweets were eliminated from the data set. The final spreadsheet was then saved in Microsoft Excel format and uploaded into MAXQDA12, a content-analysis tool.

Data Analysis

Content analysis. Once opened in MAXQDA12, the resulting data set was content-analyzed for proposed solutions or mechanisms for alleviating the U.S. food waste crisis. Content analysis is a common tool for social media studies, being "beneficial in capturing patterns and themes in large amounts of data" (Fatkin & Lansdown, 2015, p. 582). We conducted a systematic thematic analysis, or a search for important emergent themes related to a particular phenomenon (Fereday & Muir-Cochrane, 2006; Daly, Kellehear, & Gliksman, 1997), with the phenomenon in question being food waste and, more specifically, solutions to the U.S. food waste crisis. Using an inductive coding process in which emergent patterns in the data drive the development of themes (Boyatzis, 1998), the researchers developed a series of codes based on the collected tweets. One researcher was responsible for the coding process and developed initial themes; a secondary coding process was completed in which the original codes were clarified, collapsed, and grouped as subcodes under broader thematic categories.

Sysomos MAP demographic and community analysis. In addition to its aggregation capabilities, Sysomos MAP provides researchers with demographic information for public Twitter users engaged in conversations of interest. This broad demographic data includes gender, distribution by country, and distribution by state (for U.S. users) and province (for Canadian users). The platform also visualizes relationships among conversation participants—conversation communities—and identifies influential members of those communities using a proprietary algorithm based on followership, number of interactions, and tweet volume. Sysomos MAP's authority scores range from 1 (little or no authority) to 10 (very high authority). Each community's members are given influence scores based on their interactivity with other members of the conversation. These scores range from 0% (no influence) to 100% (most influential). Demographic data, communities, and influencers were recorded for the 2,892 profiles that produced the original 90,391 tweets generated in the #foodwaste discussion.

Findings

The Sysomos MAP "food waste" search generated 90,391 Twitter mentions of the search term that were posted during the selected timeline. *Figure 1* illustrates the term's popularity, with unusually high "bursts" of activity denoted by the red circles at the top of each peak.

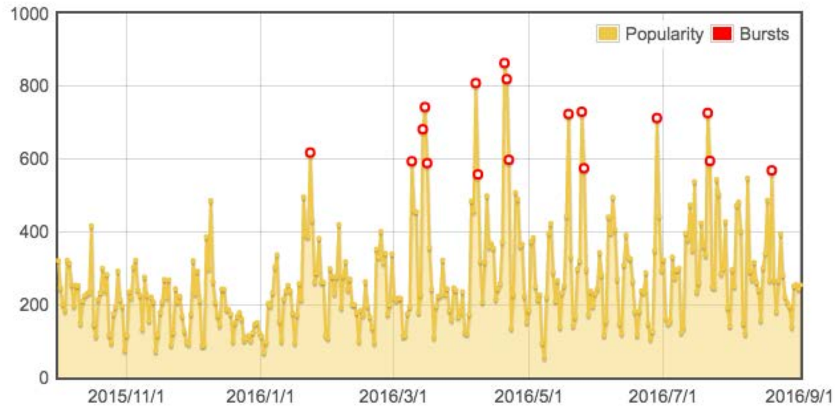

Figure 1. Popularity of the search term "food waste" on Twitter between October 1, 2015 and September 1, 2016. The y-axis represents the number of tweets posted per day.

Analysis of the cluster of bursts between April and May 2016 reveals that Twitter users tied their food waste discussion to Earth Day—April 22—while news outlets like *The Guardian* released articles about environmental impacts that mentioned food waste (Somerville, 2016).

RO1: Demographic and Psychographic Characteristics of Twitter Users Engaged in Food Waste-Related Discussions

Sysomos MAP tools were used to collect and report demographic and psychographic characteristics of conversation participants. As noted above, 2,892 Twitter users contributed to the food waste conversation, of which 1,329 provided gender information. Among these users, female participants (52%) slightly outnumbered male participants (48%). All 2,679 users who provided geographic locations were located in the United States, per the geographic filter, with California (18.63%), New York (10.94%), and Washington, D.C. (6.49%) best represented (*Figure 2*).

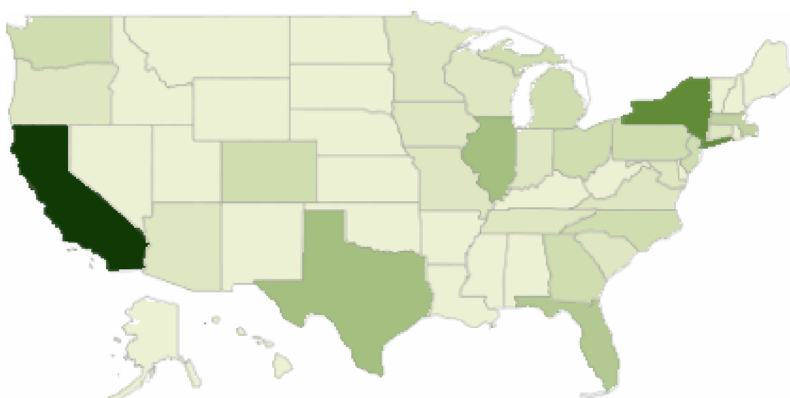

Figure 2. A map of the United States displaying food waste conversation participation among users who publicly share location information. States with higher participation are shaded darker than their counterparts.

Psychographic data, or information related to users' beliefs, attitudes, and lifestyle choices, were gleaned from Sysomos MAP analysis of Twitter biographies (or "bios") of top influencers' followers. Bios are user-generated information related to individuals' interests, hobbies, and professional and personal lives. We compared user bios of followers of the following influencer accounts, which scored over 90% using Sysomos's proprietary influencer algorithm: Food Tank founder Danielle Nierenberg (@DaniNierenberg), online news outlet Grist (@grist), *Smithsonian Magazine* (@SmithsonianMag), *Sierra Magazine* (@Sierra_Magazine), Fast Company's Co.Exist campaign (@FastCoExist), nonprofit organization Food Tank (@Food_Tank), food news site Civil Eats (@CivilEats), and the United Nations Foundation (@unfoundation).

Comparison of word clouds generated from influencers' follower bios revealed that these individuals share interests in food, sustainability, and healthy living. Most of them work in creative fields, such as writing, music, design, and photography, or in business, marketing, or technology-related careers. They enjoy instructive pursuits like travel, reading, and cooking and place value on family time. They respect science and believe in and are concerned about climate change and other environmental issues. These individuals are also likely to engage in community leadership activities—many describing themselves as "passionate"—making them ideal conduits for change in their urban and suburban surroundings.

RO2: Food Waste-Focused Twitter Communities and Their Influential Members
Sysomos MAP uses network analysis to generate communities of users that interact with each other within the parameters of the search terms and filters. The "food waste" search generated seven user communities (*Figure 3*); for brevity, the four largest communities will be described below.

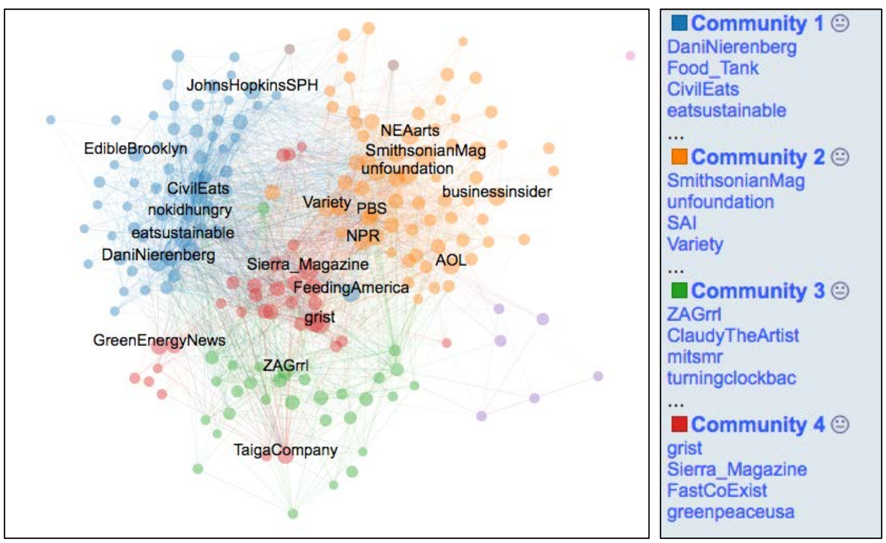

Figure 3. The six communities identified by Sysomos MAP (left) with color codes, sentiment, and key influencers (right). Communities 5 (purple), 6 (brown), and 7 (pink) lacked sufficient user data to warrant further description.

Community 1. Community 1 possesses an average influence score of 66% and comprises such influencers as Food Tank, Food Tank founder Danielle Nierenberg, anti-hunger charity Feeding America, Johns Hopkins Bloomberg School of Public Health, and USDA. The focus of Community 1 seems to be institutional changes that may impact food waste reduction, such as consumer education, governmental initiatives, and community programs.

Community 2. Community 2 consists of a number of news organizations, including print publications (*Smithsonian Magazine*, *Variety*, *Business Insider*, *Time Magazine*, and *The Economist*); broadcast outlets and programs (NPR, PBS, YouTube, Yahoo!, and *The Today Show*); and popular public figures, including meteorologist Al Roker and First Lady Michelle Obama. Community 2's average influence score is slightly higher than Community 1's at 71%.

Community 3. Community 3 contains a number of lower-influence users representing private individuals rather than organizations, government agencies, or media outlets. The average influence score is 64%.

Community 4. Environmental impacts of food waste constitute the central issue of Community 4. This community includes a variety of environment-related organizations, including *Sierra Magazine* and Sierra Club, Greenpeace USA, the Environmental Protection Agency, and Grist, with an average influence score of 71%. These users can be found at the center of the community network, indicating that Community 4 is a hub for information shared by other communities.

RO3: User-Provided Solutions to the Food Waste Crisis

Of the 3,000 tweets downloaded for use in the content analysis, 1,033 were found to be relevant to Research Objective 3. In these tweets, users suggested or discussed solutions to the U.S. food waste crisis. Thematic analysis of the Twitter data revealed the following themes (examples of tweets from which may be found in Table 1): 1) domestic or household behavior change; 2) food-waste diversion and donation; 3) recycling and upcycling; 4) consumer education; and 4) governmental action and policy.

Table 1

Food Waste-Related Themes and Subthemes Produced by a Content Analysis of Topic-Related Twitter Conversations

Theme and Subthemes	Tweet Examples
Domestic or household behavior change	
Meal planning	#2016HomeResolutions: Have you ever considered a weekly meal calendar? It can save you money time and eliminate food waste!
Waste mitigation	SHARE this with friends to promote reducing food waste by using #leftovers! https://t.co/bo0FBEV1xB https://t.co/FiWS0ashzM
Smart technology	RT @ScienceChannel This smart fridge helps reduce food waste. See more cool tech stories tonight at 8p! https://t.co/xnSWO5wbuW

Food waste diversion and donation	
Large-scale food donation	UK grocery giant @Tesco is donating all unsold food to help curb food waste. #everylittlebithelps https://t.co/mx4skaGJp7
Food waste markets	Walmart's UK grocery chain is selling ugly veggies to reduce food waste. It's time we follow https://t.co/uQQrKOPymP via @HPLifestyle
Recycling and upcycling	
Value-added products	RT @ProjectDrawdown Can food waste become fashion? https://t.co/HOkpHTF2sb
Converting food waste into energy	How Colorado Is Turning Food Waste Into Electricity: https://t.co/oQSvnmbgFJ #Innovation #EmpowerNext https://t.co/YiXJC7Fdow
Food waste for agricultural purposes	RT @AllScienceGlobe Feeding food waste to pigs could save vast swathes of threatened forest and savannah - https://t.co/zbnnlSLtUZ
Consumer education	
Public information campaigns	Ugly fruit?? "A Campaign to Reduce Food Waste: The #InnerBeauty of Fruits and Vegetables"- https://t.co/qWpYUmBUmU #FoodForThought
Mobile technology	RT @UglyFruitAndVeg This app fights food waste by letting u buy restaurant leftovers. @derekmarkham @TreeHugger https://t.co/PLZgdxWXKw https://t.co/92anAzjyYh
Home economics training	Could a Home Ec Revival Help Slash Food Waste? https://t.co/72G2khnfro via @TakePart
Governmental action and policy	
Legislating food waste reduction	RT @michaelpollan: French law forbids food waste by supermarkets | World news | The Guardian https://t.co/QhaLmbJhcj
Food date labeling	RT @SavorTooth This @99piorg on milk expiration dates is a shining moment in the campaign against food waste https://t.co/p2mN89dA8v

Domestic or household behavior change. According to Twitter users engaged in the “food waste” conversation, food waste reduction begins at home. *Meal planning*, including weekly meal calendars, using grocery lists, controlling portions, and utilizing meal-delivery services, was a popular suggestion for households trying to curb food waste. *Waste mitigation* techniques, including kitchen garbage disposals, reuse of leftover food, and use of small-scale compost bins, were discussed at length, as was the use of *smart technology*, such as refrigerators with cameras that monitor food quality.

Food waste diversion and donation. Food waste diversion, or redirection of food waste from farms, production facilities, and kitchens away from landfills, was a key theme among conversation participants. *Large-scale food donations* from grocery stores, restaurants, and cafeterias to food pantries and homeless shelters generated positive feedback from users: British grocery chain Tesco and American coffee company Starbucks were lauded for their policies of donating leftover food products. Many users also cheered a Danish grocer's decision to open *food waste markets* to encourage the purchase of previously unsold produce, a tactic echoed by American superstore Wal-Mart with its special section of "ugly" and discounted fruits and vegetables.

Recycling and upcycling. Many users identified examples of *value-added products* made from food waste that may serve as alternatives to landfills. These products included art, such as food-based portraits of clients' pets; upscale meals created by top chefs to demonstrate the value of superfluous food; and clothing produced from food waste. *Conversion of food waste into energy* through methods like digesters and the creation of biofuels was another alternative outlet: Users identified several states and metropolitan areas experimenting with such technology, including Colorado's use of a methane digester to turn food waste into electricity. Leveraging *food waste for agricultural purposes* was recommended by a number of participants, some of whom noted that insects, worms, and microorganisms could be used to spur composting and that food waste could potentially be used to supplement livestock feed.

Consumer education. Based on the Twitter conversation content, food waste is a growing perceptual issue among consumers, and many identified specific *public information campaigns* targeted at households. For instance, toy company Hasbro created an "ugly" Mr. Potato Head figure to normalize blemished produce; a photography contest allowed artists to depict food waste and share their images online. *Mobile technology*, such as smartphone apps, could bring food waste monitoring and measurement tools direct to consumers, and several participants specifically mentioned FoodKeeper, an app that monitors groceries' freshness based on purchase dates. A number of participants advocated for the return of *home economics training* to K-12 education in the United States.

Government action and policy. The United States lags behind in *legislating food waste reduction*, a fact brought to bear by conversation participants who praised laws cutting down waste from restaurants and grocery stores in Italy, France, Spain, and Denmark. Many participants identified Congresswoman Chellie Pingree's Food Recovery Act as a potential statutory solution to food waste. Likewise, *food date labeling* was a major area of discussion: Imprecise expiration dates result in large amounts of food being thrown out, and participants pushed for more research and, potentially, bureaucratic action on improving the efficacy of food labels.

Discussion

The purpose of this study was to investigate the Twitter conversation surrounding food waste in the United States; specifically, to describe participants, to define communities of users, and to catalog potential solutions based on participants' informal creative crowdsourcing. While we cannot, of course, claim causation between Twitter users' participation in this discussion and their practicing food waste reduction techniques, based on the work of Bandura and other social cognition researchers, we may infer that their information-sharing represents the potential for exertion of thought into action. As Fatkin and Lansdown (2015) note, online activism does not require strong organizational structure or interpersonal relationships; rather, social change may be affected by individuals who feel empowered by networking online with likeminded individuals.

Through this study, we now know a bit more about the individuals and communities engaged in online food waste problem-solving. They tend to be located in states and regions known for environmental awareness and policy (Wingfield & Marcus, 2007), and they tend to be white-collar professionals in creative or technological fields with an interest in health and sustainability. They build social-media networks by following influencers in news media, government, and science and technology, and their willingness to disseminate information regarding topics of importance—their collective agency—indicates that they may be ripe for turning their online words into actions. Online social support has been shown to influence Web 2.0 users' perceived real-world self-efficacy (DeAndrea et al., 2012); thus, becoming part of likeminded networks for change could encourage food waste discussants to deploy solutions and tools in their everyday lives.

The food waste Twitter chatter itself reveals a wealth of information about how participants feel they—and American society—can best address the food waste crisis. With solutions ranging from startup technologies to reviving home economics training in schools, the conversation represents a sort of unorganized but passionate crowdsourcing of ideas or collective intelligence (Brabham, 2008). The concepts addressed most often—among them household behavior change, food diversion and donation, reusing or upcycling food waste, consumer education, and government intervention—provide an excellent starting point for nonprofits, government agencies, universities, and other groups to plan and mobilize collective action among individuals who already feel strongly about their own agency to contribute. As researchers continue to analyze the issue, these can serve as a stepping off point to further look for solutions and how to engage consumers interested in solving food waste problems.

Recommendations for Organizations

Based on our findings, we recommend that organizations leverage Twitter as both a space to mine solutions, volunteers, and other resources and as an area in which to test ideas among motivated and receptive audience members. Social-mediated crowd wisdom is essentially low-risk market research that allows engaged entities to test new technologies or concepts without incurring the high costs of production or dissemination. The Twitter communities identified in this study represent potential test markets: groups of users with similar interests and backgrounds that are linked thru shared connections to specific influencers in a variety of fields.

Organizations should not only utilize the influencers' followerships and communities, but should also engage with the influencers themselves. The Twitter accounts shown in Figure 4 represent loci of online conversation; information circulated by those users has the ability to reach and sway whole communities and to stimulate both collective agency toward real-world involvement and creative crowdsourcing of solutions.

Recommendations for Future Research

Using Twitter as a scientific research tool is a relatively new concept, and care must be taken to avoid extrapolating real-world outcomes based only on social media-generated data. To that end, food waste researchers should survey members of the identified communities to see what solutions they actually do or plan to implement; potential correlations could then be calculated between social media use and real-world food waste reduction agency. In a similar vein, these Twitter users could help identify barriers to implementation of new technologies or techniques aimed at eliminating discarded food. The communities identified could also potentially serve as a testing ground for online snowball sampling techniques, wherein influencers could identify key individuals for study, disseminate surveys among their community members, and encourage participation to improve response rates.

Because we focused our data collection on Twitter conversations, potential material generated by users of other social media remains unstudied. Future research should investigate how food waste is discussed (and by whom) on Facebook, Instagram, and other emerging social media platforms. Researchers should explore the benefits of studying such tools around moments in time that spark such intense discussion like that of Mr. Oliver's segment did. By watching social media trends at times of movement like political speeches or organizational announcements we can also begin to better understand how the online populace will continue these discussions and influence movement.

The movement of this issue was not new when Mr. Oliver engaged his audience, but it did serve as part of the catalyst in the uproar that led to the announcements seen by federal agencies. As researchers and communicators, we should strive to better understand how such online influence can impact our political leaders in pushing forward on important agriculture and food related issues.

As society and media continue to engage in complicated issues, like food waste, it behooves us to capture the power of crowdsourcing and social media engagement to not only keep pulse on situations, but to also explore the range of proposed solutions and ideas being offered. As seen in this study, the communities are well connected to many influencers and by pulling together such knowledge from a variety of communities, undiscovered ideas and thoughts could be garnered and lead to further change and growth. We have done a good job of researching and using traditional media to move the needle on many important issues. It is now time that we better grasp online communication and networks to do the same.

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Is there an app for that?: Describing smartphone availability and educational technology adoption level of Louisiana school-based agricultural educators

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Abstract

The purpose of this study was to describe smartphone availability and usage by agricultural educators in Louisiana. Further, this study sought to describe the level of educational technology adoption of these teachers. Data were collected at each Louisiana FFA Leadership Camp session during the summer of 2016. Teachers were asked to indicate the availability of smartphones for instructional purposes at their school. Teachers also indicated instructional technologies they are using currently, as well as their self-perceived level of adoption of educational technology. Over half of the teachers indicated their district policy allowed teachers to employ smartphones for educational purposes. Less than one-third of the teachers were in districts that allowed students to use smartphones for learning. The teacher computer and digital projector were the most commonly utilized educational technologies. The highest percentage of teachers perceived themselves as letting others adopt technologies before they are willing to try. The results of this study are in line with the Diffusions of Innovations theory in terms of percentages of teachers in the adopter categories. It is recommended that teacher professional development opportunities be developed following the model of teacher change to ensure agriculture teachers receive up-to-date information to further their practice.

Introduction and Literature Review

Technology is often emphasized as being a critical component of both educational reform and classroom innovation (Palak & Walls, 2009). As a result, considerable resources are allocated each year by local school districts to purchase technology and provide teacher training. In fact, public education spent approximately three billion dollars on digital content for teachers to utilize in their programs in 2015 (Herold, 2016). As a result of these increased resources, teachers and students are experiencing more opportunities for technology integration (Cuban, Kirkpatrick, & Peck, 2001).

In modern classrooms, computers are commonplace, with 98% of schools having one or more computers in the classroom and 84% having high-speed Internet connections (Statisticbrain, 2015). In 2009, the average computer to student ratio was 3:1. This is true even in school systems with fewer resources (Gray, Thomas & Lewis, 2010). While the availability of technology is ever increasing, individual teachers may not integrate at the same rate. Many factors may contribute to a lack of technology integration. Specifically, issues such as a lack of support, a lack of technical access, student issues, technical problems, and teacher attitude can all impact a teacher's willingness to integrate technology into the classroom (Wood, Mueller, Willoughby, Specht & Deyuoung, 2005). Hew and Brush (2007) conducted a meta-analysis of 48 empirical studies to determine what teachers at all levels perceived as the greatest barriers to technology integration. From these studies, three main barriers were established: (a) resources, (b) teachers knowledge and skills and (c) teachers attitudes and beliefs. In a study of agricultural education teachers in North Carolina, some of the greatest barriers to technology integration in the classroom were the cost of technologies, implementation issues, and time needed to develop lessons to incorporate technology (Williams, Warner, Flowers, & Croom, 2009).

Ertmer (1999) described the barriers to technology integration as being hierarchical in nature; first order barriers include availability and teacher knowledge, while second order barriers are defined as intrinsic factors such as teacher beliefs. While the availability of technology is critical to incorporation, a teacher's willingness to include the technology within the classroom is often the determinant of a teachers' practice (Ertmer, 1999, Ertmer, 2005). Similarly, Palak and Walls (2009) found that teachers who already have ready access to resources, materials, training, and are comfortable with technology might still choose not to implement that technology in their classroom. The study concluded that teacher attitudes towards technology do not necessarily change because of the availability of technology (Palak & Walls, 2009).

An added variable in the technology integration issue is that even when available, teachers may not necessarily apply that technology in student-centered classroom instruction. For many teachers, technology is used to supplement current teaching practices or for administrative purposes, (Palak & Walls, 2009). A study conducted by Broekhuizen (2016) found 52.7% of teachers who have readily available access to technology showed no evidence of employing technology to allow students to gather, evaluate, or apply information toward learning. Further, only 36.7% of teachers implemented technology that allowed students to solve problems or create original works and only 35.4% used technology for collaborative learning (Broekhuizen, 2016). Similar results have been reported across various educational levels and programs. For example, a study of faculty members in social work programs at land-grant universities revealed that professors most often integrated educational technology at low levels, and primarily used technology such as email, internet, and course management systems (Buquoi, McClure, Kotrlik, Machtemes, & Bunch, 2013).

Similarly, previous studies in agricultural education have found teachers most regularly use technology that is teacher focused rather than student focused. In a 2003 study, the most commonly utilized technologies reported by Louisiana agricultural education teachers were interactive DVDs or CDs, digital cameras, video/CD/DVD players, laser disc players or standalone DVD or CD players (Kotrlik & Redmann, 2009). A more recent study in Tennessee found the most frequently used technologies were personal desktop computers, digital projectors, laptops, and cellular phones (Coley, Warner, Stair, Flowers & Croom, 2015). Additionally, Williams et al. (2014) found 65% of North Carolina teachers utilized projectors, as well as a teacher computer on a daily basis. These technologies all indicate a trend toward using technology to present information passively.

Passive uses of educational technologies are not always what is envisioned when teachers are asked to incorporate technology to reach students in today's classroom. Blaire (2012) called for a re-envisioning of how technology is utilized in the modern classroom. Specifically, the learners of today are capable of engaging through technology at a very different level than students in the past and that the classroom simply having an interactive whiteboard is no longer sufficient

(Blaire, 2012). This push toward innovation may be intimidating as teachers work to acquire and make resources available to students, then implement them in their lessons (Schrum, 1999).

The incorporation of technologies into the learning process is not a new phenomenon (Whisenhunt, Blackburn, & Ramsey, 2010). For example, Reiser (2001) noted the invention of lantern slides in the early 1900s sparked the movement to incorporate visual images to improve learning. Instructional technology has evolved to the present day where computers, interactive whiteboards, and digital projectors are the norm (Whisenhunt et al., 2010). The secondary students of today are labeled *digital natives* and have been surrounded by technology for most, if not all, of their lives (Prensky, 2001). Effectively incorporating educational technologies into instruction is one means of increasing motivation and interest of digital native students (Heafner, 2004). Further, technology rich environments have been shown to influence teacher attitudes and increase student engagement, achievement, and motivation to learn in all content areas (Bialo & Sivin-Kachala, 1996; Christensen, 2002; Peake, Briers, & Murphy, 2005). As technology continues to advance, teachers should look for new and innovative means for incorporating it into instruction to improve their practice. One such advancement in technology that holds potential for increasing student achievement, motivation, and/or engagement is the smartphone.

The computing capabilities of current smartphones far exceed that of the mobile phones from just a decade ago (Traxler, 2009). A modern smartphone has more processing capability than NASA had in 1969 when Neil Armstrong became the first person to set foot on the moon (Kaku, 2011). Despite the continued upward trend in computing power, approximately 69% of schools in America ban cellular phones from campus (Commonsense Media, 2010). These widespread bans on smartphones in schools has been attributed to what Thomas and O'Bannon (2015) called the *new digital divide* where students, millennial teachers, and non-millennial teachers and administration have conflicting perceptions of how smartphones could or should be incorporated into the learning process.

The all-encompassing connectivity of smartphones allows students to learn ubiquitously (Traxler, 2009), while allowing teachers to customize instruction (Steel, 2012). Bridging this digital divide could allow both parties to work together more efficiently (Corbeil & Valdes-Corbeil, 2007). However, similar to previous studies of other educational technologies, smartphones are often not used to their full ability. Basic functions such as calculator, Internet access, calendar, and clock are used more often than cutting-edge functions that enable students to create material (Thomas & Muñoz, 2016). Similar to presentation and collaboration technology, the more sophisticated uses of smartphones may improve student achievement (Liu, Scordino, Renata, Navarrete, Yujung, & Lim, 2015) and motivation (Su & Cheng, 2015) when compared to traditional teaching methods.

Various concerns arise when teachers consider the allowance of smartphones in the classroom (Thomas & O'Bannon, 2015). A survey of 675 college students from 26 states revealed that on average, students spent about 20% of class time using smart devices for purposes unrelated to class (McCoy, 2013). Further, texting during class is linked to a 30% reduction in quiz scores (Froese et al., 2012). However, sending and receiving Tweets related to material being taught has resulted in gains of understanding between 10% and 17% (Kuznekoff, Munz, & Titsworth, 2015).

Other concerns that have contributed to the banning of smartphones in the classroom include (a) cheating, (b) sexting, and (c) cyberbullying (Keengwe, Schnellert, & Jonas, 2014). Cheating is a major concern among teachers and students (Thomas & Muñoz, 2016; Thomas & O'Bannon 2015; Tindell & Bohlander, 2011). A CommonSense Media (2010) poll indicated 35% of students have used their phone to cheat. Sexting refers to the sending of inappropriate photos and sexually suggestive content via text message (Obringer & Coffey, 2007). According to Lenhart (2009), 4% of young people aged 12-17 have sent sexually explicit material via text and 15% have received sexually explicit text messages. Cyberbullying is threatening harm or attempting to shame a fellow student on social networks or other type of Internet forum. Most cyberbullying is initiated off-campus, but results in disruptions on campus. This has sparked debate to expand the jurisdiction of school punishment and some schools have begun incorporating off campus behavior policy into their handbooks. (Keengwe, Schnellert, & Jonas, 2014).

Technology integration is not as simple as technology acquisition; added factors play into a teacher actively using technology in their program. Often teachers are intimidated or anxious about incorporating educational technology into their classrooms (Redmann, Kotrlik, & Douglas, 2003). Further, teachers may not be engaging in the most appropriate professional development opportunities to learn to incorporate educational technologies into their pedagogy effectively. While some teachers seek professional development opportunities such as workshops or conferences to increase their knowledge of educational technologies, many teachers are self-taught (Kotrlik & Redmann, 2009; Kotrlik, Redmann, Harrison, & Handley, 2009; Redmann et al., 2003). Due to the ever-changing nature of technologies available to educators, research must be conducted periodically to assess how teachers are incorporating these technologies into the educational process (Thomas, Adams, Mcghani, & Smith, 2002). It is imperative that those individuals charged with providing professional development – teacher educators, state instructional staff, and local school districts, have the most up-to-date information regarding teachers' classroom practices. Further, it is crucial that these individuals design and implement professional development opportunities through methods that have been shown to influence teacher behavior in the classroom.

Theoretical Frame

The theoretical underpinning that guided this study was Roger's (2003) Diffusion of Innovation theory. The premise of the theory is that for diffusion of a technology to occur, the potential adopters must perceive certain attributes of the innovation. These attributes include (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability (Rogers, 2003). Specifically, relative advantage refers to the perception of how much better the innovation is than the idea it will replace. Compatibility is how well the innovation fits within the potential adopters current situation, while complexity the perception of the level of difficulty of the innovation. Trialability is the "degree to which an innovation may be experimented with on a limited basis" (p. 16). Finally, observability is how visible the results of the innovation are to others. Rogers (2003) noted that innovations that are perceived as low in complexity and high in the remaining categories are more likely to be adopted at a more rapid rate that innovations perceived as complex.

Rogers (2003) also discussed categories of potential adopters. These categories include (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. Rogers (2003) compares the categories of adopters in a given system to the bell curve to show their relative relationship (see Figure 1). Innovators comprise of 2.5% of a system and are described as venturesome, those who push boundaries of the current paradigm to create new and different ideas. Early adopters make up 13.5% of the population in a system and are those who are likely considered to be opinion leaders within their social circle, meaning others are likely to seek the advice of the early adopter before adopting a new innovation (Rogers, 2003). The early majority comprises 34% of the individuals in the system and are characterized as being deliberate in their adoption of an innovation. This group tends to let the kinks of an innovation get worked out before they adopt (Rogers, 2003). The late majority comprises the next 34% and are labeled as skeptical. This group normally holds out on adopting an innovation until the pressure of their social system causes them to give in and adopt (Rogers, 2003). The final 16% are known as laggards who are characterized as being traditional. They are the most isolated individual or group within their social system and are highly suspicion of change agents and innovators. Laggards may choose not to adopt for a variety of reasons, ranging from resource availability to the perception of the innovation interfering with their values (Rogers, 2003)

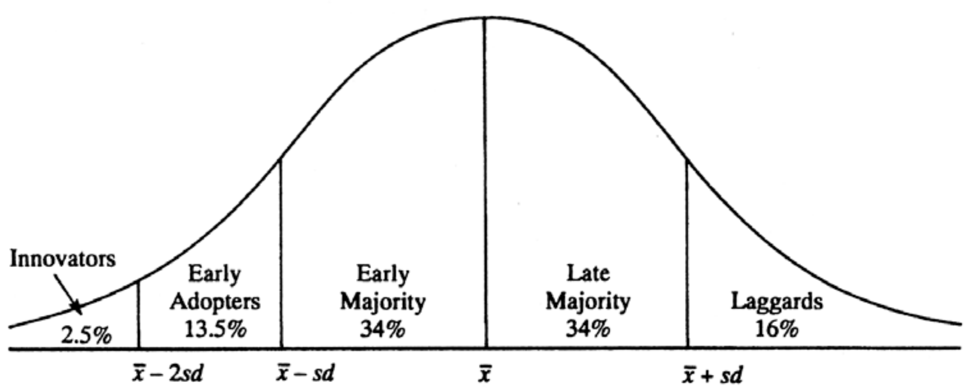

Figure 1. Adopter Categorization (Rogers, 2003).

Conceptual Framework

Conceptually, this study was framed by Guskey's (2002) Model of Teacher Change. This model can help explain the discrepancy between teacher technology availability and technology use (see Figure 2). According to Guskey (2002), teachers should first receive training in any professional development initiative before implementing change in their classrooms. Once a change is integrated into practice, there must be an opportunity for teachers to see a change in student learning. Teacher attitudes and beliefs will only change when a practice has been implemented and they have the opportunity to study the impact of the initiative further. Resources may be provided in programs, but as described by Kotrlik & Redmann (2009) the majority (92%) of agriculture teachers are self-taught, therefore there is little pressure (or support) from school systems when implementing change.

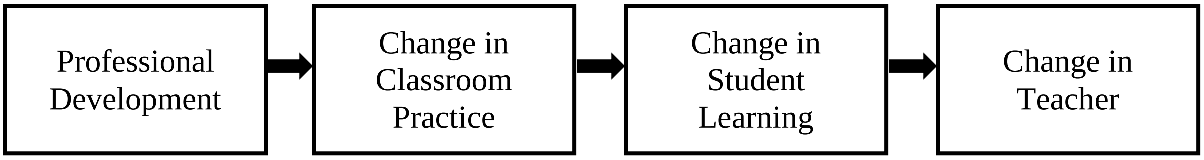

Figure 2. Guskey’s (2002) Model of Teacher Change

Existing research on instructional technology integration into secondary agricultural education has focused on adoption, sources of training, accessibility/usage and perceived barriers (Coley et al., 2014; Kotrlik & Redmann, 2009; Kotrlik et al., 2009; Redmann et al., 2003; Williams et al., 2014). However, as technology has rapidly evolved and has become increasingly more mobile, so too have teachers’ needs changed. In order to better understand the technology availability and integration opportunities available to teachers in Louisiana, more recent research is needed.

The purpose of this research aligns with the AAAE National Research Agenda, specifically Research Priority Area 4: Meaningful, Engaged Learning in All Environments (Edgar, Retallick, & Jones, 2016). Specifically, this research attempts to provide answers to research priority question one, “How do digital technologies impact learning in face-to-face and online learning environments” (Edgar et al., 2016, p. 39).

Purpose and Objectives

The two-fold purpose of this study was to (a) describe the smartphone availability and usage by agriculture teachers in Louisiana for educational purposes and (b) describe the level of educational technology adoption of these teachers. The following research objectives guided this study:

1. Describe smartphone availability (i.e., physical access and district policy) of Louisiana agricultural education programs (i.e., teachers and students).
2. Describe Louisiana agricultural educators openness to utilizing smartphone technology for teaching and learning
3. Identify educational technologies that Louisiana agricultural educators incorporate into instruction
4. Describe Louisiana agricultural educators self-perceived level of educational technology adoption.

Methods

Data collected for this study was part of a larger research project to determine differences in achievement of students in a technology enhanced curriculum versus those taught via direct instruction. The target population of this study was all Louisiana agricultural educators actively working during the 2015–2016 academic year (N = 238). The Louisiana agriculture teacher directory obtained from the Louisiana FFA website was used to determine the target population. Data were collected, face-to-face via hardcopy instrument by the researcher at each of the three Louisiana FFA Leadership Camp sessions. Per state legislative policy, all agriculture teachers employed on a 12-month contract must attend state FFA camp and bring at least two active FFA members. After registering for camp, a meeting for teachers is held in the conference area.

During this meeting, an informed consent statement was read aloud by the researcher and the teachers were allowed time to voluntarily complete the survey. In all, 177 advisors registered for camp and 157 agriculture teachers completed the survey, which yielded 88.7% response rate, representing 66.0% of the total agriculture teacher population in Louisiana.

The participants were 68.7% male (*n* = 108) and 31.3% female (*n* = 49). Louisiana agricultural educators' age ranged from 22-67 with an average age of about 41 years old. The average agricultural education teaching experience was a little more than 13 years. Teachers from each of the four FFA areas were present in the sample, with 22 (14%) from Area I, 29 from Area II (18.5%), 59 from Area III (37.6%), 42 from Area IV (26.8%), and 5 who did not indicate the area in which they teach (3.2%). According to the Louisiana FFA directory, there are 193 chapters in Louisiana with 33 (17.1%) in Area I, 41 (21.2%) in Area II, 60 (31.1%) in Area III, and 59 (30.1%) in Area IV.

The instrument used to collect data comprised of 18 items divided into three sections. The first section was comprised of researcher-created items utilized to determine smartphone availability of Louisiana agriculture teachers. The second section was comprised of items modified from Coley et al. (2014) to determine self-perceived level of educational technology adoption as well as educational technologies these teachers utilize currently. The final section was utilized to determine the demographics of the teacher participants.

A panel of three agricultural education faculty members evaluated the instrument for content validity. Further, five active Louisiana agriculture teachers completed the instrument and provided feedback on the items. Minor changes were made to some items after the instrument was field-tested. No initial items were eliminated. Due to the nature of the data collected, reliability estimates were not calculated. Data associated with each research objective were analyzed through descriptive statistics, including frequencies, percentages, minimum value, and maximum value. Due to the ordinal nature of the data collected, the mode was determined as the most appropriate measure of central tendency to meet the needs of objectives two and three.

Findings

Objective 1: Availability of smartphones for teaching and learning

The first objective of this study sought to describe the smartphone usage policy for teachers and students in Louisiana secondary schools that offer agricultural education courses (see Table 1). In all, 85 (54.1%) of the teacher participants indicated their school district policy allowed teachers to utilize smart phones for educational purposes. Further, 51 (32.5%) reported teachers could not use smartphones for educational purposes and 21 (13.4%) did not know if their district policy allowed teachers to use smartphones for learning. The second item asked teachers to indicate whether their school district policy allowed students to use smartphones for educational purposes. A total of 48 (30.6%) reported students in their district could utilize smartphones for learning, while 105 (66.9%) reported their district policy was against student smartphone use. In all, 132 (84.1%) of the teachers reported having Wi-Fi access in their classrooms and 143 (91.1%) personally owned a smartphone.

Table 1

Smartphone availability of Louisiana School-based Agricultural Educators and Students (n = 157)

Item	Yes	No	I don't know
Does your school board policy allow teachers to use smartphones in the classroom as a teaching tool?	85	51	21
Does your school board policy allow students to use smartphones in the classroom for educational purposes?	48	105	4
Do you have access to "Wi-Fi" (wireless internet) in your classroom?	132	22	2
Do you own a smartphone?	143	14	0

Objective 2: Openness to utilizing smartphone technology for teaching and learning

The second objective was to describe Louisiana agricultural educators' openness toward students using smartphones for learning. Overall, these teachers' modal score of two indicated they were *Somewhat Open* to the idea of allowing students to use smartphones for learning (see Table 2). Further, these teachers were *Open* to the idea of participating in a professional development centered on employing smartphones as an instructional tool.

Table 2

Louisiana School-based agricultural educators' openness to utilizing smartphone technology for teaching and learning (n = 157)

Item	*Min.*	*Max.*	*Mode*
How open are you to the idea of students using smartphones for learning in your agricultural class?	1	5	2
How open Louisiana agricultural educators' were toward participating in professional development centered on using smart phones as instructional tools in agricultural education	1	5	3

Note. 1 = Not at all Open; 2 = Somewhat Open; 3 = Open; 4 = Very Open; 5 = Entirely Open

Objective 3: Educational technologies incorporated into instruction

The third research objective sought to describe Louisiana agricultural educators' incorporation of educational technology into classroom instruction (see Table 3). Overall, the most commonly utilized educational technologies were the teacher desktop/laptop and digital projector, both of these items received modal scores of 6, indicating many teachers use these technologies on a daily basis. These teachers indicated they use test generation software and PowerPoint on a weekly basis and DVD players are used monthly. The remaining 10 educational technologies each received modal scores of zero, indicating many teachers do not have access to the technologies. However, of the teachers who do have access to these ten items, the smartboard is used daily, iPads/tablets are used weekly, and YouTube is used monthly. The teachers indicate they have access to the remaining educational technologies, but never use them.

Table 3

Louisiana School-based agricultural educators use of educational technologies

Educational Technology	*Do not have Access*	*Have access, but never use*	*Use a few times per year*	*Use a few times per semester*	*Use Monthly*	*Use Weekly*	*Use Daily*	*Mode*
Teacher desktop/laptop (*n* = 156)	6	1	2	3	8	11	125	6
Digital projector (*n* = 156)	10	9	5	8	16	36	72	6
Test generation software (*n* = 155)	28	15	12	25	24	39	12	5
PowerPoint (*n* = 150)	4	3	5	14	13	56	55	5
DVD player (*n* = 157)	9	7	26	33	35	33	14	4
YouTube (*n* = 157)	40	4	14	19	34	33	13	0
Smart board (*n* = 156)	75	10	5	3	6	17	40	0
Smartphone (*n* = 154)	46	30	11	14	16	12	25	0
iPad or other tablet (*n* = 156)	62	18	11	11	12	25	17	0
Apps (*n* = 154)	54	21	21	16	17	11	14	0
Document camera (elmo) (*n* = 156)	77	27	7	13	12	8	12	0
Facebook and/or Twitter (*n* = 156)	79	44	4	0	5	13	11	0
Instagram and/or Snapchat (*n* = 156)	85	56	4	1	1	6	3	0
Facetime and/or Skype (video call) (*n* = 150)	78	54	10	7	3	1	0	0
Student response system (clickers) (*n* = 156)	102	31	5	11	1	2	4	0

Note. 0 = do not have access, 1 = have access but never use, 2 = use a few times per year, 3 = use a few times per semester, 4 = use monthly, 5 = use weekly, and 6 = use daily.

Objective 4: Self-perceived level of educational technology adoption

The final research objective sought to determine Louisiana agricultural educators self-perceived level of educational technology adoption. The most frequent response (n = 77; 49.0%) was *I let others test new technologies before I adopt them*, followed (n = 50; 31.8%) by *I am among the first to adopt new technologies as they become available*. Sixteen (10.2%) of the teachers indicated *I rarely adopt new technologies* and 12 (7.6%) marked *I create my own technology resources before anyone shows me*.

Table 4

Louisiana Agricultural Educators Self-Perceived Level of Educational Technology Adoption (n = 157)

Response	N	%
I create my own technology resources before anyone shows me	12	7.6
I am among the first to adopt new technologies as they become available	50	31.8
I let others test new technologies before I adopt them	77	49.0
I rarely adopt new technologies	16	10.2
Missing	2	1.3

Conclusions/Recommendations/Implications

Smartphone ownership by Louisiana agriculture teachers mirrors the general public. Over 90% of Americans between the ages of 18 and 49 reported they own a smartphone (Pew, 2017) and our data revealed 91% of Louisiana agriculture teachers own a smartphone. Over half of Louisiana agriculture teachers are allowed by school board policy to use their smartphones in the classroom for instruction and have Wi-Fi access in their classrooms. Ironically, very few indicate daily or even weekly usage of this technology for learning. Despite ready availability, Louisiana agriculture teachers are only somewhat open to the idea of students using smartphones in class. Results from this study indicate that approximately two-thirds of schools in Louisiana ban students from using smartphones for learning, consistent with a previous report by Commonsense Media (2010). The disconnect between availability and a willingness to use the technology within a classroom environment adds to the idea of a new digital divide between students and teachers (Thomas and O'Bannon, 2015). This finding is consistent with the idea put forth by Palak and Walls (2009) that the availability of technology does not mean teachers will embrace and incorporate it. Perhaps teachers, although open to the idea of utilizing smartphones for learning, perceive it to be high in complexity, thus outweighing the positive attributes (Rogers, 2003). Future research is warranted to determine what attributes of smartphones are perceived as being useful in agricultural education.

Previous research concluded that student perceptions of smartphone use in formal education were more positive than teacher perceptions (Kalinic, Arsovski, Stefanovic, Arovski, & Rankovic, 2011; Tindell & Bohlander, 2011; Thomas and O'Bannon, 2015; Berry & Westfall, 2015). That is not to say that students do not recognize the problems with using smartphones in education. Studies have indicated that students often share the same concerns teachers have about smartphones being used to cheat, disturb, or bully (Thomas & Muñoz, 2016; Gao, Yan, Wei, Liang, & Mo, 2017). To date, most of the research on student perceptions towards smartphones for educational purposes is collected at the university level. For technology perceptions and policies to change, more research should also be conducted in secondary education, and namely in agriculture classes, to gain insight from students on the benefits of technology integration. Additional research should be focused on secondary level administrators who are charged with enforcing district policy regarding the allowance of smartphones to determine what procedures or practices would be beneficial to students and teachers in secondary education.

Despite it not being used readily within the classroom, agriculture teachers in this study indicated they are open to the idea of professional development geared towards implementing smartphone technology into classroom instruction. Kotrlik and Redmann (2009) found that 92% were self-taught in terms of where they attained technology skills. Similarly, a study of Tennessee agriculture teachers found the most common ways for teachers to learn technology were through personal trial and error, interaction with other faculty, and independent learning (Coley et al., 2015).

As with similar studies, teachers in Louisiana indicated using teacher-centered technology. The majority of teachers indicated that they used a teacher desktop/laptop, digital projectors, test generation software, and PowerPoint on a daily or weekly basis. This research is strikingly similar to previous studies in agricultural education (Kotrlik & Redmann, 2009; Coley et al., 2015; Williams et. al., 2014) and indicates that agriculture teachers' use of technology has remained relatively unchanged in the past 10 years. Previous research on teacher usage of mobile devices indicated that most use their devices for passive learning and administrative duties rather than collaborative projects and material creation (Thomas & Muñoz, 2016). Research should be conducted to determine what first and second order barriers are inhibiting agriculture teachers from using newer technologies in districts with favorable technology policies.

Findings from this study indicate that the teachers' perceptions of their educational technology adoption level are comparable to Roger's (2003) description of the categories of adopters. Over 80% of teachers in this study indicated they either are among the first to adopt educational technology or let others try new technologies prior to adopting. These categories correspond with the early adopters, early majority, and late majority as described by Rogers (2003). Per the theory, these three categories of adopters should make up 81.5% of the individuals in a given system. A larger percentage of teachers perceived themselves as innovators than Roger's (2003) theory would have predicted. Roger's (2003) states that innovators make up 2.5% of the individuals in a system, while 7.6% of teachers in this study indicate they create new technologies before anyone shows them. Finally, just over 10% of teachers indicated they rarely adopt new technologies, indicating they could be considered laggards. Roger's (2003) showed laggards should comprise 16% of a social system.

Results from this study show the large majority of teachers are willing to adopt educational technologies to enhance student learning. If teachers are indeed open to new technology and if they are willing to allow other teachers to implement technology before them, then Guskey's (2002) model for teacher change would allow for greater opportunities for teachers to successfully adopt new educational technology. According to Guskey (2002), teachers must learn about the technology, then see the impact of that technology before they will consider adoption. Professional development opportunities provided by teachers who integrate technology successfully, can be an excellent opportunity to help teachers move from becoming aware of new technology to seeing the value in including the technology as part of their educational practice. For new technology to be adopted, a new professional development model must be established in Louisiana to help teachers move into new technology integration.

This study only looked at whether teachers were using smartphone technology in their programs. More research should be used to determine what basic and advanced smartphone functions agriculture teachers in Louisiana are actually using, specifically, in programs where teachers have access to technology and are allowed to use it for educational purposes, but students are not. A better understanding of what technologies are available and useful for teachers can be beneficial when developing professional development opportunities to encourage educational technology integration.

As technology increases, education will be expected to continue to integrate. If teachers in Louisiana have not increased their technology adoption in the past 10 years, how can they be expected to integrate at even higher rates? Future research and practice should be geared toward determining what technologies can be used, how to best provide professional development to teachers and how to help teachers measure the impact of those technologies in their programs.

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International Rural Development Nonprofit Organizations' Use of Facebook: A Content Analysis

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The growing popularity of social networking sites has encouraged organizations to incorporate virtual communication strategies into their public relations plans. While previous studies have explored the concept of communicative functions present in nonprofit organizations' posts, none has explored the influence of posts characteristics and combinations of communicative functions on stakeholder response, engagement, and advocacy. This study examined how international rural development nonprofit organizations (NPOs) use Facebook to disseminate messages, facilitate dialogue, encourage mobilization, and boost stakeholder engagement. Through a content analysis of 84 posts over two weeks from 25 international rural development nonprofit organizations' Facebook pages, this study examined how Facebook is used to meet the financial and strategic goals of nonprofits. Overall, the organizational presence and practice of Facebook varied between organizations and the interactive features of Facebook were not fully utilized to generate dialogue with key audiences. The study found the information communicative function to be the most prevalent. To generate more audience engagement, researchers suggest utilizing community-building communicative functions and interacting with stakeholders through liking and replying to comments on the organizations' pages. This study provides theoretical and practical implications to enhance our understanding of nonprofits' social media use and provides insight for nonprofit public relations practitioners.

Introduction/Literature Review

Nearly 11% of the global population, or 795 million people, are malnourished and impoverished (FAO, 2015). Developing regions make up the overwhelming majority of this hungry population, accounting for 98% of the world's undernourished (FAO, 2015). With population experts projecting the worldwide population to exceed nine billion by 2050, it is dire for nonprofit rural development organizations to tailor their communication strategies to engage stakeholders, increase donations, recruit volunteers, and meet their goals (Pardey, Beddow, Hurley, Beatty, & Eidman, 2014).

In this online era, it is essential for an organization to have a social media presence (Bergstrom & Backman, 2013). For nonprofits relying heavily on stakeholders for donations and volunteer efforts, virtual communications strategies are particularly significant (Kent, Taylor, & White, 2001). Internet users want and expect organizations to engage in a two-way online dialogue with them through a social media presence (Cone, 2008). Engagement is a crucial component in mobilizing stakeholders and erecting communities (Lovejoy & Saxton, 2012). With its far reach and unique features, social media provide "dynamic updating and messaging capabilities, numerous interactive applications and media-sharing opportunities, and formal social networks" (Saxton & Waters, 2014, p. 284) to facilitate the demands of organization stakeholders and publics (Meredith, 2012; Nah & Saxton, 2012). The incorporation of engagement features such as liking, commenting, and sharing on Facebook posts has engendered a new standard of immediacy in two-way dialogic communications that was not previously attainable through print outlets or websites (Lovejoy & Saxton, 2012; Saxton & Waters, 2014). Nonprofit organizations often rely on stakeholder communities for monetary, volunteer, and advocacy aid to achieve their philanthropic missions. Because the success of nonprofit organizations is often derived from the strength of relationships with their stakeholders, more research is necessary to develop virtual communication strategies that facilitate the dynamic features of social media and drive stakeholder engagement (Ramanadhan et al., 2013).

Facebook serves as a valuable communication outlet for nonprofits to reach their stakeholders, provide information, and strengthen support for a cause (Barnes & Mattson, 2010; Chiulli, 2014; Frye, 2014; Kanter & Fine, 2010). Supporters are able to look at the social media sites, learn what they need to, and send a message to the organization if need be (Chiulli, 2014). Previous research suggests Facebook is an affordable means to more efficiently meet organizational goals and missions (Curtis et al., 2010; Frye, Armstrong, Calongne, & Sanden, 2014; Shirky, 2008; Waters, Burnett, Lamm, & Lucas, 2009). Waters and Lo (2012) recognized Facebook as a dialogic platform for organizations to involve their fans and build a devoted community, but the majority of nonprofits have not incorporated the vast majority of Facebook features available to them in their social networking presence (Waters et al., 2009).

The use of dialogic, symmetrical two-way communication allows audiences to engage while concurrently cultivating and maintaining healthy relationships between an organization and its stakeholders (Grunig & Hunt, 1984; Kent & Taylor, 2002). Kent and Taylor (1998) suggested five principles to follow to achieve effective dialogic communications in an online environment: a) provide a navigable site, b) conserve followership, c) generate return visits, d) provide useful information tailored to the needs of the audience, and e) maintain a dialogic loop where users can contribute through the form of comments and questions. Recent studies and public relations practitioners recommend organizations use social media to facilitate dialogic communication and maintain relationships with stakeholders (Kent & Taylor, 2002; Kent, Taylor, & McAllister-Spooner, 2008; Kent et al., 2001; Lovejoy, Waters, & Saxton, 2012; Saxton & Waters, 2014). Barnes and Mattson (2010) found that, of the 200 largest U.S. charities, 89% were using some form of social media. Cho, Schweickart, and Haase (2014) specifically identified Facebook as a platform that can facilitate two-way communications and also as the leading social media tool actively organizations used. With more than 1.5 billion active users on Facebook (2016a), organizations are seeking to tap into the relationship development potential social media sites offer (Frye, 2014; Waters et al., 2009).

Nonprofits generally share information about their programs and results through news stories, discussion forums, photographs, and other information exchange outlets Facebook provides (Chiulli, 2014). While previous research investigated the use of Facebook among nonprofits has been limited to the largest nonprofits with annual budgets of more than US$10 million (Cho et al., 2014; Guo & Saxton, 2012; Lovejoy et al., 2012; Nah & Saxton, 2012; Saxton & Waters, 2014; Waters & Feneley, 2013), nearly two-thirds of nonprofits have annual expenditures less than US $500,000 (McKeever & Pettijohn, 2014). At this time, research is somewhat lacking concerning the strategies and effects of social media use by nonprofit organizations of varying sizes (Macnamara & Zerfass, 2012; Svensson, Mahoney, & Hambrick, 2015) and no studies have been completed exploring the use of Facebook among international rural development nonprofit organizations (NPOs).

Despite the fact that messages, in the form of statuses and updates, are the chief dynamic element of most social media sites, prior research has primarily focused on static content such as organization-level information available on profiles (Saxton & Waters, 2014). Focusing on the actual messages the organization is sending is much needed and aligns with Rafaeli and Sudweeks' (1997) "message-based conceptualization of interactive communication" (Saxton & Waters, 2014, p. 9). This interactive communication includes a completed loop of dialogue, or a direct response related to the initial message (Sundar, Kalyanaraman, & Brown, 2003).

Conceptual Framework

Saxton and Water's (2014) research served as the conceptual framework to examine how nonprofits use Facebook as a communications platform to promote their mission and engage stakeholders. Saxton and Waters inductively developed a categorization scheme informed from Lovejoy and Saxton's (2012) study, an analysis of the top 100 largest nonprofits in the United States Twitter usage to identify communicative functions for organizational tweets. Saxton and Water's (2014) coded 1,000 randomly selected Facebook messages from the 100 largest nonprofits in the United States in terms of revenue. Their analysis yielded three overarching communicative functions for organizational posts as described in Table 1. These communicative functions have been researched in other studies regarding Twitter (Guo & Saxton, 2012; Lovejoy & Saxton, 2014; Neiger, Thackeray, Burton, Thackeray, & Reese, 2013; Svensson et al., 2015). Information-sharing is primarily a form of one-way communication while community-building and promotion and mobilization both facilitate two-way communication. In each of these studies, the authors concluded that most nonprofit organizations primarily used information-sharing messages on social media even though messages with community-building and call-to-action communicative functions resulted in more dialogue with stakeholders (Saxton & Waters, 2014).

Table 1
Communicative Functions of Organizational Facebook Messages (Saxton & Waters, 2014)

Communicative Function	Description
Information-sharing	Spread information about the organization, its activities and events, related facts, stories, organization reports, or anything of potential interest to followers
Community-building	Attempt to build relationships, networks, and communities though messages that promote interactivity and dialogue
Promotion and mobilization	Solicit donations or sales; promote organization's upcoming events; solicit the public's help in specific lobbying, advocacy, or volunteering efforts

Purpose and Research Questions

To address Priority 1 of the AAAE's *2016-2020 National Research Agenda*, more research is needed to better understand the "amount, type, accuracy, and quality of agricultural information provided to the general public" (Enns, Martin, & Spielmaker, 2016, p. 15). The current study used Saxton and Water's (2014) three communicative functions of nonprofit organizational communication on social networking sites as the framework for analysis to examine to how international rural development nonprofits organizations (NPOs) use Facebook to disseminate messages, facilitate dialogue, encourage action, and boost stakeholder engagement. The following research questions were used to address the purpose of this study:

1. What was the general Facebook presence of the organizations?
2. What post characteristics were present in individual posts?
3. What communicative functions were present in individual posts?
4. Did audience engagement differ between post characteristics?
5. Did audience engagement differ between communicative functions?

Methodology

The researchers used a content analysis as the research design to analyze international rural development NPOs Facebook posts. Purposive sampling identified the study population of 501(c)(3) registered nonprofits on social media with a mission to assuage poverty and hunger through international development. These nonprofits are commonly referred to as charitable organizations and are eligible to receive tax-deductible contributions (IRS, 2015). The researcher first reviewed a recent compilation of the most followed nonprofits on social media and selected only organizations whose mission statement aligned with the criteria in this study (Top Nonprofits, 2014). Because this compilation was skewed toward organizations with a more established online presence and higher annual expenditures, the sample was expanded to include lesser-known organizations with similar missions. These organizations were identified after asking key informants for suggestions and conducting online searches. Only organizations with an existing social media presence of at least an organizational Facebook page were included in the study. The sample consisted of 25 organizations with annual expenditures ranging from $.11 million to $1 billion according to fiscal year 2014 IRS-990 forms (M = $104.92 million, SD = $247.92 million). Seven (28%) of the organizations in the study had annual expenditures less than $500,000, while the other 72% (n = 18) were larger organizations with expenditures exceeding $500,000.

Sampling errors are the seemingly random differences between the characteristics of a sample population and those of the general population (Ary et al., 2010). One way the researcher minimized sampling error was by analyzing two weeks as opposed to only one. The two weeks analyzed were four weeks apart to avoid seasonal posts and to be more reflective of the typical posts the organization might post throughout the year. Posts analyzed were from Monday through Sunday, October 12-18, 2015 and November 9-15, 2015.

To determine the message characteristics used in the organizations' posts, the researcher developed a codebook adapted from previous literature (Guo & Saxton, 2012; Jamal & Waters, 2011; Lovejoy & Saxton, 2012; Saxton & Waters, 2014; Waters et al., 2009). The codebook had four sections to address the research questions: general Facebook page attributes, post characteristics, communicative functions, and engagement. Facebook page attributes were the presence of the mission or goals of the organization, a link to the organization's website, an official logo, contact information, a social media policy, a link to volunteer and/or donate, links to other social networking sites, and the frequency and origination of posts (i.e. post or share). The presence of post characteristics within each post was determined with the following nominal variables: text, graphic, video, hyperlink, audience ability to comment, if organization replies to comments, and if organization likes comments. Engagement for each post was measured by a count of likes, comments, and shares by the audience. The communicative functions (information, community, and action) present within each post were also identified. Although prior researchers only acknowledged the primary communicative function of each Facebook post (Saxton & Waters, 2014), this study recorded all communicative functions present within each post. "Not Identifiable" was added to account for messages with an unclear purpose, often the result of poorly composed messages with grammatical errors or sentence fragments. The codebook was developed prior to coder training, revised during the first coder training session for clarity, and then revised again through an inductive approach after the pilot test phase.

Two undergraduate students served as coders. Before collecting data, the researcher conducted a 1 ½-hour coder training session to introduce the coders to the concepts of the study without pre-coding any material. This training served to increase the coders' comfort level with the content being analyzed, address initial concerns, and clarify any discrepancies or unclear explanations within the codebook (Riffe, Lacy, & Fico, 1998). Intercoder reliability is a critical component of content analysis that measures the level of agreement among different judges (Tinsley & Weiss, 2000) when studying features of each message (Lombard, Snyder-Duch, & Bracken, 2002). To establish intercoder reliability, the two coders independently coded an amount equal to approximately 10% of the total study sample (Kaid & Wadsworth, 1989; Wimmer & Dominick, 2013). The one week (September 20-26) of posts included in this pilot phase were from five organizations outside of the time frame in the study population.

After the 10 posts were coded in the pilot test, an interrater reliability analysis using Cohen's kappa was performed to determine consistency among raters. Cohen's kappa "refers to the proportion of consistent classifications observed *beyond* that expected by chance alone" (Ary, Jacobs, Sorensen, & Razavieh, 2010, p. 273) and is commonly used and highly recommended in communications research where there are two coders (Bakeman, 2000; Dewey, 1983; Lombard et al., 2010; Riffe et al., 1998). Table 2 provides Cohen's interpretation of κ values.

Table 2
Interpretation of Cohen's kappa coefficient

Value of kappa	Level of Agreement
≤ 0	Chance agreement
0.01 – 0.20	Slight agreement
0.21-0.40	Fair agreement

0.41-0.60	Moderate agreement
0.61-0.80	Substantial agreement
0.81-0.99	Almost perfect agreement
1.00	Perfect agreement

Intercoder reliability for each item within the Facebook page attributes and engagement were found to be $\kappa = 1.00$ (95% CI), $p < 0.0005$). This perfect agreement exceeded the standard the researcher set previously and was considered acceptable for Cohen's kappa and exploratory research (Landis & Kock, 1977; Lombard et al., 2002). Within post characteristics, photos (later revised to graphics) were found to be $\kappa = 0.60$ (95% CI), $p < 0.0005$). All other post characteristics had a perfect agreement $\kappa = 1.00$ (95% CI), $p < 0.0005$). The intercoder reliability for the four communicative functions (information, community, action, and not identifiable) varied from $\kappa = 0.40$-0.80 (95% CI), $p < 0.0005$) and did not meet expectations set by the researcher. In an additional 1½-hour session with the coders, these items were discussed until 100% agreement was reached. The codebook was then revised and an additional item was added to the communicative function section to identify direct quotes. These were often Bible verses with no accompanying text that made identifying a function difficult.

To address internal validity, we set "a maximum length of time governing a coding session" (Riffe, 1998, p. 120) of no more than one continuous hour and a mandatory re-familiarization with the communicative function descriptions prior to each new coding session. Another threat to internal validity may be the experimenter effect. To address any "unintentional effects that the researcher has on the study" (Ary et al., 2010, p. 272), we trained external coders to complete the coding process, as Lombard, Snyder-Duch, & Bracken (2010) recommended.

Subsequently, the coders independently recoded the original pilot test sample to retest for intercoder reliability of the communicative functions. For the 10 messages in this sample, the coders reached moderate agreement and met the researcher's standards with 80% agreement and $\kappa = 0.56$ ($p < 0.0005$), 95% CI (Landis & Koch, 1977). The coders were then randomly assigned organizations and proceeded to collect data and independently code the study sample. Data were first entered into Microsoft Excel then analyzed using the Statistical Package for the Social Sciences version 22.0. Descriptive statistics and independent samples *t*-tests were used to address the research questions. To determine effect size, the *t*-value was converted into an *r*-value (Rosenthal, 1991; Rosnow & Rosenthal, 2005), then this effect size was interpreted according to Cohen's (1988 & 1992) descriptors (Field, 2005). An *r*-value of .10 is a small effect size and explains 1% of variance. An *r*-value of .30 is a medium effect size and explains 9% of the variance. An *r*-value of .50 is a large effect size and explains 25% of the variance.

Results

In October 2015, the nonprofits had an average number of 323,886 fans on Facebook (SD = 1,078,563.2), which ranged widely from a minimum of 370 to a maximum of 5.4 million followers. The median number of fans was 10,809.

Research question one sought to understand the attributes of the organizations' Facebook pages. All the organizations had a description of the organization's mission and goals and a link to the organization's website included on their Facebook profile page. One organization (4%) did not use the organization's official logo as the profile picture while the others did. The majority (*n* = 22, 88%) provided contact information. Only seven had a written social media policy present on the page. Nearly all (*n* = 21) had a clear link to donate or to volunteer with the organization. Some organizations provided links to other social networking sites: Pinterest (*n* = 7), Instagram (*n* = 6), Twitter, (*n* = 5), YouTube (*n* = 4), Vimeo (*n* = 1), Flickr (*n* = 1), and a blog (*n* = 1). The total number of posts analyzed during the two weeks studied was 85 posts. The frequency of posts during this timeframe ranged from 0 (3 organizations) to 12 posts. Organizations posted an average of 1.4 posts (*SD* = 1.4) in the first week studied and 1.9 posts (*SD* = 1.7) in the second week studied. Twenty-three organizations did not post any "shared" posts while the remaining two only posted one "shared" post during the study timeframe.

Research question two was to understand the post characteristics present in individual posts: text, graphics, videos, hyperlinks, audience ability to comment, if organization replies to comments, and if organization likes comments. Within the entire sample, 14% (*n* = 12) of posts contained just a link or graphic with no accompanying text. Graphics, identified as any visual aspect except videos, were present in 77% (*n* = 65) of the posts. The majority of posts (*n* = 72, 84.7%) did not include embedded videos. Fifty-three percent (*n* = 45) of posts included hyperlinks. Of these, 58% (*n* = 23) linked to an organizational page, such as another social media site, a website, or other web-based page the organization managed. All the posts (*n* = 85) allowed comments. Of the posts that had comments from the audience, only 26% (*n* = 10) had replies and 21% (*n* = 8) had likes from the posting organization.

Research question three sought to find what communicative functions were present in individual posts. This study is unique from previous studies of micro-blogging communicative functions in that it does not restrict the communicative function of posts to only three possibilities. This study identified the communicative functions present in each post whether that be none, one, or a combination of functions. Table 3 provides examples of each function and the frequency of individual posts according to their communicative function(s).

Table 3
*Communicative Functions of Facebook Posts (*N = *84)*

Communicative Function	*Example*	*n*	*%*
Information	Tap stands in Mali bring clear water to the center of communities, making it possible for families to take as much as they need. <Graphic>	20	23.5
Information and Community	Today on World Food Day, we want to take a moment to celebrate our farmers. Their work ethic and discipline are transforming the lives of thousands of Kenyans and Ethiopians. Thank you for working together with them to cultivate a better world! #Hashtag <graphic>	19	22.4

Not Identifiable	[Organization] updated their cover photo.	15	17.6
Information and Action	Clean water is important to families everywhere. Honor your family by making a donation at <Link> <Graphic>	11	12.9
Information, Action, and Community	#Hashtag is the day we give back amidst the holiday season. It's in its fourth year & we're ready to make this year better than ever! Join [Organization] on 12/1. Mark your calendars! <Link> <Graphic>	7	8.2
Community	[Organization] depends on our volunteers! <Graphic>	6	7.1
Community and Action	This #Hashtag, join millions of people calling for a better world. Watch and share this video if you believe in [Organization], #Hashtag! <Video>	4	4.7
Action	Help these hardworking families lift themselves out of poverty and increase food security within their communities. Double the impact of your donation with our matching gift challenge! Give now at <Link> <Graphic>	2	2.4

Note. Each post was uniquely identified.

Of the posts analyzed, only one (1.2%) was recorded as a quote with no accompanying text and not eligible to be coded for its communicative function. After removing this post, 84 posts remained to be coded based on their communicative function(s). Figure 1 displays the communicative functions found in the posts with the overlap indicating where multiple functions were identified. Sixty-eight percent (*n* = 57) of the identified communicative functions in the posts contained the information communicative function. About one-third of the posts (*n* = 36, 32.9%) included the community building function, and 28.6% (*n* = 24) of posts included the action communicative function. Poorly composed messages with grammatical errors, sentence fragments, or an unclear purpose were categorized as Not Identifiable (*n* = 15, 17.9%). Sixty percent (*n* = 9) of these posts were automatic updates that the organization had updated their cover photo. Another 20% (*n* = 3) of these posts included a link or hashtag accompanied by a graphic but no additional text.

Research question four sought to determine if audience engagement differed between post characteristics. Eight posts with likes, comments, and shares beyond two standard deviations away from the mean were removed as outliers before running an independent samples *t*-test to determine how audience engagement (measured as the average number of likes, comments, and shares) differs with the absence or presence of different post characteristics. The “allows comments” variable was not measured for its impact on engagement because comments were allowed on 100% of posts in this study.

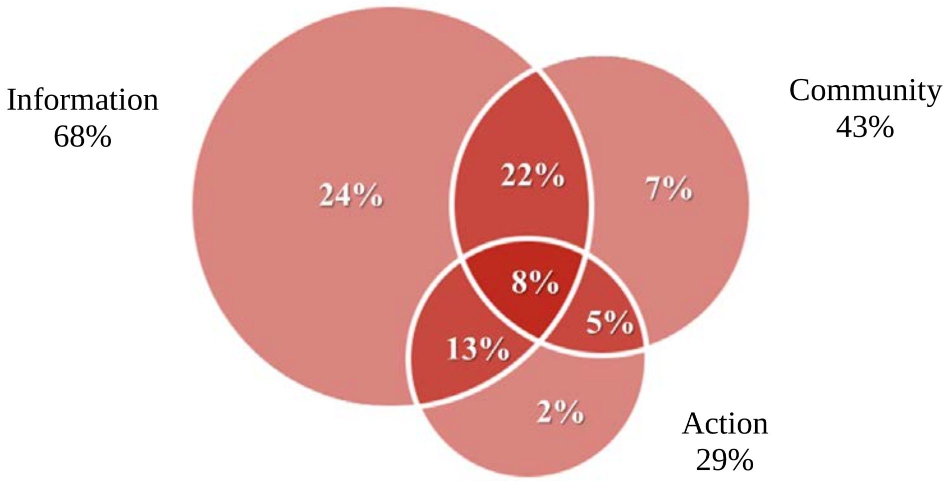

Figure 1. Communicative Functions Present in Facebook Posts.

Posts including text experienced a higher average number of likes (*M* = 122.1, *SD* = 188.9), comments (*M* = 2, *SD* = 3.6), and shares (*M* = 24.6, *SD* = 44.9), when compared to posts lacking text in terms of likes (*M* = 67.3, *SD* = 98), comments (*M* = 0.4, *SD* = 0.7), and shares (*M* = 4, *SD* = 5.7). These differences were not statistically significant, but did represent between small and medium effect sizes, which accounted for 1-9% of the total variance. Posts containing graphics had more average likes (*M* = 124.3, *SD* = 186.4) than those without graphics (*M* = 78.9, *SD* = 151.5). This was not statistically significant $t(31.3) = -1.0$, $p > .05$, but did have a small to medium sized effect $r = .18$, explaining 1-9% of the variance. Posts that contained videos had more likes (*M* = 3.3, *SD* = 5.5) than those without videos (*M* = 1.6, *SD* = 2.9), but this difference was not statistically significant, $t(74) = -1.5$, $p > .05$. It did, however, represent a small to medium sized effect $r = .17$, which accounts for 1-9% of the total variance. Posts that contained videos also were shared more (*M* = 41.3, *SD* = 65) than those without videos (*M* = 18.7, *SD* = 37.4), and this difference was not statistically significant, $t(9.9) = -1.1$, $p > .05$). It did represent a medium sized effect $r = .33$, which explains at least 9% of the total variance.

Posts that included organizational replies to comments experienced more likes (*M* = 448, *SD* = 228.6) than posts that did not (*M* = 207.6, *SD* = 188.6). This was statistically significant, $t(6.8) = -2.4$, $p = 0.05$, and represents a large effect size $r = .68$, which explains more than 25% of the variance. Similarly, posts that included organizational replies to comments also received more comments (*M* = 10, *SD* = 4.2) than posts that did not (*M* = 3.2, *SD* = 2.6). This was statistically significant, $t(28) = -5$, $p < 0.05$, and represents a large effect size $r = .69$, which accounts for more than 25% of the variance. A similar pattern holds as posts with organizational replies to comments also garnered more shares (*M* = 102.5, *SD* = 60.9) than posts that did not (*M* = 36.1, *SD* = 47.3). This was also statistically significant, $t(6.6) = -2.5$, $p < 0.05$, and represents a large effect size $r = .7$, which explains more than 25% of the variance. Similarly, posts where organizations liked stakeholder saw more dialogic engagement in the form of comments (*M* = 7.8, *SD* = 6.4) than posts that did not (*M* = 3.9, *SD* = 3.2). This was also statistically significant, $t(28) = -2.1$, $p < .05$ and represented a medium sized effect, explaining more than 9% of the total variance.

Research question five aimed to know if there was a difference in engagement among communicative functions. We removed eight outliers then ran descriptive statistics on all posts, including the one (1.2%) post identified solely as a quote, to describe communicative functions and engagement measured by the likes, comments, and shares. As Table 4 displays, average engagement of the total sample studied ($N = 76$) was 114.2 for likes ($SD = 179.2$), and 1.8 for comments ($SD = 3.4$), and 21.6 for shares ($SD = 42.2$). Posts identified as Community resulted in the most engagement averaging 205.5 likes ($SD = 213.1$), 3.7 comments ($SD = 4$), and 63.7 shares ($SD = 80.2$).

Table 4
Comparison of Engagement Means Based on Facebook Posts' Communicative Functions

		Likes		Comments		Shares	
Communicative Function(s)	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Community	6	205.5	213.1	3.7	4.0	63.7	80.2
Information	20	157.0	238.4	2.2	3.3	22.3	43.5
Information and Community	19	142.9	206.3	2.4	1.4	31.1	50.5
Information and Action	11	83.0	119.9	0.6	1.3	12.1	19.0
Not Identifiable	15	63.2	94.5	0.3	0.7	3.8	5.5
Information, Community, and Action	7	50.3	105.5	2.6	6.4	9.0	16.6
Action	2	37.5	23.3	1.0	1.4	17.0	22.6
Community and Action	4	36.0	46.1	1.0	1.0	17.0	29.4
Quote	1	7.0	-	0.0	-	0.0	-
Total		114.2	179.2	1.8	3.4	21.6	42.2

Conclusions and Implications

The dynamic features available on social networking sites, such as Facebook, are creating unique ways for organizations to communicate and interact with their stakeholders (Saxton & Waters, 2014). Social media tools provide organizations with a platform to meet public demands for transparency and mutually beneficial information while facilitating stakeholder response, dialogue, and advocacy (Kent & Taylor, 1998; Saxton & Waters, 2014). As international rural development NPOs strive to alleviate poverty and hunger in populations around the world, they need to effectively engage stakeholders and encourage advocacy through social media, specifically Facebook, to increase support (Pardey et al., 2014).

All the organizations in the study had a description of the organization's mission and goals and a link to the organization's website included on their Facebook profile page. This is a larger percentage than previous research had found (Waters et al., 2009). Although Facebook pages allow organizations to provide links to other social media platforms (e.g. Pinterest, Instagram, and Twitter) very few of the organizations actually provided this information, which limits the ability to cross promote their social media presence. All except four had the “Donate” button on their profile page to make it easier for visitors to contribute.

On average, the organizations posted less than two times per week and during the study’s time frame, three organizations did not post at all; therefore the results of the post-specific research questions are limited to the remaining 21 organizations. Some posts were not very descriptive (contained only a link or graphic with no accompanying explanation). Graphics were present in 77% of posts in this study, but only 15% had videos. As video becomes a more common feature on Facebook, these organizations should seek opportunities to integrate the form of visual communication. Hyperlinks were present in 53% of posts, similar to findings of a previous study (Waters et al., 2009). Of these, over half (58%) linked to an internally-managed page, which helps drive traffic to organization-controlled content while also providing links to valuable supporting content from other sources. Although comments were allowed on all the posts, the organizations weren’t actively replying or liking comments to strengthen relationships. This limits the ability to engage in dialogic, two-way communication.

This research expands upon our knowledge of Saxton and Waters’ (2014) social networking communicative functions: information-sharing, community-building, and action (i.e. mobilization and promotion). The most common communicative function was information alone. The information-sharing function is an example of the one-way communication model and serves to disseminate information about the organization’s mission, goals, activities, history, and reports related to finances and programs. This presence of this function in 68% of the posts may be due to the relative ease of passing along happenings within the organization or other news items. The dominance of this function was also found in previous studies of nonprofits’ posts (Cho et al., 2014; Saxton & Waters, 2014).

The community-building function, identified in 43% of the posts in this study, is reflective of the two-way symmetrical communications model and meant to facilitate dialogic communications while recognizing supporters and strengthening community ties. The action communicative function, present in 29% of the posts, explicitly tells stakeholders what to do, know, and/or feel in an attempt to meet financial and strategic goals. It seems reasonable for action to be the least common function as organizations work to provide information and build community first to help stakeholders feel able to engage in action. Fifteen posts had no identifiable communicative function. These primarily included automated updates related to an updated cover photo and posts with graphics but no accompanying text. No statistical differences in engagement (likes, shares, or comments) based on the presence or absence of text, graphics, or videos. However, a statistically significant difference was found in engagement for posts that demonstrated the organization responded to comments. These posts had more subsequent comments, likes, and shares. When the organization made the effort to comment, this led to more comments from audience members.

A surprising find in this study is that audiences were more prone to share than to comment on all types of communicative functions. Overall, the public is most responsive in the form of likes to Community posts and least responsive to Action posts and Community-Action posts. In terms of dialogic engagement, the Community posts were the most engaging and Information- Action posts were the least. A similar pattern holds with respect to sharing. Publics are more prone to share Community posts over any other type of communicative function present in messages. The combination of Information-Community-Action communicative functions were the least likely to be shared. As Saxton and Waters (2014) found, the community-building function yielded more stakeholder responsiveness in terms of likes and more dialogic interaction in terms of comments. This study also found that audiences were more likely to advocate by sharing a post when the community-building communicative function was present, although the difference was not statistically different. Providing two-way symmetrical messages that encourage community-building is the most effective way to nurture relationships and lead to more meaningful dialogue with stakeholders, which could also have a positive impact on donations.

Recommendations

The findings from this study have several important practical and theoretical implications. For instance, the findings confirm that organizations are better at using disclosure features of Facebook profiles to create transparency. Organizations are not, however, fully utilizing the interactive features of Facebook to engage in dialogue with stakeholders and encourage advocacy. Based on these findings, communications strategies of international rural development NPOs should include liking and replying to audience comments in order to more effectively drive audience engagement. Posts should also facilitate more two-way symmetric communications, such as community-building communicative functions, to foster relationships with key stakeholders.

This study enhances our understanding of nonprofits social media use and further supports broader theories that many nonprofits are not fully utilizing the two-way communicative features capable within Facebook. While this study explored an emerging area, it does have several limitations that can be addressed with additional research. This study only examined two weeks of content, so future research should examine more content to provide a more thorough understanding of how nonprofit organizations of varying sizes and platforms are using Facebook throughout the year to interact with stakeholders and meet organizational goals.

The researcher did not identify if Facebook boosted posts were used to expand reach. The presence of outliers could have been attributed to the use of boosted posts. This increased reach through inorganic means may have skewed the data and not provided a look into the raw opportunities for engagement pertaining to post characteristics and communicative functions. Posts in the study sample were categorized by as many communicative functions as were present. There was no particular order or ranking recorded in this analysis. Future research should weigh the functions according to the most prevalent or primary purpose. This could contribute to research and help practitioners to understand the most effective primary and accompanying communicative functions to combine.

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Examining the Critical Moments in Information Processing of Water Conservation Videos within Young Farmers and Ranchers: A Psychophysiological Analysis

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Abstract

Discussions on water conservation and how to conserve and provide enough water has become one of the most highly debated issues in modern society. Agricultural irrigation plays a key role in the water quantity levels in rural communities, and farmers and ranchers have previously supported water conservation practices. However, many of these same producers are conflicted between conserving water for future generations or maximizing profits for short-term yield to cover the increasing costs of annual operations and debt service. Although many Extension efforts have engaged the public in understanding of behavior and attitudes toward water conservation, limited research has been focused on understanding how agriculturalists respond to water conservation messages. Theories of information processing have connected increased cognitive resource allocation and cognitive processing may lend itself to stronger attitudes and a stronger likelihood of behavioral intent and action. The goal of this study was to employ an innovative measurement approach – the use of a psychophysiological measure (e.g., heart rate) to determine what message components elicited increased information processing during exposure to two water conservation videos. The results of this study provides key information to educators and communicators designing messages targeting farmer and rancher attitudes of water conservation. Farmers and ranchers allocated more attention to sections of the video that provided scientific evidence, specifically on screen graphics and narrated statistics. Because attention allocation has been associated with information processing, the findings from this study provide unique evidence showing where in a media stimulus farmers and ranchers allocate attention.

Introduction and Literature Review

Globally, water is a crucial aspect of human survival impacting modern industry, recreation, and the agricultural food system (Watkins, 2009). Although water may cover more than 70% of the planet, less than three percent is freshwater that may be used for drinking (Adler, 2007). However, both non-recreational and recreational activities used to support modern society have negatively impacted the quantity of water available (Haung, Lamm, & Dukes, 2016). In an effort to preserve naturally occurring freshwater, discussions on how to conserve and provide enough water has become one of the most highly debated issues in modern society (Levy & Sidel, 2011).

Increases in water use are due to a growing population who needs more water than ever before to sustain themselves (Bartlett, 1999; Flint, 2004). According to Flint (2004), water demand in the United States has more than doubled since the 1950's and is expected to continue to increase as the world population grows to more than 9 billion by the year 2050. Although residential and industrial water demands play a key role in urban and suburban environments, water demand is primarily used for agricultural irrigation in rural areas (Huang et al., 2016).

The context of this research was in the Southern Great Plains in an arid to semi-arid environment. In 2007, Allen, Baker, Segarra, and Brown reported that irrigated landscapes in these climatic areas were often fragile and stressed due to declining water quality and quantity and that efficiencies in irrigation (often exceeding 95% for drip systems) resulted in more water usage as new cropping systems were added.

According to West, Johnson, Kellison, Brown, & Pate (2015), some of the most conservation-oriented farmers in the Southern Great Plains experienced a 25% decline in aquifer volume compared to a 2003 baseline measure, and that “close to one-half of that decline occurred during 2011 and 2012, two years of severe drought and high water extraction” (p. 4). [State] High Plains farmers are also facing state-mandated pumping restrictions. As of January 1, 2015, [State] House Bill 1763 required that regional water districts adopt conservation measures. The regional underground district adopted a “Desired Future Condition” of 50% of the 2010 saturated thickness remaining in the aquifer in 50 years and placed a new rule on the amount of water that can be extracted to 18” per contiguous acre. Regional producers realize that the next drought will include these new pumping restrictions. Hence, growers and municipalities alike have a sense of urgency for interventions, which will reduce aquifer depletion where 95% of the aquifer extraction is to support the region’s $5B agricultural economy.

Prior research has shown farmers and ranchers have been found to have positive attitudes toward water conservation practices and programs (Durst, Meyers, Irlbeck, & Ritz, 2016). However, these same farmers also have indicated neutrality when asked if they had intentions of participating in water conservation practices (Durst et al., 2016). Durst et al.’s (2016) study on farmer and producers’ perceptions on water conservation had similar results in terms of consumer water conservation perceptions to Huang et al. (2015) and Gorham, Lamm, and Rumble (2014) studies.

Many farmers and ranchers understand the need for engaging in water conservation behaviors; however, many are unable to maximize participation in water conservation activities due to a variety of reasons. These reasons range from changing weather patterns, the need to maximize production due to increasing costs and debt service obligations, and/or land tenure issues. Because persuasion theories suggest that the higher the level of information processing, the higher the level of attitude change during a persuasive message (Petty & Cacioppo, 1986), a useful first step in crafting tailored messages that will achieve strategic communication goals is to identify specific message elements or techniques that elicit increased information processing. By identifying such passages that yield increased information processing in response to educational videos that persuade receivers to participate in conservation behaviors, agriculturalists can develop higher quality messaging.

Prior research has addressed the ideas of strategic communications (i.e., targeting audiences and tailoring messages) as an effective means to communicate about water conservation practices with the public. For example, Huang et al. (2016) recommended message tailoring, or developing communication and education programs that are relevant to the specific needs and behavioral patterns of high-water users. Gorham et al. (2014) identified how critical thinking style or the way individual's think about and seek out information had a moderate relationship with water conservation intentions. Similarly, the role of salient and tailored messages to encourage water conservation behaviors has provided evidence that such messaging can encourage individuals to participate in environmentally responsible behavior (Warner, Rumble, Martin, Lamm, & Cantrell 2015). When making information salient for consumers to participate in behaviors, or frame a message, communicators select aspects of information "to promote a particular problem, definition, casual interpretation, moral evaluation, and/or treatment recommendation" (Entman, 1993, p. 52).

Message features or attributes refer to aspects of communication that produce a greater effect on affective, cognitive, and behavioral processes that impact persuasion (Shen & Bigsby, 2013). The goal of the persuasive messages is to have the receiver think and behave in a specific way or to find information as truthful (Petty & Cacioppo, 1986; Shen & Bigsby, 2013). Specifically, the aspects of message construction have influenced how receivers find information to be true (Shen & Bigsby, 2013; Warner et al., 2015). Within persuasion literature, researchers have found two types of message features impacting decision-making are statistical evidence, which "presents statistics such as frequencies and percentages to support the claim, or testimonial evidence, which "uses a person's personal experience, eye-witness account or personal opinion to support a claim" (Shen & Bigsby, 2013, p. 22). In Allen and Preiss' (1977) meta-analysis, statistical evidence has been found to be more persuasive than testimonial evidence. However, Warner et al. (2015) discovered messages resonating with an individual's social and personal beliefs were more effective in persuading someone to participate in conservation behaviors in consumer-based research with water conservation messages.

Studies have shown how tailored message frames are crucial to achieving strategic communication goals to encourage an audience segment to engage in water conservation (Gorham et al., 2014; Huang et al., 2016; Warner et al., 2015). However, these studies only allow the researchers to understand an individual's overall or global response to a communication material after they have viewed it, and they disregard the dynamic nature of messages or how they unfold over time. Moreover, post-test assessment fails to reveal the dynamic nature of individual response to various parts of a message over time. Theories of information processing suggest higher levels of information processing lead to higher levels of change in attitude and behavioral intent (Petty & Cacioppo, 1986). Drawing upon theories of information processing during message consumption, this study employs a psychophysiological, or a biometric measurement tool (e.g., heartrate as a proxy for cognitive resource allocation), to understand how specific message attributes or components of a message create higher levels of information processing in response to water conservation videos.

Conceptual Framework

In order for a communications message to have an effect on attitude or behavioral intention, it must be processed by an individual (Lang & Ewoldsen, 2010). Information processing has been conceptualized as the idea of how an individual attends to, makes sense of, and remembers information contained in a message (Geiger & Newhagen, 1993; Lang, 2000). In theories regarding information processing of persuasive messages to encourage behaviors, such as the Elaboration Likelihood Model, higher central-route processing refers to higher levels of information processing of a persuasive message (Petty & Cacioppo, 1986). Such central processing of a message is privileged, as it leads to stronger memory for the message, attitude, and behavior change. As researchers look to understanding what parts of water conservation messages create more significant changes in attitude and behavior, researchers must determine what cognitive processes occurred that resulted in the desired attitude change (Lang & Ewoldsen, 2010).

During message consumption, information processing is automatic, and the individual will undergo sub-conscious cognitive and emotional processing of messages (Lang, 2000; Potter & Bolls, 2012). The use of psychophysiological measures of viewer response allows researchers to investigate the sub-conscious processing by continuously monitoring and recording “changes in the activity of physiological system caused by psychological input” (Ravaja, 2004, p. 193). This approach differs from typical measurement approaches that rely on qualitative or quantitative self-report in that such responses are subject to various biases and represent a less “pure” measurement of how viewers automatically respond during message consumption. Put another way, self-report data are viewed as “offline” responses; whereas, psychophysiological measures are “online” responses collected during the act of message consumption. Moreover, specific responses may be pinpointed to precise elements within the message to reveal key message components. Theoretical advances in cognitive psychology and media psychology have provided connections to yoke specific types of physiological response with various constructs of cognitive resource allocation (i.e. attention) and their impact on information processing (Potter & Bolls, 2012; Ravaja, 2004).

Attention. Attention to an external stimulus such as a media message has been conceptualized as the “allocation of limited mental resources to a specific stimuli” (Ravaja, 2004, p. 197). Within psychophysiology, this increase in resource allocation or attention is indexed by cardiac deceleration, or a decrease in heart rate (Potter & Bolls, 2012). Furthermore, this allocation of cognitive resources may occur both in a controlled and uncontrolled fashion. For example, uncontrolled responses may be “orienting responses” to novel stimuli or the introduction of something in one’s sensory environment. Within media messages, such responses may be elicited by structural elements such as cuts, edits, or the introduction of onscreen graphics (Lang, Potter, Bolls, & Kawahara, 1999; Lang, Potter, & Grabe, 2003). In contrast, controlled attention allocation may result when viewers find information particularly salient or high in motivational relevance (Ravaja, 2004). Additionally, these measures may provide evidence of attention allocation that is complementary, and even sometimes, contradictory to self-report data (Ravaja, 2004). In both types of response, the individual prepares for greater information uptake, and these increases in attention allocation have been shown to relate to increased memory for elements of a message (Bolls, Muehling, & Yoon, 2003).

By continuously tracking these measures of viewers’ allocation of resources to a message, researchers can empirically examine processing of information without relying on self-report (Ravaja, 2004). Furthermore, these psychophysiological measures have the unique ability to detect changes in information processing throughout the duration of media consumption and allows researchers to understand how processing changes over time (Potter & Bolls, 2012). Lastly, measurement of resource allocation through psychophysiological measures allows comparisons with more traditional self-report measures to reveal consistencies or discrepancies between the two. Sometimes, By adopting these tools to understand what elements of a message elicit increased attention within specific audiences, agricultural educators and communicators can develop messages targeted to increasing information processing to influence behavior intentions and attitude change.

Purpose and Research Questions

Supporting Research Priority 7 of the AAAE National Research Agenda (Roberts, Harder, & Brashears, 2016), the goal of this study was to employ an innovative measurement approach—the use of psychophysiology as a transdisciplinary approach to solving the complex problem of sustainable water management—to determine what message attributes or components elicit increased information processing during exposure to two water conservation videos. To fulfill the purpose, the following research questions were addressed:

> RQ_1: What were the differences between the participant's cognitive resource allocation between the two videos?
>
> RQ_2: What message attributes created higher levels of cognitive resource allocation in the scientific evidence and testimonial videos?
>
> RQ_3: What were the differences in self-reported message elaboration between the two videos?

Methods

Design

To address these research questions, an experiment was conducted where participants viewed two videos focusing on water, drought, and agriculture while the psychophysiological measure of heart rate for cognitive resource allocation was continuously recorded. A 2 (message appeal: testimonial vs. scientific evidence) X 80 (3-second time periods) within-subjects design was used to evaluate the role of information processing during stimulus exposure in a laboratory setting. Within this research approach, within-subjects designs are frequently employed to control for individual differences in resting or baseline heart rate (Potter & Bolls, 2014).

Independent Variable

Treatment Variable. The persuasive strategy employed by a message has the potential to elicit differences in message elaboration by inviting either central or peripheral processing of message content (Shen & Bigsby, 2013). Based upon prior research, two messages employing distinct message appeals while discussing water and drought impacts in the Southwestern United States were employed. One video was a human-interest or testimonial video outlining farmer/rancher personal experience, or testimonial evidence, of the effect of drought in an area geographically proximal to the research location. The second treatment was a scientific evidence-based video focused on presentation of statistics and percentages to conserve water. Both videos were edited to be four minutes in duration. Presentation order of the videos was counterbalanced across participants to guard against order effects (Ary, Jacobs, & Sorenson, & Walker, 2013).

Dependent Variable

Resource Allocation. Attention has been conceptualized as greater allocation of cognitive resources to encoding a message into the participant's memory. It has been operationalized through cardiac deceleration (i.e., lower heart rate) via online measurement during message consumption (Potter & Bolls, 2012). Throughout an orienting response to a specific message attribute, Ravaja (2004) explains, “increased cardiac parasympathetic activity causes the heart to slow down and is associated with information intake, attention, and approach behavior” (p. 201).

To answer research question one and two, heart rate was recorded as time between R-spikes in the QRS pattern in electrocardiogram waveform and transformed for ease of interpretation into heart rate in beats per minute. Heart rate data were resampled offline into 80 three-second time intervals. Lastly, heart rate values were transformed into change scores from a baseline or resting state to control for individual differences in physiological response. Baseline measures of heart rate were assessed for five seconds before onset of each message.

Elaboration. Cognitive elaboration of a message’s features occur when individuals think critically and evaluates the content and features of a stimulus. In order to determine the level of elaboration on each message, or research question three, the researchers utilized Reynolds’ (1997) self-report elaboration scale. After viewing each message, participants were asked to indicate their level of agreement with 12 items that were paired with 5-point Likert-type response scales (1 = *Strongly Disagree*, 5 = *Strongly Agree*). Sample items included “While watching I was exerting a good deal of cognitive effort” and “While watching the message, I was deep in thought about the message.” Responses were internally consistent (Cronbach’s $\alpha = .84$), and they were summed and averaged to create an elaboration measure in response to each message.

Participants

For the purpose of this study, twenty male beginning farmers and ranchers from the Lubbock, Texas area were recruited for this study. Participants were provided a $100 gift card to Tractor Supply Company as an incentive. The beginning farmers and ranchers were selected as individuals who had recently completed, or were close to completing, a college degree program in an agricultural college at a large university. Physiology data were deleted for three participants due to high levels of noise artifacts from participant movement, yielding a sample of 17 for analysis.

Procedure and Protocol

After participants signed Texas Tech University Institutional Review Board approved consent forms, the psychophysiological measures of heart rate were collected via a bioamplifier module data acquisition system connected to a desktop computer running AcqKnowledge version 4.21. The AcqKnowledge software allows researchers to control the data acquisition process and extract the data offline after collection. The participants were seated in a comfortable chair locked in a reclining position and were asked to view two stimulus clips on a 40-inch flat panel television monitor approximately four feet away. Instructions and stimuli were presented on the television monitor through MediaLab stimulus presentation software. Heart rate, the physiological indicator of cognitive resource allocation, was recorded from the electrocardiogram (ECG) waveform obtained from the AcqKnowledge software during exposure to each stimulus. To record ECG, three AG/AGCL electrodes were placed on the participants (ground electrode placed on the wrist, positive and negative referenced recording electrodes placed on the forearms), and signals from the electrodes were transmitted to ECG100C bioamplifier module, and then to the data collection program (AcqKnoweledge).

Data Analysis

To perform data analysis, participant data were converted into change scores for each psychophysiological measure (Potter & Bolls, 2012). Calculations were computed by subtracting heart rate from the mean baseline. Baseline data were collected 5 seconds prior to each stimulus to represent the participant's resting heart rate prior to message onset. Data were resampled offline into 3-second segments. A repeated measures ANOVA was conducted in SPSS version 22.0 to answer RQ1. To determine the message attributes that created higher levels of cognitive resource allocation (RQ2), the researchers created an average for each participant response per 3-second segment. Next, z-score computations were completed in SPSS version 22.0 and were plotted on a graph in Excel. Potter and Bolls (2012) discussed cognitive resource allocation occurs when heart rate decreases. Visual inspections of peaks more than 1.0 standard deviations below the baseline identified attention allocation to message attributes over time. Afterward, the researchers conducted a repeated measures ANOVA to determine the significance of the changes in heart rate (RQ2). A paired sample t-tests was also used to determine differences in self-perceived elaboration between the treatment videos (RQ3).

Results

RQ1: What were the differences between participants' cognitive resource allocation between the two videos?

This research question sought to identify if any difference appeared in overall resource allocation between the two videos. A repeated-measures ANOVA was conducted where message type (2) and time period (80) served as within-subjects factors and heartrate change from baseline served as the repeated dependent measure. This test failed to find an overall effect of message type, F (1, 16) = .20, $p > .05$. Thus, no global difference was observed in terms of resource allocation.

RQ2: What message attributes created higher levels of cognitive resource allocation?

In this research question, the researchers sought to identify moments within the message that led to increased cognitive resource allocation. To identify these moments, mean heart rate change scores for each time segment were standardized to z-scores. These z-scores were then plotted and visually inspected to identify unique moments within each message when mean standardized heart rate change scores fell below 1.0 standard deviation from the series mean of zero. As such, these represent periods indicative of increased resource allocation (i.e., decreases in heart rate).

Scientific Evidence Video

Visual inspection of the standardized heart rate change data provided evidence of five critical moments within the scientific evidence video where heart rate deceleration suggested increased levels of cognitive resource allocation (see Figure 1).

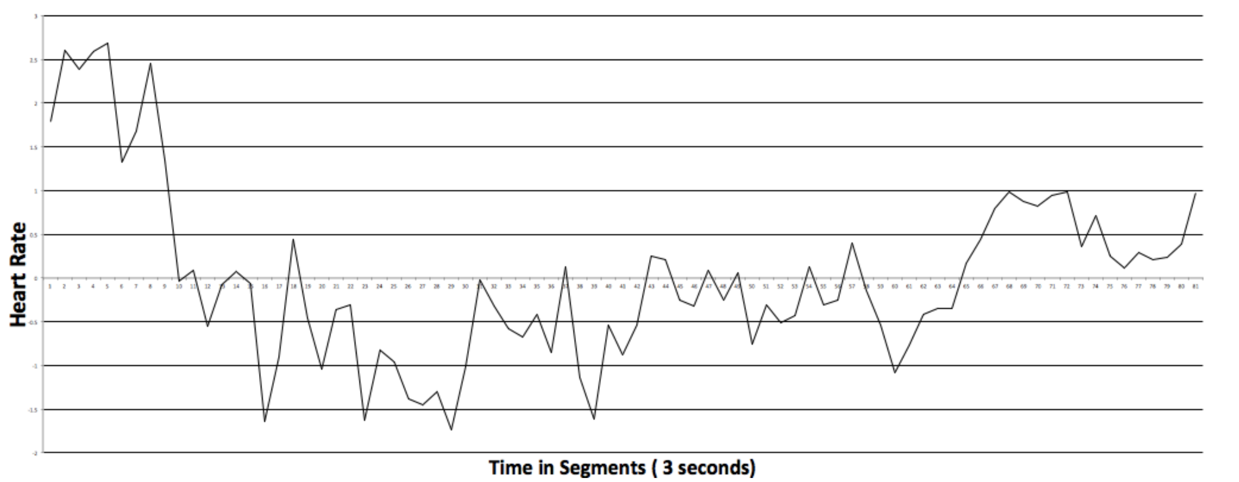
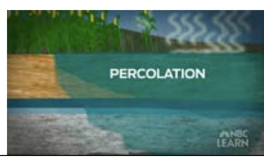


Figure 1. Standardized heart rate change over time during scientific evidence video.

Table 1 provides a description of the video during the critical moments. To verify the decrease in heart rate change during each of these segments, data for each period were subjected to repeated-measures ANOVAs where time period served as the within-subjects variable and the change score measurements for each specified period served as the repeated dependent measure. The first test examining heart rate deceleration during time segment 16 found a significant decrease in heart rate, F (1, 16) = 19.99, p < .001, η^2_p = .56. Similarly, a critical moment occurred at segment 23 to 30 which discussed agricultural irrigation had a statistically significant difference from baseline, F (8, 128) = 6.67, p < .001, η^2_p = .29. Third, the discussion on the period of drought for segment 38-41 also led to a statistically significant decrease in heart rate from baseline, F (4, 64) = 9.87, p < .001, η^2_p = .38. Lastly, the animated graphic explaining aquifer recharge at time period 60 also elicited a significant decrease in heart rate from baseline, F (1, 16) = 20.18, p < .001, η^2_p = .56. In sum, these passages all represent moments within the four-minute video where participants exhibited significant increases in allocation of cognitive resources to the message.

Table 1

Description of Scientific Evidence Video Critical Moments

Segment	Imagery	Narration
16		"The Ogallala Aquifer, also known as the High Plains Aquifer, is a ground water storage reservoir that stretches 174,000 mi^2 underneath parts of eight states from South Dakota to Texas."
20		"Today's irrigation technologies is able to pump out water that has been in the aquifer for hundred for thousands of years in just a matter of minutes."
23-30		"A rate that far outpaces the rate that nature can replenish it - threatening the over sustainability of the aquifer and for agriculture."
38-41		"This area as well as others, you are now in a period of exceptional drought."
60		"In Western Kansas, it can take one year to recharge the aquifer by less than an inch."

Note: Segment numbers refer to three-second segments within each video.

Testimonial Video

A similar visual inspection of the data provided evidence of three moments within the testimonial video where heart rate deceleration suggested significant levels of cognitive resource allocation (standardized heart rate change scores more than 1.0 standard deviations away below the series mean).

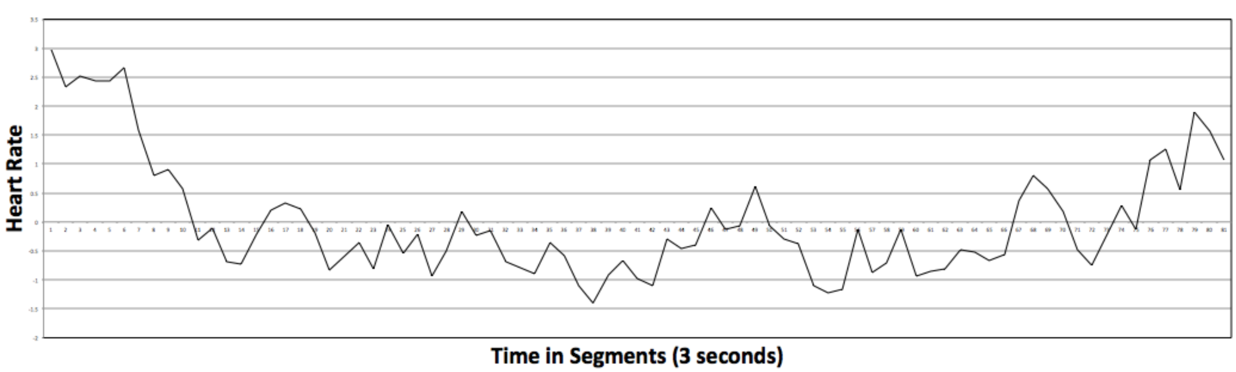
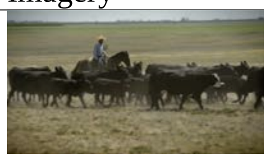


Figure 2. Standardized heart rate change over time during testimonial video.

Table 2 provides a description of the video during the critical moments. A repeated-measures ANOVA examining heart rate change from baseline within those segments revealed that scores were significantly lower during that period, F (4, 64) = 11.64, p < .001, η^2_p = .42. Next, a discussion of corn not doing well in the heat within segments 41-42 likewise elicited significant decrease in heart rate from baseline, F (2, 32) = 10.31, p < .001, η^2_p = .39. The third and final critical moment was within segments 53-55, F (3, 48) = 10.62, p < .001, η^2_p =.40. In sum, the testimonial video elicited fewer passages where participants exhibited increased attention allocation.

Table 2
Description of Testimonial Video Critical Moments

Segment	Imagery	Narration
37-39		"We wear two hats. We use our farming hat to raise the feed source, and we use our cowboy or cattleman's hat to raise our cattle on our pasture land."
41-42		"Corn does not do well in the heat. So that's a problem right there."
53-55		"Cattle numbers are down. Cow Herds are gong down. Thus, we are losing Cargill's, packing plants, there aren't enough cattle to keep them open."

Note: Segment Numbers refer to three-second segments of video

RQ3: What were the differences in self-reported message elaboration between the two videos?

To answer the final research question, a paired-samples t test was conducted to compare responses to the self-report measure of message elaboration in response to the two videos. That test revealed that the difference in message elaboration approached statistical significance, $t(20) = 1.84$, p = .86, Cohen's d = .41. Participants reported greater elaboration in response to the testimonial message (M = 4.28, SD = .41) compared to the scientific evidence message (M = 4.10, SD = .30). Although the test statistic did not reach the level of statistical significance, the associated effect size suggests that the observed effect was moderate. Thus, the failure to reach significance may be a function of the small sample of beginning farmers and ranchers employed in the design (Hoyle, 1999).

Discussion and Recommendation

This study assessed the role of information processing as a function of message type. The researchers examined the influence of two message types (scientific evidence and testimonial) of water conservation videos on the physiological process of attention and the self- report measure of elaboration. The results of this study indicated the video providing greater levels of scientific evidence had a higher level of cognitive resource allocation because the scientific video had more frequent heart rate deceleration during critical moments throughout the video.

Specifically, research question two explored which facets of the two videos elicited attention. The results for the scientific evidence video indicated media features, such as cuts, edits or the introduction of on screen graphics, elicited orienting responses that result in increased attention allocation (Lang et al., 1999; Lang et al., 2003). Similarly, orienting responses were documented with message features depicting on-screen graphics in the scientific evidence video. Additionally, in segments 13 and 77, information included scientists referring to statistics depicting the impact of drought and the necessity for water conservation to elicit an attention response.

Although the scientific evidence video provided evidence of higher attention allocation during exposure to specific video features, the testimonial video caused participants to allocate attention to information related to their current occupation. For example, in the testimonial video, the participants had an orienting response, as observed by a decreased heart rate, when the narrator discussed issues regarding management practices, temperature impacting cattle efficiency, and the loss of jobs in production plants. As discussed by Warner et al. (2015), issues impacting the participants personally have elicited a higher level of persuasive effectiveness, or a higher level of information processing, due to messages with personal or social congruence. The researchers concluded visual media pertaining to life on the farm resulted in personal similarity, which caused an attentional response.

Global responses to the messages were reported through self-report elaboration scale used in research question three. Although the paired samples *t* test was approaching significance, the moderate effect size indicated the participants had a greater elaboration during the testimonial message. This result suggested cognitive processing was higher for the testimonial; however, psychological measures provided evidence that the scientific message invited more frequent resource allocation. Perhaps this finding was a result of the scientific message that was more demanding of limited resources, while the testimonial invited more rumination with easier to process information. This finding is representative of online (i.e., physiological and biometric measurements) versus offline (i.e., self report) measures of response. The offline response is a more contemplative response that references a more cumulative representation of how the individual provided cognitive resource allocation; whereas, the online response is raw and immediate to the specific message features in the videos.

Because message frames are crucial to strategic communication goals (Gorham et al. 2014; Huang et al., 2016; Warner et al., 2015), understanding which aspects of message construction and the message appeal that impact information processing are crucial to improving farmer and rancher water conservation practices. Not only does information processing lead to memory recall, but it also leads to higher levels of attitude formation and behavioral intention in the case of persuasive messaging (Petty & Cacioppo, 1986). The results of this study suggest communication with farmers and ranchers about water conservation may be different than strategic communication to target the general public about water conservation.

When targeting farmers and/or ranchers with messages, educators and communicators should focus on incorporating scientific evidence to promote information processing. The results of this study indicated farmers and ranchers allocate attention via cognitive resource allocation to scientific evidence. At the same time, inferences to personal relevance and messages congruent with aspects of farming resulted in increased cognitive resource allocation provided minimal evidence to attention allocation. Extension, communications practitioners, and faculty should use this information to apply and combine scientific evidence with a small amount of discussion of testimonial content to improve information processing to partake in water conservation behaviors. Similarly, within an educational setting, this study's results show educators and communicators should include more emphasis on statistics and facts related to reasons to implement water conservation tactics embedded within video graphics into curriculum. For example, the findings suggested attention allocation to on screen graphics representing facts and statistics as well as references to the participants' current occupation and community news elicited a higher attention response. Therefore, when creating messages and education programming, practitioners should implement these types of elements into their educational and communication materials.

Further, research should explore the impact of message features in information processing and provide connections to attitude or behavioral intentions. As shown in this study, physiological measures provide agricultural social sciences with the ability to pinpoint how specific message features impact message processing. This knowledge should be used in experimental methods to explore how facets of information such as topic, message features, and number of arguments, effect how individual's perceive information, process information, and develop an attitude toward such information. The authors suggest future research in the realm of biometric or psychophysiological analysis should be continued in the agricultural education, agricultural communications, and Extension settings. For example, future research should continue to explore the connections between information processing and heart rate. Additionally, biometric research may also be used to connect emotional arousal, or an emotional response, to information processing and attention. Additionally, within the traditional classroom setting, the researchers propose understanding how manipulated lesson plans and teaching strategies relate to attentional responses from students.

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Impact of Agricultural Issues Courses on Undergraduate Students' Opinion Leadership

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Employees and academics have recognized the need for postsecondary students in colleges of agriculture to be knowledgeable about issues facing the agriculture industry. In addition, students need to demonstrate sought-after leadership and communication skills. One of the ways agricultural educators are able to train the next generation of opinion leaders is through agricultural issues courses. The purpose of this study was to examine the impact these courses had on undergraduate students' self-perceived ability to serve as opinion leaders. The researchers conducted a pre-/posttest research design with a sample of undergraduate students at three universities who were enrolled in an agricultural issues course to determine the level of opinion leadership in nine agricultural and natural resource issue areas. The respondents' perceived levels of opinion leadership overall and for each of the nine specific agricultural issues had positive changes at the end of the courses. Overall, the results of this study suggest that an agricultural issues course can positively change self-perceived levels of opinion leadership and lead to a more prepared future agricultural workforce. However, the self-perceived level of opinion leadership reported at the conclusion of the course was still not very high. Recommendations for practice and future research are provided.

Introduction

The food, agricultural, natural resources, and human sciences disciplines consistently address a variety of significant and often controversial issues because the disciplines consist of a multitude of complexly intertwined societal functions — food, feed, fuel, fiber, and fun (recreational land use) — all of which "have to be fulfilled, simultaneously, in a framework in which inputs (soil, water, air) are increasingly tight" (Aerts, De Tavernier, & Lips, 2009, p. 331). In 2013, former Deputy Secretary of Agriculture Kathleen Merrigan provided the top 10 non-farm-bill issues currently impacting agriculture, which included immigration reform, tax reform, food safety, foreign-trade agreements, genetically modified organisms (GMOs) labeling, and aging farmer demographic (Thompson, 2013). On its Issues webpage, the House Committee on Agriculture (n.d.) lists a variety of issues, including farm economy, conservation, nutrition, food transparency, biotechnology, and trade.

More than a decade ago, Doerfert and Miller (2006) conducted a content analysis of guest speakers in a graduate-level agricultural issues course and identified five issues these experts in agriculture consistently referenced: 1) environmental concerns, 2) agricultural water management, 3) biotechnology, 4) rural development, and 5) globalization/trade. Doerfert and Miller encouraged educators to take these issues into consideration as they "prepare new agricultural communications graduates with the knowledge and skills to effectively enter the workforce" (p. 28). One of the specific recommendations was to have undergraduate and graduate students complete courses in agricultural sciences that address current issues (Doerfert & Miller, 2006). A recent study of 172 course offerings in agricultural communication programs nationwide classified eight as “issues courses…with a focus on specific or current issues such as the environment and debates about science” (Cannon, Specht, & Buck, 2016, p. 11).

Leadership and communication skills have proved to be more important than ever within the agriculture and natural resource industry, as debates over agricultural practices increase (Rumble et al., 2016). Organizations are actively seeking college of agriculture graduates who possess compelling leadership and communication skills (Allen, Ricketts, & Priest, 2007; Crawford, Lang, Fink, Dalton, & Fielitz, 2011). One of the identified priority areas in the American Association for Agricultural Education’s *National Research Agenda* was to develop a “sufficient scientific and professional workforce that addresses the challenges of the 21st century” (Roberts, Harder, and Brashears, 2016, p. 10). Investigating the models, methods, and programs that are most effective in preparing individuals to enter the global agriculture and natural resource field is presented as an important research question in the agricultural education field (Roberts et al., 2016). Research has shown individuals working in community-facing, non-formal positions have the ability to persuade others in their social networks through opinion leadership (Dalrymple, Shaw, & Brossard, 2013; Lamm, Lamm, & Carter, 2015; Lamm, Rumble, Carter, & Lamm, 2016; Rogers, 2003). A large part of opinion leadership is an ability to effectively communicate about the issue being discussed. “Leadership effectiveness depends on our willingness to communicate as well as on developing effective communication skills. Only those who engage in communication can exercise influence” (Hackman & Johnson, 2000, p. 27).

Hackman and Johnson (2000) found communication skills must be developed in three key areas: linking, envisioning, and regulating. “Linking skills include monitoring the environment, creating a trusting climate, and team building. Envisioning involves creating new agendas or visions out of previously existing elements. Regulating involves influencing others” (Hackman & Johnson, 2000, p. 27). Fortunately, agricultural educators and communicators are in a unique position to train the next generation of opinion leaders who are able to build relationships, communicate effectively, and foster understanding between the general public and the agricultural industry (DiBenedetto, Lamm, Lamm, & Myers, 2016; Lamm, Lamm, & Carter, 2015; Roberts, Harder, & Brashears, 2016).

Colleges and universities across the nation responded to the demand for professionals with leadership and communication skills by evaluating and revamping agricultural leadership and issues programs and courses (Strickland, 2011). A primary goal of these courses is to increase undergraduate students’ ability to discuss agricultural and natural resource issues, leading them to become more efficacious as opinion leaders within their realm of influence. The degree to which agricultural issues courses are impacting students’ ability and interest in serving as opinion leaders around agricultural and natural resource issues has gone undocumented in the literature.

Theoretical Framework

Opinion leadership, originally introduced by Lazarsfeld, Berelson, and Guadet (1948), was used as the theoretical framework for this research. The theory of opinion leadership emphasizes the importance of key non-formal leaders (those that are not elected or appointed to a position of power) in communicating information, altering attitudes related to the information being transferred, and changing the way people make decisions about information they receive (Gnambs & Batinic, 2011). Opinion leaders are individuals who have an above average reach, and are the individuals who others rely on to get the most up-to-date information on trends, new ideas, or whose opinions are valued (Rogers, 2003).

An individual's level of opinion leadership varies depending upon the social system being examined (Lazarsfeld et al., 1948). An individual may be regarded as an opinion leader within a specific group because they exhibit the most knowledge about a subject when compared to the other members of the social system. In another group, the same individual may be seen as having only a moderate amount of knowledge about the subject, with other members of the social system exhibiting more, and is not considered an opinion leader (Gnambs & Batinic, 2011).

While important, perceived knowledge level is not the only indicator, or predecessor, of opinion leadership within a group. The power of self-perceived opinion leadership has also been studied. Previous research has found individuals who pay attention to issues, discuss the issue frequently, and believe they are persuasive in convincing others are most likely to be opinion leaders (Katz & Lazerfield, 1955) despite actual knowledge level. When an individual engages in self-efficacious behaviors it helps them draw attention to the particular issue and signals how others should respond; ultimately granting the individual persuasive power as an opinion leader (Nisbet & Kotcher, 2009).

In the realm of agriculture and natural resource issues, Dalrymple et al. (2013) examined the role opinion leaders played in communicating about aquatic invasive species in Wisconsin lakes and the impact opinion leaders had on public engagement in related best management practices. Individuals with high levels of self-efficacy, expressing the characteristics described above, increased the motivations of others to seek out relevant information about invasive species and influenced behaviors. Their study showed opinion leaders expressing a strong sense of self-efficacy were one of the key factors influencing behavior change (Dalrymple et al., 2013) within this specific context area.

Agricultural issues courses are designed to increase the self-efficacy of students related to critical agricultural and natural resource issues. The courses engaged students in a variety of issues impacting the industry, encouraged discussion surrounding these issues, and strived to get students to think critically when forming opinions and making decisions. The students in these courses are primed to become opinion leaders within their current social structures but also as the future workforce that will be guiding the agriculture and natural resource industry.

Purpose and Objectives

The purpose of this study was to examine the impact agricultural issues courses had on undergraduate students' self-perceived ability to serve as opinion leaders within specific agricultural and natural resource issue areas. It was guided by the following objectives:

1. Describe the students enrolled in agricultural issues courses.
2. Identify the students' self-perceived level of opinion leadership within specific agricultural and natural resource issue areas before and after the course.

3. Determine if significant changes in self-perceived opinion leadership occurred while taking an agricultural issues course.

Methods

The population of interest was undergraduate students enrolled in an agricultural issues course. A sample was purposively selected from three universities with these courses that had been taught for more than five consecutive years, to ensure the courses were viewed as an integral part of the students' curriculum. The universities chosen were Colorado State University, Texas Tech University, and the University of Florida. All three universities offered an agricultural issues course during the spring semester in 2016. These courses were similar in that the content introduces students to agricultural issues and instructors encourage in-depth discussions about these topics. Students enrolled in the three courses were most likely from their respective college of agriculture, but enrollment was open to students from other colleges.

A pre-/posttest research design was employed with level of opinion leadership in nine agricultural and natural resource issue areas measured before each course began and then again at the conclusion of the course. The nine issue areas were animal health, biotechnology, climate variability and change, conservation, food safety, food security, invasive species, marketing and trade, and water. These issues were selected as a combination of the U.S. Department of Agriculture's Challenge Areas (USDA, n.d.) and topics addressed in the courses. The students enrolled in the three courses (N = 59) were given the opportunity to complete the pretest and posttest. Twenty-six matched complete pre- and posttests were obtained, with eight from the University of Florida, nine from Texas Tech University, and 10 from Colorado State University. The 44% response rate was due to students enrolling after the first day of the course (when the pretest was administered), students dropping the class during the semester (before the posttest was administered), and students opting out of participation in the study and should be recognized as a limitation. Respondents' gender and college rank were compared to non-respondents using two Chi-squared tests to address non-response bias. No significant differences were found, and the sample was determined to be representative of the students enrolled in the three courses.

Opinion leadership was measured using the Childers (1986) opinion leadership scale, which requires respondents to react to six statements on a five-point semantic differential scale ranging from zero to four. The scale was adapted to include the following statements: (a) during the past six months, how many people have you told about each of the following agriculture and natural resource issues (0 = *told no one*, 4 = *told a lot of people*, (b) in general, how often do you talk to your friends and colleagues about the following agriculture and natural resource issues (0 = *never*, 4 = *very often*), (c) in a discussion about the following agriculture and natural resources issues, which of the following happens most (0 = *your friends tell you about the issue including new developments*, 4 = *you tell your friends about the issue including new developments*), (d) when you talk to your friends and colleagues about agriculture and natural resource issues do you (0 = *give very little information*, 4 = *give a great deal of information*), (e) compared with your circle of friends, how likely are you to be asked about new information regarding each of the following agriculture or natural resources issues (0 = *not at all likely to be asked*, 4 = *very likely to be asked*), and (f) overall, in your discussions with friends and colleagues, regarding each of the following agriculture or natural resources issues are you (0 = *not used as a source of* *advice*, 4 = *often used as a source of advice*). Responses to the statements were averaged to create an overall opinion leadership score.

The six-item scale was used nine times in the pretest and posttest to obtain the perceived level of opinion leadership within all of the specific issue areas of interest, for a total of 54 statements. Within each of the nine issue areas, the stem was altered to be specific to the issue area being measured. An opinion leadership score within each issue area was calculated by taking the average of the six items specific to that area. An overall opinion leadership score was also calculated by taking the average of the responses to all 54 statements. Reliability of the nine issue area specific opinion leadership constructs and the overall opinion leadership scale was measured *post hoc*. All of the indexes were found to be reliable in both the pretest and posttest (Table 1).

Table 1

Agricultural and Natural Resource Issue Opinion Leadership Index Reliability

Issue	Pre α	Post α
Overall Opinion Leadership of Issues	**.93**	**.92**
Animal Health (e.g. animal welfare, animal disease)	.90	.89
Biotechnology (e.g genetically modified organisms)	.93	.92
Climate Variability and Change (e.g. carbon sequestration, greenhouse gas emissions, sea level rise, storm frequency and intensity)	.89	.87
Conservation (e.g. endangered species, land use)	.92	.91
Food safety (e.g. foodborne illnesses)	.97	.94
Food security (e.g. food availability, access, and use)	.92	.93
Invasive species (e.g. plants, fungus, animals not native to a specific location)	.93	.90
Marketing and trade (e.g. imports/exports)	.93	.88
Water (e.g. water quality, water quantity, agricultural water use)	.91	.89

The pretest also included demographic questions addressing race, gender, college rank, and college major. The instruments were reviewed by a panel of experts for content and face validity. The panel of experts included an assistant professor at the University of Florida who specializes in instrument development, an associate professor at Texas Tech University specializing in issues education and agricultural communication, and the director of the Public Issues Education Center] at the University of Florida. Data were analyzed in SPSS 24. Descriptive statistics were used to address the first two objectives and dependent *t*-tests were used to address the third objective.

Results

Description of Students in Agricultural Issues Courses

The 26 students analyzed in the three agricultural issues courses at Colorado State University, Texas Tech University and the University of Florida were all white, non-Hispanic, and between 20-24 years old. Most were female (80.8%). They represented freshman (7.7%), sophomores

(15.4%), juniors (38.5%) and seniors (38.5%). The majority of the students were agricultural education, leadership, and/or communication students (65.4%), with small groups of journalism and media communication majors (18.5%), and agricultural literacy majors (7.7%). There was also one environmental communications major and one natural resource recreation and tourism major.

Self-Perceived Level of Opinion Leadership

The respondents expressed a low overall level of self-perceived opinion leadership (*M* = 1.81, *SD* = .63)) prior to taking the course (Table 2). While mean scores within all nine issue areas were 2.00 or below, the highest mean score was in biotechnology, followed by water and food safety, indicating these were the three areas the respondents were most comfortable communicating about prior to the course.

Table 2
Self-Perceived Level of Opinion Leadership Before and After Taking an Agricultural Issues Course

Issue	Pre *M (SD)*	Post *M (SD)*
Overall Opinion Leadership of Issues	**1.81 (0.63)**	**2.17 (0.70)**
Water (e.g. water quality, water quantity, agricultural water use)	1.99 (0.88)	2.47 (0.89)
Animal Health (e.g. animal welfare, animal disease)	1.91 (0.88)	2.47 (0.83)
Food safety (e.g. foodborne illnesses)	1.99 (1.12)	2.46 (1.00)
Food security (e.g. food availability, access, and use)	1.87 (1.12)	2.31 (1.01)
Conservation (e.g. endangered species, land use)	1.79 (0.92)	2.19 (1.05)
Biotechnology (e.g genetically modified organisms)	2.00 (1.18)	2.15 (1.08)
Climate Variability and Change (e.g. carbon sequestration, greenhouse gas emissions, sea level rise, storm frequency and intensity)	1.72 (0.88)	2.05 (1.09)
Marketing and trade (e.g. imports/exports)	1.73 (1.02)	1.84 (1.18)
Invasive species (e.g. plants, fungus, animals not native to a specific location)	1.15 (0.84)	1.72 (0.94)

Note. 0 = *Low level of opinion leadership*, 4 = *High level of opinion leadership.*

The respondents expressed a low overall level of self-perceived opinion leadership (*M* = 2.17, *SD* = .70) after taking the course, although it was higher than prior to the course (Table 2). The highest levels of opinion leadership expressed after the course were in the water, animal health, and food safety. The issue respondents felt least comfortable discussing, both before and after the course, was invasive species.

Changes While Taking an Agricultural Issues Course

Dependent t-tests were used to determine if there were significant changes in self-perceived levels of opinion leadership while taking an agricultural issues course. There was a positive, significant change in overall level of self-perceived opinion leadership of agricultural and natural resource issues (+.36, *p* = .02). There was also a positive, significant change in six of the nine specific issue areas (Table 3). It is interesting to note the second largest change was in the issue area of invasive species with a +.57 change in the mean score (p = .00). Invasive species was also the issue area the respondents expressed the lowest level of opinion leadership within both before and after the course. The three issue areas where a significant change was not found were climate variability and change, biotechnology, and marketing and trade.

Table 3

Changes in Self-Perceived Level of Opinion Leadership While Taking an Agricultural Issues Course

Issue	*t*	*p*
Overall Opinion Leadership of Issues	**-2.54**	**.02***
Animal Health (e.g. animal welfare, animal disease)	-4.60	.00**
Invasive species (e.g. plants, fungus, animals not native to a specific location)	-2.89	.01**
Food safety (e.g. foodborne illnesses)	-2.80	.01**
Food security (e.g. food availability, access, and use)	-2.62	.02*
Conservation (e.g. endangered species, land use)	-2.34	.03*
Water (e.g. water quality, water quantity, agricultural water use)	-2.33	.03*
Climate Variability and Change (e.g. carbon sequestration, greenhouse gas emissions, sea level rise, storm frequency and intensity)	-1.49	.15
Biotechnology (e.g genetically modified organisms)	-.66	.51
Marketing and trade (e.g. imports/exports)	-.51	.62

Note. $^{**}p < .01$, $^{*}p < .05$.

Conclusions, Implications, & Recommendations

Scholars and industry representatives have recognized the importance of equipping students with the ability to intelligently discuss agricultural issues (Doerfert & Miller, 2006) through the application of exceptional leadership and communication skills (Allen et al., 2007; Crawford et al., 2011). This study examined what impact agricultural issues courses at three universities had on students' perceptions to serve as opinion leaders. The majority of students were majoring in agricultural education, Leadership, and/or Communication areas. Females and upperclassmen (juniors and seniors) comprised the majority of the sample.

Before taking an agricultural issues course, respondents indicated they were most comfortable communicating about biotechnology, followed closely by water and food safety. They were least comfortable communicating about invasive species. While it was not explored in this study, these confidence levels may have to do with the students' awareness of these issues. Biotechnology, water, and food safety are topics they likely hear or read about in other courses or through mediated communication channels. These topics were also commonly mentioned in previous literature (Doerfert & Miller, 2006; House Committee on Agriculture, n.d.; Thompson, 2013). On the contrary, these sources did not mention invasive species as a prominent agricultural issue. This lack of general exposure to the topic may explain respondents' low level of self-perceived opinion leadership regarding this topic. Recognizing that exposure to issues may increase comfort when communicating about the topic, educators should design their courses to expose students to a variety of issues.

The respondents' perceived levels of opinion leadership overall and for each of the nine specific agricultural issues had positive changes at the end of the courses. There was a positive, significant change in the overall opinion leadership score and six of the nine individual issues had positive, significant changes. The greatest area of change was for invasive species, although this topic was still the lowest in self-perceived opinion leadership at the posttest. While respondents indicated they became more confident in their ability to communicate and serve as opinion leaders about this topic, they are still not as confident, regarding this topic when compared to others. The three areas that did not have a significant change – climate change, biotechnology, and marketing and trade – may be due to a number of factors, including respondents' issues awareness and course design.

Overall, the results of this study suggest that an agricultural issues course can positively change self-perceived levels of opinion leadership and lead to a more prepared future agricultural workforce (Roberts et al., 2016). Previous research has found individuals who perceive themselves as opinion leaders are most likely to actually serve as opinion leaders despite actual knowledge levels (Katz & Lazerfield, 1955). While this is a very positive result, the self-perceived level of opinion leadership the respondents reported at the conclusion of the course was still not very high. Perhaps introducing more real life examples, including the use of case studies, could help improve the overall success of these courses in building opinion leadership aspirations as students directly apply the concepts to real life. This research could then serve as a foundation for future studies to further explore how real-life application of agricultural issues in these courses can influence students' self-perceived levels of opinion leadership.

Agricultural educators need to improve undergraduate students' communication and leadership skills to address the expressed needs of employers within the agricultural industry (Allen et al., 2007; Crawford et al., 2011; Rumble et al., 2016). It is important to recognize that opinion leadership is the measurement of non-formal leadership (Lazarsfeld et al., 1948). Upon graduation, students may be taking formal leadership roles; therefore, gaining an understanding of their ability to serve as formal leaders within the agriculture and natural resource industry is also important. Further research could explore how agriculture issue courses influence formal leadership skills as well as opinion leadership.

Being limited to 26 students who completed both the pre- and posttests, the results are not generalizable to a larger student population and should be recognized as a limitation; however, this research offers an exploratory view at the impact of agricultural issues courses. Future research should be undertaken with more students in subsequent semesters. Respondents in this study answered questions regarding nine agricultural issues; however, many other issues exist that were not studied. Future research could also investigate students' self-efficacy in their role as opinion leaders regarding other prominent agricultural issues.

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Predicting Likelihood to Pay Attention to Agriculture-Related Issues in the News with Demographic Characteristics

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The public has more choices than ever when it comes to choosing media, which has led to gaps in knowledge across members of the public. Investigating motivational differences across demographic groups to pay attention to agriculture-related news could address knowledge gaps related to agriculture-related issues. The Elaboration Likelihood Model (ELM) includes motivation as a precursor to attitude change. Past research has indicated the public utilizes the peripheral processing route of the ELM when presented with agriculture-related messages, which leads to weak changes in attitude. The purpose of this research was to explore how demographic characteristics could predict likelihood to pay attention to agriculture-related news issues. A nationwide survey of United States residents indicated that respondents were likely to pay attention to agriculture-related news topics. A regression analysis found the following to be statistically significant predictors for likelihood to pay attention: marital status, geographic region, age, and political beliefs. However, the model accounted for a small amount of variance in likelihood to pay attention. The results from this study illustrate that while U.S. residents possess the motivation to process agriculture-related news, they may be utilizing the peripheral pathway of the ELM due to a lack in ability to process the communication.

Introduction

With the introduction of the internet, social media, and niche news programming, members of the public have the ability to selectively choose what information they do and do not want to hear or read in the media. They also have more media options than ever before (Prior, 2007). Thirty to fifty years ago, members of the public would inadvertently be exposed to a variety of topics and issues in the media while watching the nightly news or listening to the radio (Hopmann, Wonneberger, Shehata, & Hoijer, 2016). However, the public now has expansive media options (Perloff, 2014), which has made it easy for them to ignore information they are not interested in (Hopmann et al., 2016). Selection of certain news content over others has led to gaps in knowledge now that members of the public have the ability to only pay attention to information that matches their own values (Prior, 2007). These differences in media news preferences and political knowledge can result from differing motivations between members of the public (Bennett & Iyengar, 2008; Blekesaune, Elvestad, & Aalberg, 2012; Ksiazek, Malthouse, & Webster, 2010; Prior, 2007).

Motivational differences between members of the public will continue to widen knowledge gaps between highly motivated and lowly motivated individuals (Bennett & Iyenger, 2008; Mutz & Young, 2011; Prior, 2007). In the United States, agriculture is a topic where gaps in public knowledge and awareness are known to exist (Meischen & Trexler, 2003). A small portion of the population is directly involved in agriculture, which makes it difficult for individuals to make informed decisions about issues in agriculture without first seeking information from an outside source (Powell & Agnew, 2011).

Although food is safer today than ever before, members of the public are skeptical about what they are eating and demand higher quality food compared to the past (Verbeke, 2005). Supplying individuals with information alone will not ease skepticism or increase knowledge (de Garidel-Thoron, 2005; Dranove, Kessler, McClellan, & Satterthwaite, 2003; Ruth & Rumble, 2016); information may need to address the values of the public to be effective (Rumble & Irani, 2016; Ruth & Rumble, 2016). Additionally, members of the public will only seek out and process information they are motivated to learn about (Verbeke, 2005). Individuals' traits have been found to influence their ability to process information (Verbeke, 2005), and advertising can become more effective if it segments audiences by their traits (Schmit & Kaiser, 2004). The purpose of this research was to explore the influence of United States residents' demographic characteristics on motivation to pay attention to agriculture-related issues in the news. This study directly aligns with research priority one of the *American Association for Agricultural Education National Research Agenda*: Public and Policy Maker Understanding of Agriculture and Natural Resources (Enns, Martin, & Spielmaker, 2016).

Conceptual Framework

The Elaboration Likelihood Model (ELM) of persuasion guided this research. The model proposed that people will move through one of two cognitive paths to form attitudes after being presented with information (Petty, Brinol, & Priester, 2009). Because not every piece of information individuals are exposed to is relevant or captivating, people will rely on peripheral cues, like source quality and number of arguments, to form attitudes regarding the information. People will not spend time assessing the information carefully or drawing upon past experiences to assess the validity of the information, which is why peripheral cues are able to influence attitude formation. This process is called the peripheral pathway and is associated with weak changes in attitudes that are not predictive of behaviors (Petty et al., 2009). However, when people have the motivation and ability to process the information, they will draw upon past experiences to form attitudes. Motivation to process information includes personal relevance and need for cognition, or need to make sense of information (Cacioppo & Petty, 1982; Petty et al., 2009). Ability to process the information addresses if a person has the knowledge necessary to evaluate the information or if there are too many distractions, whether physical or cognitive, to elaborate upon the information (Petty et al., 2009). Additionally, ability to assess communication is increased over repeated exposure, or repetition, of the same message (Petty et al., 2009). When people possess the ability and motivation to evaluate the message, they move through the central processing pathway. This second pathway is associated with a change in cognition, which leads to attitudes that are resistant to counter-information and are predictive of behavior. Sometimes, people can move through either path and retain their original attitudes if the message process is not operating (Petty et al., 2009).

Historically, research using ELM has found that the public uses a low amount of elaboration when presented with agricultural communication (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Verbeke & Vackier, 2004; Verbeke & Ward, 2006), which is indicative of the peripheral pathway. Additionally, researchers have concluded that a lack of motivation and involvement related to agricultural topics likely led to individuals using the peripheral pathway to process communication (Goodwin, 2013; Morgan & Gramann, 1989; Verbeke & Vackier, 2004). According to the ELM, individuals must be motivated to process information before being concerned with ability to process or what route the individuals will use to move through elaboration (Petty et al., 2009). Because research has already found the public lacks motivation to process agricultural topics, additional research is needed to explore this specific aspect of the ELM.

Demographic Characteristics

Verbeke (2005) proposed that individuals' characteristics can influence motivation to process information. Research has explored specific individual characteristics as they relate to attitude and behaviors regarding a variety of agricultural topics, including food safety, nutrition, animal welfare, and genetically engineered food. Gender, age, income, and education have been areas of interest for research related to how attitudes and behaviors form regarding agricultural topics (Byrd-Bredbenner, Berning, Matin-Biggers, & Quick, 2013; Clark, Stewart, Panzone, Kyriazakis, & Frewer, 2016; Ruth & Rumble, 2016; Satia, Galanko, & Neuhouser, 2005). Clark et al. (2016) concluded that women were more concerned about animal welfare compared to men and held negative attitudes toward conventional farming. The researchers also found members of the public who were younger or had a higher level of education were more likely to be concerned with modern farming practices and aware of animal welfare issues (Clark et al., 2016). Association between income and concern toward animal welfare was found to be highest for low-income and high-income individuals. Research has also concluded that individuals with more liberal political ideologies were more concerned about animal welfare compared to conservatives (Clark et al., 2016; McKendree, Croney, & Widmar, 2014). Results regarding families with children and attitude toward animal welfare were inconclusive (Clark et al., 2016). A separate study regarding animal welfare found that Midwesterners in the United States were not as concerned about livestock compared to other regions (McKendree et al., 2014).

Regarding food safety behaviors, Byrd-Bredbenner et al. (2013) concluded after a detailed literature review that women were much less likely to mishandle their food compared to men. While literature related to animal welfare and nutrition found higher education associated with increased concern toward the topic (Clark et al., 2016; Satia et al., 2005), Byrd-Bredbenner et al. (2013) found that individuals with post-secondary education were actually more likely to mishandle their food. A study by Leal, Ruth, Rumble, and Simmone (2017) supported additional findings from Byrd-Bredbenner et al. (2013) that the youngest and oldest generations of the public were least likely to engage in safe food handling practices.

Researchers have also explored the role of demographics in forming attitudes and risk perceptions regarding genetically engineered food. Similar to other agriculture topics (Clark et al., 2016), researchers found women to hold more negative attitudes toward genetically engineered food compared to men (Lockie, Lawrence, Lyons, & Grice, 2005; Pounds, 2014; Ruth & Rumble, 2016). There has been conflicting literature regarding the influence of age on perceptions of genetically engineered food (Antonopoulou, Papadas, & Targoutzidis, 2009; Ruth & Rumble, 2016), but some literature indicated that younger individuals are more skeptical of the technology (Ruth, Gay, Rumble, & Rodriguez, 2016).

Satia et al. (2005) found that a significantly larger portion of women were reading food nutrition labels compared to men in a sample of African American consumers. Additionally, older individuals and those with higher education levels were more likely to utilize nutrition labels than their counterparts. While Satia et al. (2005) found no association between marriage status and nutritional label use, Flagg, Sen, Kilgore, and Locher (2014) determined that married men participated less in meal preparation compared to divorced, widowed, or single men. Additionally, women in marriages were spending more time preparing and planning meals compared to married men (Flagg et al., 2014).

These differences between demographic groups related to attitudes and behaviors across agricultural and food topics could suggest differences in motivation to process information about the subjects. The literature indicated that some demographics held similar influences across topics (e.g., women being more concerned/holding more negative attitudes about agriculture; Clark et al., 2016; Lockie et al., 2005; Pounds, 2014; Ruth & Rumble, 2016), while other characteristics were inconclusive across topics (e.g., education and age; Antonopoulou et al., 2009; Byrd-Bredbenner et al., 2013; Clark et al., 2016; Ruth et al., 2016; Ruth & Rumble, 2016; Satia et al., 2005). These characteristics have been looked at in separate contexts, but additional research is needed to explore how the demographics characteristics of gender, education level, income, age, political beliefs, marriage status, parental status, and geographic region influence motivation to process agricultural topics.

Purpose & Objectives

The purpose of this study was to determine which demographic characteristics of U.S. residents predicted their likelihood to pay attention to agriculture-related issues in the news. The objectives of this study were to

1) Determine respondents' likelihood to pay attention to agriculture-related issues in the news, and
2) Determine demographic predictors for respondents' likelihood to pay attention to agriculture-related issues in the news.

Methods

To achieve the objectives of this study, a nationally representative quantitative survey of U.S. residents was conducted online through Qualtrics. Qualtrics was also used as a third-party surveying organization to access an online panel of respondents. Non-probability quota sampling was used to ensure respondents were representative of the national population based on sex, race, and Hispanic/Latino status results from the 2010 U.S. Census. Research increasingly uses nonprobability sampling because probability samples that depend on phone and internet samples lack complete coverage and receive poor response rates (Dillman, Smyth, & Christian, 2014). The use of demographic quotas at the beginning of the survey can lessen the effects of bias typically associated with this type of sampling (Baker et al., 2013). Additionally, non-probability sampling has been identified as comparable to, and sometimes better than, using probability sampling (Twyman, 2008; Vavreck & River, 2008). One thousand and ninety-three people started the survey, and there were 524 respondents after filtering out ineligible respondents (i.e., under 18 or not U.S. residents) and incomplete responses.

The study used a researcher-developed instrument. An expert panel consisting of faculty members in colleges of agriculture from three universities reviewed the instrument to help ensure its validity. Their expertise included agricultural communications and evaluation. Cognitive interviews were also conducted with two graduate students to allow individuals not involved in the study to complete the questionnaire and provide feedback on usability of the questionnaire and ability to appropriately respond to the questions.

For issue attention, respondents reported how likely they were to pay attention to five issue topics in the news (agriculture, the environment, food safety, nutrition, and animal welfare) on a five-point scale ranging from 1 = *very unlikely* to 5 = *very likely*, with the option to mark unsure. The post-hoc reliability for the issue attention scale was addressed using Cronbach's alpha, with a resulting reliability of .85. Reliability scores of at least .80 are considered ideal (Norcini, 1999). An index was created for likelihood to pay attention to agriculture-related issues by summating the mean for each topic and dividing by five. Real limits were defined to aid in the interpretation of the results (Sheskin, 2004) and were as follows: 1.00 – 1.49 = *very unlikely*, 1.50 – 2.49 = *unlikely*, 2.50 – 3.49 = *neither likely nor unlikely*, 3.50 – 4.49 = *likely*, 4.50 – 5.00 = *very likely*.

Respondents also provided their marital status, age, if they were the parent or guardian of any children younger than 18, their gender, highest level of completed education, household income, state, and their political beliefs on seven-point scale ranging from 1 = *very liberal* to 7 = *very conservative*. State was recoded into four regions as classified by the U.S. Census Bureau. For marital status, respondents were able to report being single, married, divorced, separated, widowed, or other. Responses were recoded for regression so that all non-married responses were classified as one option. A slight majority of respondents were married, so merging non-married responses provided a more even comparison group.

The questions for this study were part of a larger instrument that also assessed perceptions of organizations that communicated about agricultural and natural resources issues. Results for the other sections of the instrument are reported in separate publications.

Descriptive statistics were used to describe respondents' characteristics and respondents' level of attention for agricultural and environmental issues. Linear regression was used to assess demographic predictors of respondents' level of attention to agricultural and environmental issues. More information will be provided in the results related to the linear regression analysis.

Results

The mean age of respondents was 44.5 (SD = 12.2), ranging from 18 to 79. Respondents were 50% male and 50% female. Seventeen percent were Hispanic. The majority of respondents were White (77.5%), followed by Black or African-American (13.9%), Asian (5.9%), American Indian or Alaska Native (2.9%), and 2.9% indicated other as their race. About half of respondents (51.0%) were married, and 35.1% of all respondents were parents to a child under the age of 18. Yearly household of respondents were as follows: 20.0% were less than $25,000, 26.7% were between $25,000 and $49,999, 32.6% were between $50,000 and $99,999, 20.7% were $100,000 or more. The largest group of respondents was from the South (31.9%), followed by the West (29.0%), Northeast (20.6%), Midwest (17.6%), and Pacific (1.0%). The Pacific only includes Hawaii and Alaska, which is the reason for the lower number compared to other regions. Respondents' highest levels of education were 1.7% with less than high school degree or GED, 16.0% with a high school degree or GED, 23.5% with some college credit but no degree, 13.5% with a two-year degree, 29.6% with a four-year degree, and 14.7% with a graduate or professional degree. On a seven-point scale ranging from 1 = *Very Liberal* to 7 = *Very Conservative*, the mean of respondents' political beliefs was 3.77 (*SD* = 1.61).

Objective 1: Likelihood to Pay Attention to Agriculture-Related Issues in the News

Table 1 shows respondents' likelihood to pay attention to agriculture-related issues in the news. The grand mean for all of the issues was 4.10, indicating respondents believed they were likely to pay attention to agriculture-related issues in the news. While there were differences between topics, respondents' means indicated they were likely to pay attention to each topic.

Table 1

Respondents' likelihood to pay attention to agriculture-related issues in the news

Issue	*M* (*SD*)
Agriculture	3.91 (0.96)
Animal Welfare	3.99 (1.03)
Environment	4.12 (0.97)
Nutrition	4.15 (0.89)
Food Safety	4.37 (0.83)
Grand Mean	4.10 (0.74)

Note. Scale ranged from 1 = *very unlikely* to 5 = *very likely*.

Objective 2: Demographic Predictors of Likelihood to Pay Attention to Agriculture-Related Issues in the News

Initially, a backward stepwise regression was run to minimize suppressor effects that can result from stepwise regression (Field, 2013). Based on results from previous research, the variables included in the first model in the stepwise regression included age, gender, the Pacific region, the Northeast region, the Midwest region, the Western region, marriage status, political beliefs, education level, parent of younger than 18, and household income. The Pacific and Western regions were combined due to the low number of respondents in the Pacific region, which only includes Alaska and Hawaii. The Southern region was not included because it had the largest number of respondents and was used as the control group (Field, 2013).

The stepwise regression produced six models, excluding a variable each iteration. The following are the results for each model: Model 1 was R^2 = .085, Model 2 was R^2 = .085 (ΔR^2 = .000) after excluding highest level of education, Model 3 was R^2 = .084 (ΔR^2 = -.001) after excluding the combined West and Pacific regions, Model 4 was R^2 = .082 (ΔR^2 = -.003) after excluding parents/guardians of children younger than 18, Model 5 was R^2 = .078 (ΔR^2 = -.004) after excluding gender, and Model 6 was R^2 = .073 (ΔR^2 = -.005) after excluding household income. The final iteration included age, the Northeast region, the Midwest region, marriage status, and political beliefs. Because the stepwise analysis included only some of the regions, forced entry analysis was run to include all of the variables from the final iteration of the stepwise analysis, plus the Western and Pacific regions variable. Table 2 shows the results of the final model.

The model was statistically significant (F (6, 495) = 6.553, $p < .001$); however, the model only accounted for 7.4% of the variance in likelihood to pay attention to agriculture-related issues in the news ($R^2 = .074$). Marital status was a significant predictor of likelihood to pay attention, and married respondents were predicted to be less likely to pay attention to agricultural and environmental issues compared to non-married respondents. Additionally, the political belief of respondents' predicted level of attention; for every one-point increase toward very conservative, there was a .085 decrease in attention. Midwestern respondents were also found to be less likely to pay attention to agricultural and environmental issues compared to Southern respondents. The final significant predictor of attention was age, and as age increased by one-point, attention was predicted to increase by .008 points.

Table 2

Linear model of predictors of likelihood to pay attention to agriculture-related issues in the news.

Predictor	*b* (CI)	*SE B*	β	*p*
Constant	4.395 (4.027, 4.762)	.187		.000
Marital Status	-0.175 (-0.301, -0.049)	.064	-.118	.007*
Political beliefs	-0.085 (-0.125, -0.045)	.020	-.184	.000*
NE Region	-0.135 (-0.316, 0.046)	.092	-.075	.142
MW Region	-0.217 (-0.403, -0.030)	.095	-.112	.023*
W & P Region	0.045 (.0.117, 0.207)	.083	.028	.583
Age	0.008 (0.002, 0.013)	.003	.124	.005*

Note. $R^2 = .074$ for the model.
*$p < .05$.

After the final regression model was developed, post-hoc analysis of individual demographic factors was run using the Bonferroni correction to control the familywise error rate (Field, 2013). To be statistically significant, the corrected significance level threshold was .0125. There were no statistically significant differences in likelihood to pay attention based on the factors of age ($r = .11$, $p = .014$) and geographic regions (F (3, 500) = 2.198, $p = .087$). While age and geographic region were statistically significant components of the model, they were not statistically significant on their own as predictors of likelihood to pay attention to agriculture-related issues in the news. There was a statistically significant difference between married and non-married respondents on likelihood to pay attention to issues in the news ($t = 2.748$, $p = .006$). Married respondents ($M = 4.18$, $SD = 0.73$) were more likely to pay attention than non-married respondents ($M = 4.01$, $SD = 0.74$). Cohen's d was .23, indicating a small effect size (Field, 2013). There was also a statistically significant relationship between issue attention and political beliefs ($r = -.163$, $p < .001$). This indicated that liberal respondents were more likely to pay attention to agriculture-related issues in the news than conservative respondents, though it was a low correlation using Davis's conventions (as cited in Miller, 1994).

Conclusions

The purpose of this research was to explore how likely individuals were to pay attention to agriculture-related issues in the news and how demographics influenced attention. The results from this study can be used to aid agricultural communicators and Extension personnel in developing communication in the future. The respondents reported they were likely to pay attention to agriculture, animal welfare, environment, nutrition, and food safety issues in the news. While respondents indicated they were most likely to pay attention to food safety issues, the large standard deviation scores for each topic represent little practical differences between the issues.

This research conflicted with previous literature that concluded members of the public lacked motivation to process agricultural messages (Goodwin, 2013; Morgan & Gramann, 1989; Verbeke & Vackier, 2004). Because respondents were likely to pay attention to each of the individual topics, and the grand mean supported they were likely to pay attention to agriculture-related issues in the news, they likely possessed the motivation to elaborate upon the issue (Petty et al., 2009). However, research has indicated that the peripheral pathway is used by the public when reading agricultural messages (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Verbeke & Vackier, 2004; Verbeke & Ward, 2006). Members of the public may not be able to process messages using the central processing route due to a lack of ability to process the communication (Petty et al., 2009). Inability to process the communication may stem from a lack of knowledge and/or experience with agricultural topics, too many distractions presented with the message, or not enough repetition of the message for the individual to elaborate (Petty et al., 2009). Another explanation for the inconsistency in the findings is that the survey measured behavioral intent to pay attention to the messages in the news and not actual behavior.

The final regression model for how demographic characteristics predicted likelihood to pay attention to agricultural and environmental issues in the news was statistically significant; however, the model accounted for a low amount of variance and is not useful for practical applications. The predictors in the model did support prior research that region (McKendree et al., 2014), age (Antonopoulou et al., 2009; Byrd-Bredbenner et al., 2016; Clark et al., 2016; Leal et al., 2016; Ruth et al., 2016; Ruth & Rumble, 2016; Satia et al., 2016), marital status (Flagg et al., 2014), and political beliefs (Clark et al., 2016; McKendree et al., 2014) were predictive of attention level. Like the small R^2 value of the model, the small effect size of each of the predictors provide few practical applications. Post-hoc tests on individual demographics yielded similar results, except there were no differences in attention across age or region. Because these were statistically significant predictors in the regression, age and region characteristics likely have an interaction with the other demographic characteristics when predicting likeliness to pay attention to agriculture-related news.

Although the regression model did not account for much of the variance in likelihood to pay attention to agriculture-related issues in the news and conflicted with previous literature that differences in attitude and behavior were the result of differences in demographic characteristics (Antonopoulou et al., 2009; Byrd-Bredbenner et al., 2013; Clark et al., 2016; Leal et al., 2017; Lockie et al., 2005; Pounds, 2014; Ruth et al., 2016; Ruth & Rumble, 2016; Satia et al., 2005), there are still conclusions that can be made from these results. The previously cited literature analyzed behaviors or attitudes, while this research used likeliness to pay attention as the dependent variable. The effect of demographics on motivation may not be consistent with the effect of demographics on behaviors and perceptions. Another possible explanation for the inconsistent results is that differences in attention level stem from differing values, personal experiences, or personality characteristics. Additionally, the lack of variation explained in the model when looking at attention level for agricultural issues in the news may indicate that one type of communication campaign will not resonate with all audience types across all issues. The model also supports that alternative characteristics should be explored to better understand what influences individual motivation to pay attention to agricultural and environmental news.

Recommendations

Communicators and extension professionals should understand that the public does have interest in reading, listening to, or watching agriculture-related news. However, they will need to work together to identify strategies to communicate with their target audiences. Most importantly, communication and education campaigns in the media will need to be tailored to the needs of a target audience. While this research supports prior literature that individuals' demographic characteristics influences their motivation to pay attention to agriculture-related issues in the news (Antonopoulou et al., 2009; Byrd-Bredbenner et al., 2013; Clark et al., 2016; Lockie et al., 2005; Pounds, 2014; Ruth et al., 2016; Ruth & Rumble, 2016; Satia et al., 2005), the relationships were limited in their effect sizes. More research is needed to make specific recommendations for practitioners.

While this research supported the notion that members of the public possessed the motivation to assess agricultural and environmental news, there is still a need to further explore why individuals utilize the peripheral pathway when exposed to messages on these topics (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Verbeke & Vackier, 2004; Verbeke & Ward, 2006). Specifically, researchers should examine individuals' ability to process the information and how we can improve that ability. Ability to process information has been conceptualized as knowledge in previous research (Ruth & Rumble, 2016), but distractions from the message, whether actual distractions like noise or cognitive distractions like perceptions of risk, could lessen a person's ability to process communication (Petty et al., 2009). These different variables of ELM should be investigated to provide a holistic understanding of how individuals process agricultural-related information presented in the news.

One of the limitations of this study is that behavioral intent was measured rather than actual behaviors. Presenting respondents with a series of news articles that cover both agricultural and non-agricultural topics and asking them to select what they would read may provide more accurate accounts for what topics the members of the public are motivated to read. Additionally, motivation was measured by likelihood to pay attention to a news on an agriculture-related issue. Understanding how personal relevance or need for cognition influence motivation related to agriculture-related topics will provide practitioners and researchers a nuanced understanding of how to create effective communication campaigns (Cacioppo & Petty, 1982).

Measurement of actual attention to topics in the news versus intent to pay attention may also yield different results from the regression in this study. The model was significant, but the little variance could be accounted for by the demographic variables. One explanation for this could be that demographic characteristics have differing effects across topics. Prior literature was inconclusive on the effects of education or age on different, and sometimes even the same, topics (Antonopoulou et al., 2009; Byrd-Bredbenner et al., 2013; Clark et al., 2016; Ruth et al., 2016; Ruth & Rumble, 2016; Satia et al., 2005). Inclusion of additional variables to the model, like risk perceptions, personal relevance, past experiences, and knowledge, may account for more variance in likeliness to pay attention to agricultural news topics.

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A Theoretical Model for Decision-Making Related to Agriculture and Natural Resource Science and Technology

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Abstract

Agricultural educators, leaders, communicators, and extension professionals are faced with the increasingly difficult task of sharing science-based information to a public that is exposed to an array of media options, which are not always factual. Additionally, issues related to agriculture and natural resources (ANR) have become increasingly complex, and people can elect to only read information or communication that supports their pre-existing views on a topic. The complexity of disseminating information in today's society has led to the proposal of a new theoretical model: The Decision-Making Model for ANR Science and Technology. This is a multi-facetted model utilizing the theoretical foundations from the Theory of Diffusion of Innovations, Theory of the Spiral of Silence, and the Elaboration Likelihood Model. In a world of echo chambers, this theory has the potential to break the cycle of decisions made with incomplete information and equip practitioners with the foundation needed to efficiently and effectively disseminate information through educational practice and informed communication efforts. An informed and aware public could make decisions about ANR science and technology with a more complete understanding of the issue, which would solve some of the wicked problems facing society today.

Introduction

Technological advances and a growing population have brought many benefits to society; however, challenges have also arisen. Many of these challenges are complex in nature and have an impact on the agriculture and natural resource (ANR) industry. Andenoro, Baker, Stedman, and Weeks (2016) discussed complex challenges as those that are "rich with complexity, embody the diversity and scope of human knowledge, and require multiple perspectives and systems thinking to develop and implement sustainable solutions" (p. 58). Others define complex challenges as wicked issues. Trowler (2012) defined wicked issues as those that are "ill-understood or understood in multiple, perhaps conflicting, ways and are fundamentally complex in character" (p. 273). Some of the complex issues facing ANR include climate change, land-use, food production, and natural resource management (Andenoro et al., 2016). Addressing these complex issues expands beyond bench-science research and requires social scientists to investigate public perceptions and adoption decisions related to ANR issues to create sustainable solutions (Andenoro et al., 2016).

Conflict often arises when the public is trying to understand and make decisions about complex issues (Trowler, 2012). This conflict arises because the public is introduced to science and fact, but personal decision-making also involves emotion, ethics, morals, and politics (Cook, Pieri, & Robbins, 2004). Scientists may be able to identify a solution to address part of a complex issue but because of the multifaceted nature of the issue, public perception may prevent the science from being implemented (Andenoro et al., 2016; Bardes & Oldendick, 2012).

Andenoro et al. (2016) identified public perception as an overarching problem facing scientists as they wrestle with complex ANR issues. Individuals have a tendency “to seek out information that reinforces and confirms their existing convictions,” also known as confirmation bias or the echo chamber (Knutson, 2016, para. 3). Thus, individuals tend to make decisions about or take a stance on a complex issue without understanding all sides. The advent of new media and social media has complicated the adoption of ANR science and technology as solutions to complex issues by accelerating the spread of information (Ferguson, 2000) and misinformation (Andenoro et al., 2016) that an individual may desire to confirm their current beliefs.

Public perception “drives the market” and will impact the outcome of complex ANR issues (Andenoro et al., 2016, p. 59). As colleges of agriculture conduct groundbreaking research, it is imperative agricultural educators, communicators, leaders, and extension professionals fulfill the Land-Grant mission and disseminate information (Association of Public and Land-grant Universities, 2012) to the public so they are able to make informed decisions on complex ANR issues. However, the complexity of the issues and information-rich landscape makes it difficult to reach the public with science-based information. Social science researchers rely on theory to provide discourse and explanation (Trowler, 2012); however, when examining foundational theoretical works it is impossible to find one theory suitable to guide the dissemination of information about complex ANR issues. Rather, it takes a variety of theories to guide the dissemination of information about complex ANR issues. As identified by Trowler (2012), “The repertoires of each theory help us organize apparent chaos and to produce texts which communicate these understandings to our audiences in particular ways” (p. 282). In an effort to understand how scientific information about complex ANR issues is used by the public in decision-making, a new theoretical model was developed. The model is titled “A Decision-Making Model for Agricultural and Natural Resources Science and Technology” and is based on the theories of diffusion of innovations, spiral of silence, and Elaboration Likelihood Model (Figure 1). This work contributes to priority 7 of the American Association of Agricultural Education’s National Research Agenda (Andenoro et al., 2016).

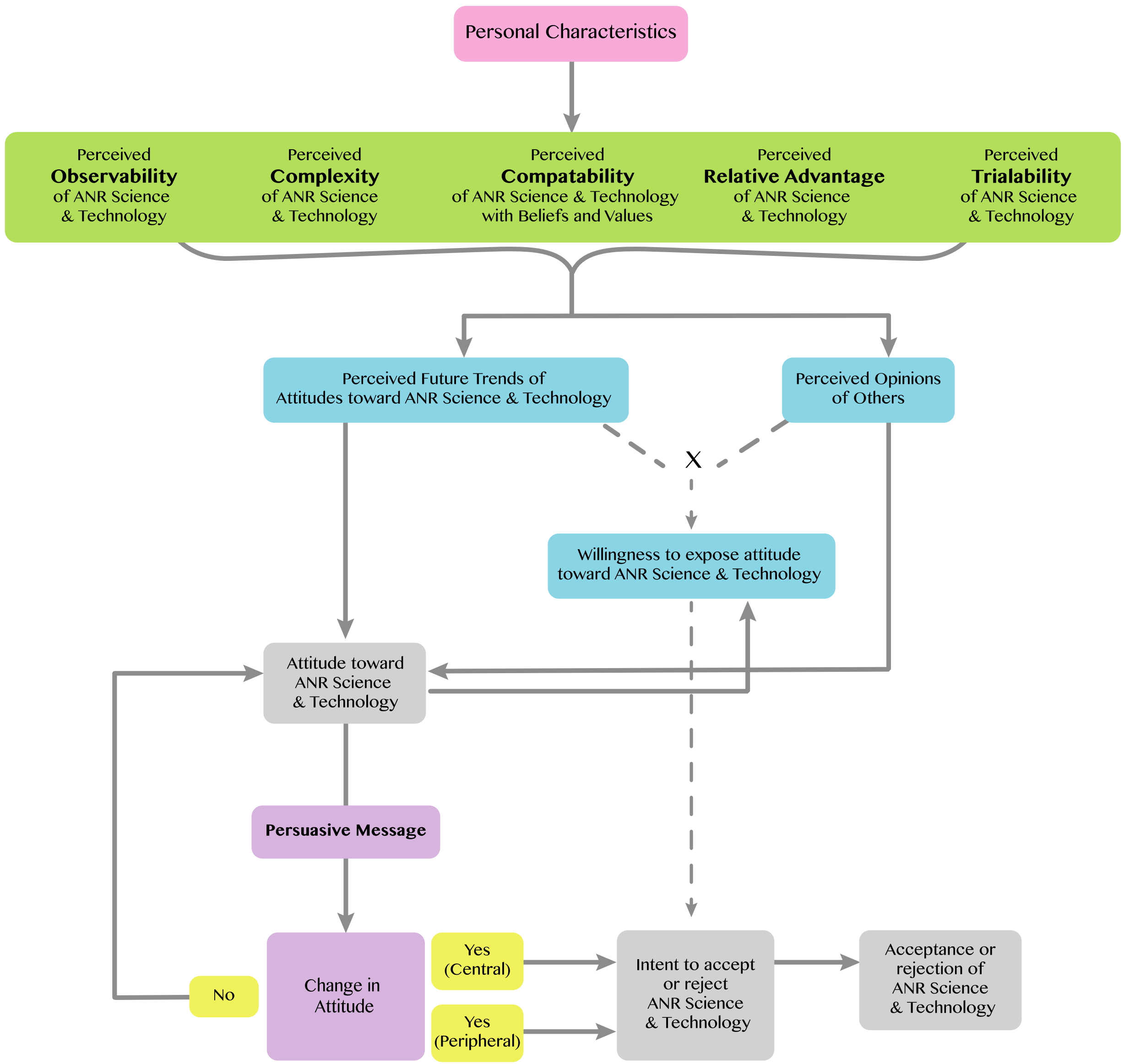

Figure 1. Decision-Making Model for ANR Science and Technology.

Literature Review and Discussion

How consumers form attitudes and make decisions about ANR issues is a complex and multi-facetted process that no one theory can fully explain. The theories of diffusion of innovations, spiral of silence, and ELM were used to develop a more complete and holistic model - The Decision-Making Model for ANR Science and Technology.

The first part of the model is derived from Rogers' (2003) diffusion of innovations theory. An innovation is an idea, practice, or item that is perceived as new by an individual or group (Rogers, 2003). The proposed model begins with the *personal characteristics* of an individual. Rogers (2003) generalized that people who adopted an innovation early typically have a higher level of education, income, and literacy compared to late adopters. Additionally, early adopters of an innovation had larger farms or companies and possessed a greater ability to move up socially compared to late adopters (Rogers, 2003). However, literature was inconsistent on the effect of age on people's likeliness to adopt an innovation.

Prior research regarding ANR communication determined demographic characteristics, such as gender, age, and race/ethnicity, influence people's perceptions of agricultural and life science topics (Antonopoulou, Papadas, & Targoutzidis, 2009; Clark, Stewart, Panzone, Kyriazakis, & Frewer, 2016; Conko & Prakash, 2005; Gaskell, 2003; Hall & Moran, 2006; Irani, Sinclair, & Malley, 2001; Makki, Stewart, Panuwatwanich, & Beal, 2013; McKendree, Croney, & Widmar, 2014; Moon & Balasubramanian, 2001; Ruth, Gay, Rumble, & Rodriguez, 2016). Gender has been associated with influencing perceptions of ANR issues, and Clark et al. (2016) found that women were more likely than men to be concerned with animal welfare issues. Similarly, researchers have concluded women held more negative attitudes toward GM foods compared to men (Hall & Moran, 2006; Lockie, Lawrence, Lyons, & Grice, 2005; Pounds, 2014; Ruth & Rumble, 2016). In addition, women in groups of people who considered water conservation to be important were more likely to be engaged in water conservation behaviors compared to men (Lamm, Lundy, Warner, & Lamm, 2016).

Researchers have also explored the influence of age and socioeconomic characteristics on perceptions of ANR science. Young consumers and those with higher levels of education were likely to be aware of modern farming practices and concerned with animal welfare (Clark et al., 2016). However, research has also supported Rogers' (2003) conclusion that the effect of age on innovation adoption was inconclusive as studies regarding GM science perceptions have found conflicting results regarding age and attitude (Antonopoulou et al., 2009; Ruth et al., 2016). Makki et al. (2013) explored differences in socioeconomic status and water conservation while showering. The researchers concluded that consumers with higher education and higher income were less likely to conserve water compared to their counterparts (Makki et al., 2013).

Researchers have also made connections between race/ethnicity and consumer perceptions and acceptance of agricultural science. A study by Irani et al. (2001) found white and Hispanic consumers would purchase GM labeled food, but most African American respondents would not purchase the labeled food. Additionally, Hispanics were less likely to engage in water conservation when compared to other ethnicities (Makki et al., 2013).

According to Rogers (2003), the demographic characteristics of individuals should influence their perceptions of innovation characteristics. Rogers (2003) proposed the perceived attributes of an innovation largely influence the rate of adoption. These attributes include the *relative advantage*, *compatibility*, *complexity*, *trialability,* and *observability* of the innovation. The relative advantage of an innovation is the perceived advantage of using the new item/practice/idea over what was used previously (Rogers, 2003). Advantages can be concrete, like economic advantages, or abstract, like satisfaction and social prestige. Compatibility of an innovation is how well an innovation aligns with the values and norms of the adopter. If an innovation does not fit within existing social norms, adopters must accept a new social system before adopting the innovation. The third attribute, complexity, is used to describe how difficult an innovation is to understand. An idea that is easily comprehensible will be adopted quickly amongst a group. Trialability refers to how easily an innovation can be tested initially by the adopters. When people are unable to sample or test a new product they are less likely to adopt it in the future. The final attribute is observability, which is how easily the adopter can see the results of using an innovation by others. Greater visibility of results will lead to discussion amongst groups of potential adopters and eventually adoption of the innovation. High levels of relative advantage, compatibility, trialability, and observability combined with low levels of complexity of an innovation have been shown to lead to the quickest rates of adoption (Rogers, 2003).

Researchers have used the diffusion of innovations to develop a greater understanding of the adoption of agricultural science practices and technologies amongst stakeholders (Diker, Walters, Cunningham, & Baker, 2011; Moore, Murphrey, Degenhart, Vestal, & Loux, 2012; Rumble et al., 2016; Weick & Walchi, 2002). Weick and Walchi (2002) specifically explored the influence of diffusion attributes on consumers' adoption of GM food. The researchers concluded that consumers had neutral to negative attitudes toward each of the attributes, which may deter the American public from adopting the technology of GM science (Weick & Walchi, 2002). Rumble et al. (2016) explored undergraduate students' perceptions of GM diffusion attributes and found that compatibility was the only significant predictor of likelihood to consume GM citrus even though relative advantage was the most favorable diffusion characteristic described by the respondents.

Diffusion attributes have been studied in contexts beyond GM food and science and have been used to analyze other ANR topics. Diker et al. (2011) examined how diffusion attributes predicted the implementation of a children's nutrition education program and curriculum. Perceptions of program complexity was the only significant predictor of adoption; curriculum use increased as complexity decreased (Diker et al., 2011). The theory has also been used to see how veterinarians utilized an animal health network that was developed by Extension (Moore et al., 2012). Participants in the study expressed the complexity, compatibility, and relative advantage of the program were easy to assess, but the trialability and observability was difficult to judge (Moore et al., 2012).

While diffusion attributes have been found to influence rate of adoption for ANR science and technology, interpersonal communication will also influence the ultimate decision to adopt (Rogers, 2003). People prefer discussion with those of similar opinions (Rogers, 2003), which is reflective of the spiral of silence (Noelle-Neumann, 1974) and the next section of the proposed Decision-Making Model for ANR Science and Technology. Noelle-Neumann (1974) developed the theory of the spiral of silence theory to understand how public opinion is formed. Because attitudes are learned and not formed within a vacuum (Perloff, 2014), the spiral of silence theory suggests public opinion forms through the process of individuals' observations within their own social environment (Noelle-Neumann, 1974). However, the issue must have strong moral or ethical components for people to feel pressure from the spiral of silence (Noelle-Neumann, 1993).

The spiral of silence consists of three components: *perceived perceptions of others' opinions*, *perceived future trends of others' opinions*, and *willingness to expose own attitude* (Noelle-Neumann, 1974). Fear of isolation from a group drives a need to evaluate the current and future public opinions about an issue to avoid exposing attitudes that do not align with the majority (Noelle-Neumann, 1993). These assessments influence willingness to expose one's own attitudes and eventually behavior regarding an issue (Noelle-Neumann, 1993). People will happily expose attitudes when they sense they are in the majority but will remain silent if they believe they are in the minority (Noelle-Neumann, 1993). However, perceived public opinions do not always align with the actual opinion of the public, and some opinions can be over or underestimated depending on how much they are showcased to public (Noelle-Neumann, 1974). There is an additional positive relationship between perceptions of current and future opinions. Weaker relationships are also expected between the two variables, indicating the public is shifting its opinion (Noelle-Neumann, 1974).

Prior literature has determined the spiral of silence can be present in conversations about ANR science and technology (Gearhart & Zhang, 2015; Kim, Kim, & Oh, 2014; Porten-Chee & Eilders, 2015; Priest & Eyck, 2004). Kim et al. (2014) examined the role of the internet with the spiral of silence and the issue of GM food; hypothesizing the internet could allow users to share their thoughts without fear of isolation. Findings from the study supported that the internet shaped individual perceptions of public opinion toward the topic. Additionally, how much a person's opinion aligned with opinions expressed in an online forum was significantly associated with their likelihood to express their own opinion (Kim et al., 2014). Even though the researchers believed the internet could diminish the effects of spiral of silence in discussions of GM food, they found social pressure still existed to only share like opinions (Kim et al., 2014). While research has found the spiral of silence present in online settings (Gearhart & Zhang, 2015; Kim et al., 2014), Porten-Chee and Eilders (2015) concluded people whose view was in the minority were more likely to voice their opinions online regarding climate change compared to those with the majority opinion. However, the researchers noted that climate change was not a contentious topic in Germany (where the study was conducted) and the fear of isolation was likely not a factor in conversations about climate change because different opinions were reflective of differing perspectives rather than divergent morals or values (Porten-Chee & Eilders, 2015).

Priest and Eyck (2004) explored the role of mass media's portrayal of biotechnology in the spiral of silence and proposed that the biotechnology industry had control over the stories the news would report and opposition to the technology was rarely covered. However, at the time of the writing, voices from those concerned about biotechnology had broken the spiral of silence and entered mainstream media. Exposure to oppositional messages in the media allowed consumers without a scientific background the opportunity to question the conclusions made by scientists in mainstream news (Priest & Eyck, 2004).

The main components of the spiral of silence were included in the proposed model due to the changing media landscape and how consumers are able to receive information from a variety of different platforms (Chan-Olmsted, Rim, & Zebra, 2012). In the Decision-Making Model for ANR Science and Technology, perceived opinions of others and perceptions of future trends are expected to have an interaction effect on willingness to expose attitude toward ANR science and technology (Noelle-Neumann, 1993), which will have an indirect effect on the intent to accept or reject the ANR science or technology. Additionally, each of these variables will serve as a mediator between the innovation characteristics and an individual's attitude toward the topic. Subsequently, depending on the strength of the attitude, a person is expected to be more or less willing to expose their attitude about ANR science and technology. The next and final path of the model addresses how attitudes can be changed.

The final path of the model was derived from the Elaboration Likelihood Model (ELM), which is a comprehensive model used to understand changes in attitude due to persuasive communication. The literature shows attitudes toward agricultural issues will not remain stagnant as people are constantly exposed to new information and messages (Perloff, 2014). Elaboration refers to the amount and depth of thought a person will apply to a communication method or message (Perloff, 2014). The ELM is a dual-process model and accounts for both passive and active processors of information because people will not thoughtfully consider every piece of communication to which they are exposed (Petty et al., 2009).

The two routes in the ELM are the central processing route and the peripheral processing route. An individual will move through the central processing route when motivation and ability are high. Motivation refers either to an individuals' involvement with the communication topic or their likelihood to engage in complex thought. If communication can be presented as personally relevant, the receiver of the communication will use greater elaboration to process the information (Fazio & Towles-Schwein, 1999). The ability to process information can be helped or hindered by a number of factors. If a person has high knowledge about a topic, they will have greater ability to process the information. However, if there are too many distractions surrounding communication, ability to process information will be lowered. When motivation and ability are high, an individual can either experience more or less favorable thoughts, depending on the nature of the processing. Meaning the quality of the argument and the individual's initial attitude can promote or impede changes in thought (Petty et al., 2009). A central attitude change occurs when the change in thought becomes rehearsed and the receiver has time to reflect on the new attitude, thus creating a change in his/her cognitive structure. The central processing route leads to changes in attitude that are resistant to new information, will hold over time, and are predictive of behavior (Petty, Haugtvedt, & Smith, 1995).

Not every piece of communication will be interesting or relevant to an individual. When the motivation or ability to process information is lacking, people will assess information through the peripheral processing route (Petty et al., 2009). Rather than carefully considering the information presented, a person relies on peripheral cues to elicit changes in attitude. These can include the expertise of the source or number of arguments (Petty et al., 2009). People will also use peripheral cues to form attitudes when motivation and ability are high but there is no actual change in their cognitive structure (Petty et al., 2009). Peripheral attitude shifts can easily be influenced by counter information, will not last over time, and are not predictive of behavior (Petty et al., 1995). Changes in attitude are not guaranteed in either route though. If the peripheral cue is not correctly operating, or the nature of processing does not produce more or less favorable thoughts, the initial attitude will be retained (Petty & Wegener, 1998).

The ELM is often used in communication research and has been applied to a variety of contexts. In agricultural fields, researchers have found consumers utilize the peripheral processing route when processing persuasive communication (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Verbeke & Vackier, 2004; Verbeke & Ward, 2006). Researchers have also used the model to examine consumers' perceptions toward food-related risks. Frewer, Howard, Hedderley, and Shepherd (1997) explored the role of the type of food hazard, information source, and persuasive information on consumers' elaboration regarding risk messages about food. Perceptions of risk were found to be lowered when the message came from a government source, but the amount of elaboration used was much more the result of the type of hazard communicated about rather than the information source used. Additionally, as persuasive content increased, so did the amount of elaboration. The researchers concluded that ELM was an essential model in assessing risk communication about hazardous food products (Frewer et al., 1997).

Krause, Meyers, Irlbeck, and Chambers (2015) conducted a content analysis of YouTube videos for and against Proposition 37 in California. The bill did not receive enough votes to pass, but if it had, it would have required mandatory labeling of GM food. The majority of sources in the videos opposing the bill were scientists. The researchers concluded consumers likely viewed this positively, which led to effective influence from the peripheral processing route. A study by Ruth and Rumble (2016) sought to identify various influences on consumers' attitudes toward GM food after exposure to persuasive communication, using the ELM to guide the study. Higher perceptions of source credibility and lower perceptions of risk both led to more positive final attitudes after exposure to a message. However, knowledge of GM food science and technology was not found to be predictive of consumers' attitudes toward GM food. The researchers concluded knowledge and facts might not be as important when trying to influence attitudes as consumers' values and beliefs (Ruth & Rumble, 2016).

Walters and Long (2012) looked at how experts versus novices made judgments about food products after reading nutrition labels. The novice consumers paid close attention to peripheral cues and did not use a lot of consideration when drawing conclusions about the food labels. Conversely, experts used the central processing route when evaluating the food labels and scrutinized the information more than novice consumers. In a study on how supporters and opponents use potable recycled water in Australia, Price, Fielding, and Leviston (2012) determined that people would selectively pay attention to messages that aligned with their current attitude toward the topic. Additionally, the supporters and opponents did not take the time to critically assess the information that aligned with their personal values (Price et al., 2012).

The final part of the model draws upon ELM to account for *attitude changes* that are the result of *persuasive communication*. If an individual possesses the motivation and ability to process information, he or she will experience a *central* change in attitude (Petty et al., 2009). When motivation and/or ability are lacking, and an attitude change occurs, the change in attitude is *peripheral* (Petty et al., 2009). The change in attitude is predicted to influence *intent to accept or reject ANR science or technology* depending on the strength and direction of the attitude. However, only central changes in attitude are predictive of behavior (Petty et al., 1995), which will be predictive of behavioral *acceptance or rejection of ANR science and technology* rather than only intent. The possibility also exists that the person will experience *no change in attitude*, which loops the model back to the individual's original attitude toward ANR science and technology.

Conclusions, Implications and Recommendations

The Decision-Making Model for ANR Science and Technology was developed to aid agricultural educators, communicators, leaders, and extension professionals deliver science-based information to their stakeholders. The variables in the model adapted from the theory of diffusion of innovations (Rogers, 2003) and spiral of silence (Noelle-Neumann, 1974) will have direct and indirect effects on attitude toward ANR science issues. This attitude will determine the effectiveness of persuasive communication on the individual (Petty et al., 2009). A person's ability and motivation to process the communication will lead to a potential change in attitude that utilizes the central or peripheral processing route introduced in ELM. Changes in attitude could lead to greater intent to accept or reject the ANR science or technology; however, only changes in attitude via central processing will translate to actual acceptance or rejection (Petty et al., 1995). The third, and final, result of exposure to persuasive communication is that there is no actual change in attitude (Petty & Wegener, 1998).

Research Implications and Recommendations

This model has theoretical value, but cannot make a practical impact until it has been further investigated. The multiple components and aspects of the model lead to an array of research opportunities, and multiple studies will be needed to validate the model. Quantitative research should be used to investigate how personal characteristics of individuals impact perceptions related to innovation characteristics. Research has already identified the connection between characteristics and general attitudes toward ANR topics (Antonopoulou et al., 2009; Clark et al., 2016; Conko & Prakash, 2005; Hall & Moran, 2006; Gaskell, 2003; Irani et al., 2001; Makki et al., 2013; McKendree et al., 2014; Moon & Balasubramanian, 2001; Ruth et al., 2016), but there is a need to see how demographic and psychographic characteristics influence perceptions of individual innovation characteristics. This type of information will be beneficial when creating communication or education for a target audience. Additionally, understanding how personal characteristics vary in influence across ANR topics will provide practitioners with guidance on how to best frame their messages for their intended audience.

Future research also should address the connection between innovation attributes, perceptions of others, future trends, and attitudes toward ANR science and technology. While the perceptions of innovation attributes influence attitude (Rogers, 2003), variables derived from the spiral of silence should also influence attitude (Noelle-Neumann, 1974). This interaction can be measured quantitatively, and structural equation modeling should be used to determine the direct and indirect effects these variables have on attitude. Additional research could investigate the role of echo chambers (Knutson, 2016) in attitude development toward ANR science and technology. Current ANR research has been inconclusive regarding the presence of the spiral of silence in online settings (Gearhart & Zhang, 2015; Kim et al., 2014; Porten-Chee & Eilders, 2015), so a deeper understanding of the phenomenon is needed for practitioners to develop communication for online settings. Research could also expand past traditional, self-reported measurements of attitude, and use biometrics to explore unconscious perceptions that influence attitudes and acceptance of ANR science and technology.

Understanding the public's current perceptions and attitudes about ANR science and technology is the first stage in determining how to best disseminate information to stakeholders. Practitioners will need to have a firm understanding of how persuasive communication will impact attitude, whether it be positive or negative. Research on elaboration is difficult to establish with quantitative methods, but qualitative strategies, like interviews or focus groups, would allow research to assess the amount of elaboration people use when presented with ANR information and messages. Focus groups with purposively selected participants that represent various target audiences would allow researchers to make recommendations about the best type of messages to use depending on the audience characteristics. For people to experience a change in attitude that leads to actual behavior changes, they will need to elaborate upon past experiences and experience a change in cognition using the central processing route (Petty et al., 2009). However, ANR researchers have concluded most people use the peripheral route to assess information related to ANR (Goodwin, 2013; Meyers, 2008; Morgan & Gramann, 1989; Verbeke & Vackier, 2004; Verbeke & Ward, 2006). Researchers should test messages in focus groups and/or in-depth interviews to determine what messages, sources, or communication platforms elicit the greatest amount of elaboration from participants. Research in focus groups made up of people of differing views about ANR topics can also provide insight into how social pressure can influence attitude change or lack thereof. The effects of the spiral of silence could even serve as a distraction for people's ability to process information, which could lead to a peripheral shift in attitude or no change in attitude at all (Petty et al., 2009). These research avenues will be instrumental in developing and disseminating information to the public about ANR science and technology that will allow them to make educated decisions on the topic.

Implications and Recommendations for Practitioners

While this model has yet to be tested, it still serves as a theoretical guide for agricultural communicators, educators, leaders, and extension professionals. First and foremost, practitioners should not expect a one-size-fits-all model of education and communication to be effective. Rather, communication and educational campaigns in the ANR industry should be crafted to meet the specific needs of their audience and with an understanding of how that audience currently perceives the topic. Additionally, practitioners should evaluate the current perceptions of their target audience related to each section of the model.

The model segments are interconnected, but areas of weakness should be addressed first to facilitate changes in attitude that will lead to a decision regarding ANR science and technology. For example, if practitioners have identified that the majority of the public has negative attitudes toward the ANR science or technology they are introducing or discussing, their stakeholders will likely demonstrate attitudes reflective of those negative perceptions (Noelle-Neumann, 1974). The issue of how the science or technology is portrayed in the public's eye must be addressed prior to creating communication that simply outlines the science behind the ANR topic. Similarly, if practitioners know that the science they are communicating about is associated with low levels of trialability or observability, that part of the model will need to be addressed first in order to impact attitudes (Rogers, 2003). After research has been conducted on the model, specific recommendations can be made for practitioners. However, the theoretical foundation for the Decision-Making Model for ANR Science and Technology should provide practitioners with guidance on how to disseminate science-based information to target audiences that will lead to desired changes in attitudes and informed decision-making related to ANR science and technology.

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Education in agritourism: A qualitative case study of central Ohio agritourism managers' decisions to enter the industry and educate visitors

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Abstract

This qualitative study of agritourism in central Ohio was conducted using fieldnote observations and interviews with employees and owners of two popular agritourism destinations in the region. The goal of the study was to gain a broader perspective of the goals and intentions of business owners related to educating the public on modern agricultural practices. Researchers recorded observations, developed an interview guide, conducted interviews, and developed themes and codes. The conclusions drawn from the study indicate that education is happening at such operations, though approach varied widely between the two locations. Patterns of the emotional connection associated with visiting a farm were noted, as well as the transition process that these farms have undergone to develop from production-based businesses to agritourism destinations.

Introduction

As of 2015, two percent of the American population is involved in production agriculture, though the food and fiber industry once reigned as the primary occupation of the majority of Americans (American Farm Bureau Federation, 2015; Conkin, 2008; Hurt, 2002; Kolodny, 1975). In place of firsthand agricultural experience, agritourism has emerged as a primary—and increasingly popular—source of information about modern production agriculture (Arroyo, Barbieri, & Rich, 2013). Carpio et al. (2008) found that based on principles of supply and demand, visitors demand on average 10.3 visits to a farm per year. According to the Travel Industry of America (2001), approximately 87 million people took a trip to rural America between1998 and 2001.

One may argue that without direct experience with a farm, the average consumer's perception of agriculture is based upon their exposure to images, film, marketing advertisements, social media, and other outlets (Specht & Rutherford, 2015; Kellogg, 2002). Agritourism may be a way to counteract the images propagated in popular media. Visiting an agritourism destination, consumers are given the opportunity to see and learn what a modern-day farm looks like. Many such destinations are created or adapted to educate consumers (McGehee & Kim, 2004), and the things visitors see and experience contribute to this agricultural edification. According to the 2007 U.S. Census, there was a 17 percent increase in farms selling agricultural products direct to consumer (Nasers & Retallick, 2012). With a growing interest in opening production-based farms to the public, there seems to be opportunity and interest in educating the public. How, then, are farm owners addressing this opportunity? Are they recognizing the potential to educate and implementing educational experiences on their farms?

Ohio serves as an ideal area to investigate the educational benefits of agritourism. With its mix of agricultural land and major metropolitan areas, Ohio is home to nearly 700 agritourism locations (Graves, 2015). For this project, we selected two agritourism destinations in proximity to Columbus, the capital city of Ohio with a population of more than 850,000 (U.S. Census

Bureau, 2015). One fieldsite, Young's Jersey Dairy, is located just over 50 miles west of Columbus, with a 140-year history and over 1 million visitors per year. Young's offers plenty of entertainment opportunities for visitors, including a driving range and batting cages, seasonal events, and school tours. The second fieldsite, Lynd's Fruit Farm, another well-known and longstanding rural destination for locals, is approximately 25 miles northeast of Columubs. Here visitors can pick their own apples or purchase goods from the farm market, and schools can bring students for school tours. Both fieldsites offer unique approaches to agritourism activities and education, with a rich history of transition to get them where they are today.

Literature Review

Agritourism

Agritourism is any activity, enterprise, or business designed to increase farm and community income by attracting the public to visit agricultural operations and outlets that provide educational and/or recreational experiences to help sustain and build awareness of rural quality of life (University of Arkansas Division of Agriculture, 2006). The industry itself is difficult to define (McGehee & Kim, 2004). Phillip, Hunter, and Blackstock (2010) outline three characteristics that determine whether an entity represents agritourism: the extent to which it is a working farm, direct contact with agricultural activity, and the authenticity of tourists' agricultural experience. Using Phillip et al.'s characteristics as a guide, Arroyo et al. (2013) surveyed farmers, Extension faculty, and residents of Missouri and North Carolina to arrive at a concise and consistent definition of agritourism: "[farming]-related activities carried out on a working farm or other agricultural settings for entertainment or education purposes" (p. 45). This definition informed our operationalization of agritourism in this study.

Types of agritourism range from non-working farm agritourism to working farm, direct contact, or authentic agritourism. Agritourism activities comprise a wide variety of events, ranging from traditional farm tours and pick-your-own operations to more modern pursuits, such as ATV rides, corn mazes, and wine tastings (Nasers & Retallick, 2012). Proponents of the industry have identified a number of potential societal benefits of agritourism, "including wildlife conservation, obesity reduction, and survival of small farms in the global economy" (Bagi & Reeder, 2012, p. 189).

Motivations to Enter Agritourism

Much of the research surrounding agritourism focuses on the motivations for and financial impacts of entering the industry. In the United States, the agritourism industry has been a growing venture, especially in Appalachian America, since the 19th Century (Chesky, 2009). Agritourism is often initially seen as a way to diversify product offering and boost the profits of a working farm, followed by a desire to educate the public and gain support for the American farmer (Chesky, 2009).

In their survey of agritourism operators in Virginia, McGehee and Kim (2004) found that a large portion—some 60 percent—of agritourism sites were run by small-scale producers for whom production was not a primary income source. Respondents indicated that educating consumers was a motivating factor in their decision to enter the industry, but one that fell below earning additional income and utilizing existing resources more effectively. Similar results were reported by Bagi and Reeder (2012), whose national survey indicated that income and other mitigating factors, such as owned farm acreage, proportion of non-tillable land, and recreational access, increased the likelihood of a producer entering the industry.

Non-formal Education

According to Merriman, Caffarella, and Baumgartner (2007), education can be broken down into two basic categories: formal and informal. Brennan (1997) also refers to informal education as non-formal education. Formal education is often viewed as the structured, institutionalized type of education, where learning takes place in the classroom and contains assessments such as exams and grades (Poore, 2011). Unlike formal education, informal/non-formal education can occur anywhere, with or without a certified instructor (Poore, 2011). Under this definition, instances of education on site at agritourism destinations would be considered informal education. Adult participation in such on-farm education generally leads to more proficiency in connecting what is seen and learned at these locations to what goes on in food production and making informed food decisions (LaFolette et. al., 2014).

For this particular study we refer to these informal educational opportunities as structured or unstructured. In structured programs, the farms use an organized plan to implement and promote educational opportunities, while unstructured would assume the passive view that the act of visiting a farm allows for education in and of itself.

Purpose of the Study

The purpose of this study was to describe the practices and intentions of central Ohio agritourism destinations for visitor education. Three research questions were outlined to guide the study:

> **RQ1:** Does consumer education play a role in a farm owner's decision to enter in to agritourism?
> **RQ2:** Do agritourism operators have goals for consumer knowledge and understanding of agricultural practices?
> **RQ3:** What do agritourism operators' destinations do to educate visitors?

This study supports Priority 1 of the 2016-2020 AAAE National Research Agenda in its focus on public understanding of industry practices. In response to Research Question 1: "What methods, models, and programs are effective for informing public opinions about agricultural and natural resources issues?" (Enns, Martin, & Spielmaker, 2016, p. 13), we posit that agritourism venues may be an effective means of educating the public and dispelling negative perceptions of the industry.

Methods

To investigate how agritourism destinations appeal to consumer views on modern agriculture, we selected two individual field sites for a qualitative case study: a fruit farm in Pataskala, Ohio and an operational dairy farm and creamery in Yellow Springs, Ohio. Observations were utilized to better understand visitors' experiences, educational opportunities, perspectives, and reasons for visiting the farms. Any visitor quotes were recorded based on direct observation at the field sites, rather than through interviews.

Site Selection and Observations

Researcher 1 (R1) observed their field site, the fruit farm, on two occasions in September 2016. This farm was chosen for its popularity amongst Columbus-area locals as a place to visit, shop, and pick apples. The farm is located about 30 miles from the city of Columbus and attracts individuals and families of all ages, as will be seen in the fieldnotes. The farm is a multi-generational, family-owned operation functioning as both a retail store for their own apples as well as packaged goods and produce from local sellers. The farm also provides pick-your-own apple orchards for visitors who want a hands-on experience, and school tours run throughout the season, offering youth a closer look at the apple business from beginning to end.

Fieldnotes were recorded during the observation periods using mobile devices, including an iPad and iPhone. Any visitor statements made or behaviors described were based only on researcher observation and not direct interaction or interview with farm visitors. Researcher 1 took brief notes on-site, which were expanded upon in the days following each observation into rich and in-depth fieldnotes. Both observations took place within the central market area of the farm as well as in the apple orchards on the property. The researcher who conducted observations and interviews at this field site brought a unique perspective to the study, having grown up in a rural, agricultural area though lacking experience or familiarity with apple tree farming.

Researcher 2 (R2) conducted two observations on-site at the dairy, one in September and the other in November 2016. Although this farm is an hour outside of Columbus, the researchers selected this location based on the rich heritage and educational aspects of the farm. Young's Jersey Dairy is a working dairy farm with two restaurants, homemade ice cream, farmstead cheese, miniature golf, a driving range, batting cages, and an animal petting area. There is also an area within the barnyard where patrons can watch the staff milk cows daily and participate in events throughout the year.

Researcher 2 repeated Researcher 1's recording methods, taking brief notes and photos during the observations at the dairy using a smartphone. These notes were expanded upon after the observation. The researcher who conducted observations and interviews at this field site grew up in a suburban area with limited dairy farming experience.

Interviews

Following the observation period, researchers drafted and finalized an interview guide for interviews with employees and managers at both locations. The interview guide included questions focused on approaches to agritourism, educational experiences, and portrayal choices on the farm. The guide included questions such as: "In what ways do you provide opportunities to educate visitors?" and "Can you give an example of a time someone came to you or another employee with skepticism or concern?"

Researcher 1 conducted two interviews at the fruit farm in October 2016. The researcher contacted the company and scheduled an interview with "John," one of the farm owners. The second interview was with seasonal employee "Jane," who was selected based on a recommendation from John as a knowledgeable and experienced employee. Researcher 2 conducted two interviews at the dairy in November 2016. The first interview took place with "Bob," the dairy's CEO. The second interview took place with "Dave," the owner of the cut-your-own Christmas tree area of the farm. Both Bob and Dave are from the family business and have been a part of it since they were children.

Data Transcription and Analysis

During the interviews, we followed a printed copy of the interview guide and made brief notes throughout. Mobile cellular devices were used to record audio for later transcription. The interview was semi-structured with the interviewer adhering to the interview guide, with some further probing and questioning. Before, during, and after the interviews, jottings and mental notes were taken to describe the interview setting and the interviewee. In the few days following the interviews, reflective fieldnotes were further developed to accurately describe the setting and individuals interviewed. Upon completion of the interviews and transcriptions, all materials were uploaded to a shared cloud-storage folder. The four interviews ranged from 15 minutes to 49 minutes in length.

Researchers transcribed all four interviews word-for-word, at times leaving out unnecessary filler words (i.e., "um," "uh," and "like") in instances where they did not contribute to the overall meaning or persona articulated by the respondent. After transcription, one researcher established initial codes through the process of reading the other researcher's interview using NVivo Transcription Software. Both researchers agreed upon, and coded, one interview according to the initial codes developed. These codes included *business goals and offerings*, *changes over time*, and *interviewee experiences*. A total of 9 subcodes were found within these main codes. After further discussion, additional subcodes were added in order to create a more meaningful categorization of interview data. Examples of these 21 subcodes include *reasons for education*, *controversial questions due to lack of agricultural knowledge*, and *generational differences of farm ownership*. Both researchers then re-coded the first interview and coded the remaining three interviews using the new coding scheme.

Table 1

Final coding scheme used to code interviews and field notes.

Codes (*n*=3)	**Initial Subcodes (*n*=9)**	**Final Subcodes (*n*=21)**
Business goals and offerings	Education	Formal programs
		Informal programs
		Reasons for educating
	Guest Experience	Feelings invoked
		Reasons for visiting
	Profit	Growth
		Profit use
Changes over time	Approach to farming	Agritourism
		Production
		Production and agritourism mix
		Reason for transition
	Attractions	Education focused
		Entertainment focused
	Controversy	Animal welfare

		Concern with safety/environment Lack of knowledge
Interviewee experiences	Goals for visitors Observations of visitors Personal history	Positive experiences Agricultural knowledge Education Family expectation On the farm experience

Findings

After coding and analyzing the fieldnotes, interviews, and other components of the data collection, we identified three emerging themes: *emotional connection to the farm*, the *shift from a production-based business to a consumer-focused business*, and *differences between agritourism operations in their approach to visitor education*.

Emotional Connection to the Farm

Through visitor observations and interviewee commentary, there was a clear indication that for visitors, the farm makes an emotional impact. People delight in days past or recall old memories, like a reminiscent grandmother "sharing stories about the apple farm as I overhear her say, 'your grandpa used to just *loove* coming here and picking apples'" (R1, Fieldnote 2), or the way "one lady at the pickle stand tells her two daughters 'these look like the pickles grandma used to make'" (R1, Fieldnote 1). Among the patrons visiting the field sites, it is clear that the sights, smells, and activities that brought them to the farms are tied to old memories or experiences rooted in their past. These effects do not go unrecognized by the business owners.

The first interview with one of the owners at Young's Jersey Dairy shed light on this phenomenon: "[The visitors] like to go since there is some sort of connection to a farm. Some emotional deep connection that they like to visit the country, or a farm and see it happening" (Bob, Interview 1). As for the fruit farm, the owners changed their entire marketing approach, which originally focused on saving money, when they recognized the real reason visitors were coming. As John describes:

> It's not about comparing the cost of Kroger's berries to our berries. It's you know, somebody with kids with berries with stains all over their faces. Uh, it's the emotional appeal that seems to connect with a lot of people…there's some value associated with coming here with your family or group of friends that's beyond money savings. That's not -that's not where it is, there's an emotional appeal to coming out here. (Interview 1)

The observations and interviews made it abundantly clear that, beyond just purchasing goods to take home, visitors flocked to the farms for enjoyment and positive experiences. This is in many ways a good indication for the agritourism industry, signaling that the draw to rural farms comes from a deeper place than monetary savings and weekly grocery shopping.

The Shift from a Production-Based Business to a Consumer-Focused Business

Many agritourism businesses begin with the consumer in mind; however, that was not the case for both sites in this study. These businesses started as production-based farms that gradually shifted their focus to the consumer. This evolution allowed the businesses to focus more on consumer needs while changing their practices accordingly.

Starting as a large-scale production wholesale apple grower, the fruit farm produced apples in what John referred to as "an exercise in mediocrity, really. If the grocery store would accept it – job done." With notable generational differences throughout the life of the business, changes were made as opportunities arose. "Mom and Dad had seen the reaction of some friends from town, came out with their little girls. Dad just saw how it appealed to them to pick apples. He just said wow, and he knew of other farms that did pick-your-own so he though let's try it." This hints again at the emotional appeal and impact for visitors at the farm. From here the family transitioned over several decades into today's direct retail and agritourism approach.

The family ties were a large part of the transition for Lynd's Fruit Farm, and a generational difference in how they viewed the farm's future was a point of contention. Ultimately, the owners arrived at their current business model, selling all of their apples onsite, whether at the retail market or through pick-your-own apples. While this brought its own set of challenges—"Dealing with the final consumer you have to grow a good product," (John, Interview 1)—it seems as if the decision was the right one.

Young's Jersey Dairy started in 1869 as a family farm producing grain crops, market hogs, and Jersey cows. By 1958, the family decided to start selling their milk directly to the public. By 1960, they had built and opened their first retail dairy store. "Creating it from a farm into….in essence going from a general farm to a farm-roadside stand kind of thing, basically just sort of selling our product directly to the customer, then we kept adding things onto that and adding things onto that" (Bob, Interview 1). After the first dairy store was built, Young's continued to cater to their clients and visitors, leaning on the goal of creating a fun family experience. The operation kept expanding and adding new features like a petting zoo, batting cages, and putt-putt golf. "In the late '80s, we figured out we were something different…We were basically selling the experience of a farm, and we had a lot of elements of that, but we had never thought of it that way as a growing-up-on-a-farm kind of way" (Bob, Interview 1).

These farms demonstrate the concept of transitioning from using a farm to produce goods that appeal to the grocery store, to instead appealing to the public. Based on our interviews, we presume that this was more driven by the desire to attract visitors, leading to greater profit opportunities, and less in hopes of reaching and educating consumers. What then, happens when consumers flock to these farms on busy weekends with questions or doubts about the farms and their practices?

Approach to Visitor Education

Agritourism can be thought of as an educational experience by opening the doors for the public to see what happens on the farm. Some owners may see offering educational programs as an additional opportunity to reach the public while making profit by offering organized tours and events, while others may see education on their farm as a role that they fulfill naturally by talking to visitors and contributing to a more food and agriculturally literate public.

Through interviews, we found that two strikingly different approaches to education were occurring at the two field sites. Young's Jersey Dairy preferred to take the more natural approach, insisting that “to educate, that’s not why we are here, but while we are doing all this we want to help folks understand” (Bob, Interview 1). While visitors have the opportunity to see a milking barn and dairy cows roaming in the pasture, the attractions at Young’s are centered on fun and enjoyment. Though the concept of educating patrons is not far back in the mind of owners. “If you make a good experience for them and also use that opportunity to educate a little bit…that’s not my main mission, but that is almost like a sub-mission” (Bob, Interview 1).

Although the dairy’s primary focus is not on education, the farm hosts many public events during the year where informal education can occur via demonstrations or speaking with event vendors. For example, at the annual wool gathering event, visitors were able to observe and learn about the shearing or wool gathering process of sheep, llamas, alpacas, cashmere goats, and Angora rabbits. Visitors also learned about the processes of wool spinning, weaving, and knitting and attended a sheep herding demonstration.

At Lynd’s Fruit Farm, educating visitors, specifically youth, is one of the farm’s main goals. Owner John’s philosophy is borne of concern for media portrayals and his attempt to improve the public’s ability to discern fact from fiction:

> If they have no connection to the farm- it’s the only connection to a farm they have. If they had no connection they’re clueless as to how food is grown… then they’re wide open for whatever they’re told on the media.
>
> If you spend the time with the kids, they’re gonna remember that they went to the farm. So they’re gonna have some connection with a farm. And when they get older if they see a news story like that they may be more open to hearing the grower’s side of the story.

At this farm, the focus primarily falls on educating youth, while several informal events allow employees to interact and answer questions from patrons. This perspective of providing younger people a foundation of agricultural experiences is one that is not unfamiliar in the industry. The farm owners clearly recognize the important role the media can play in shaping the public’s understanding of certain issues. This is an important step in encouraging consumers to think about and learn about food production in a unique way.

Out in the orchard, a more passive, unstructured form of education appears to take place. A father and his children “worked quickly to pluck apples off the tree loading an already full plastic bag sitting on the ground. His son and daughter stood nearby picking apples up higher. Every once in a while one would ask their father’s opinion of the quality of their apples before adding them to two other plastic bags of their own” (R1, Fieldnote 2). This is just one example of the hands-on education that can take place. At this particular farm, most educational opportunities available to adults were through this type of activity, or by directly seeking out an employee at the market to ask questions. With the exception of a parent or teacher chaperoning a group of kids, tours are reserved for schools and not advertised for the public.

The question here, however, is whether these educational opportunities at both locations are transparently portraying today’s dairy and apple farming industries in a way that offers consumers an updated and modern look at food production. Lynd’s Fruit Farm employee Jane describes the tours for children as an opportunity to see everything, “the whole process that they go through from when they’re planted in the ground to they pick ’em, they pack ’em, and they go in crates to bring ’em up here. So they see it from beginning to end.” This ability to offer children an inside look at machinery, packaging, and other production elements seems to be far more involved with a realistic depiction of the farm’s procedures. While both locations acknowledge the importance of education, Lynd’s Fruit Farm appears to be taking on the task more directly and with specific interest in teaching youth.

Discussion

The findings of this study present interesting parallels to—and divergence from—agritourism literature. Coming into this project, we believed that visitor education would play a vital role within these businesses; however, upon completion of this project, we discovered that education was, in many ways, not as important to them as we imagined. The three themes that did emerge were the emotional connection associated with the farm, differences between agritourism operations in their approach to visitor education, and the shift from a production-based business to a consumer-focused business.

The emotional connection associated with being on a farm did not go unmentioned in both the interviews and our fieldnotes. While educating customers may not have been an initial goal or expectation for both farms’ owners, it became clear that they had something to offer that the visitors wanted. Farm visitors’ commentary and the interviewees’ observations of their customers hinted at the farms’ emotional impact. Visitors delighted in days past, recalling old memories, like the reminiscing grandmother “sharing stories about the apple farm as I overhear her say, ‘your grandpa used to just *loove* coming here and picking apples’” (R1, Fieldnote 2). The large number of families and friends gathering for photo-ops and making small talk at both locations provided a clear indication that visitors were there to enjoy themselves and create experiences, rather than just to buy ice cream or apples. “There’s something about an orchard that people just take to. They love it. I don’t know what that is exactly, but we hear it over and over again” (John, Interview 1).

Research Question 1 sought to describe the operators’ reasons for entering agritourism. For both the fruit farm and the dairy, an opportunity presented itself to leave behind large-scale production and distribution of dairy or apple products. These businesses gradually shifted their focus to the consumer, allowing them to develop unique and valuable agritourism destinations. The evolution of Lynd’s Fruit Farm and Young’s Jersey Dairy gave the businesses a way to focus on consumer needs and desires in a more direct and personal way. Both farms entered agritourism, not without risk, to diversify and expand their businesses beyond simply producing a wholesale product, further supporting the findings in other U.S. states and regions of Chesky (2009), McGehee and Kim (2004), and Arroyo et al. (2013). The inadvertent educational aspects of Lynd’s and Young’s supplemented the entertaining and production pieces of their operations.

The second theme aligned with Research Question 2: “Do agritourism producers have goals for consumer knowledge and understanding of agricultural practices?” The stark differences between the two agritourism operations in their approach to visitor education provide insight on this research question. We found contrasting perspectives on both structured and unstructured approaches to utilizing agritourism experiences to educate visitors, whether by simply visiting or via tours and informational materials. The fruit farm owner indicated the importance of educating youth and made mention of how many thousands of school children they were able to reach this year (20,000 for the 2016 year). Based on our findings, we believe that acknowledging the opportunity to educate and create educational opportunities, as the fruit farm does, is a stronger approach to creating an authentic farm experience for visitors. The owner of Lynd'swas very cognizant of the impact that structured, on-farm youth education can have for the agricultural industry as a whole, supporting Mars and Ball's (2016) assertion that agritourism could be a powerful conduit for nonformal agricultural education. Young's owners took a more nonchalant and unstructured approach, assuming that the act of coming to a farm was in and of itself an exercise in education. While both have a large educational presence, the more structured approach seems to have been more impactful with greater reach.

Finally, Research Question 3: "What do agritourism operators' destinations do to educate visitors?" was addressed through descriptions of the specific activities undertaken by each site. Lynd's was, as stated above, more blatant in its attempts to inform customers through school tours, educational take-home materials, and production facility tours. Young's on the other hand, was more laissez-faire in its approach to educational activities, as it focused primarily on visitor entertainment, rather than education. Events like the annual "Wool-Gathering Festival" and attractions like the farm-animal petting zoo provide opportunities for patrons to learn about agriculture, but in a more indirect, and potentially less effective, way.

American agritourism is a rich and thriving niche area of American agriculture, but most literature regarding the industry is regionally constrained and limited in scope. This research project attempted to fill the gaps in the literature about American agritourism and consumer perceptions by looking at central Ohio's agritourism destinations' motivations, goals, and management decisions. Based on our findings, we consider educational opportunities to be an important aspect of agritourism, but perhaps an underutilized one. There is a large demand for, and interest in, visiting farms. Farm operators could better take advantage of this interest in educating consumers, and take a strong step toward improving American consumers' understanding of modern agricultural practices.

The findings of this study also support the supposition that the decision to convert to agritourism as a way to diversify a farming business appears to be a viable one, as both operations survived transitions and found great success in a new niche. Finally, the inclusion of a structured educational program seems to create a clearer position on agricultural education in informal settings like these. Both of these farms offer educational opportunities, but neither takes a strong position or goal of promoting educational programs to the public for the purpose of improving agricultural literacy.

This study is not without its limitations. This study took place over the course of four months, and this short timespan did not allow for a full understanding of central Ohio agritourism on a widespread scale. Both of the interviews conducted at the dairy were shorter than anticipated and follow-up interviews would have been ideal had time allowed for it. We believe that the findings are valuable as a resource for farm operators interested in agritourism and for Extension professionals who may work with these operators as they move into the industry.

The themes that emerged over the course of the study are of great interest to us. Further research is needed to see if these themes hold true for other agritourism destinations in different regions of the United States. We would like to suggest some ways to fill the voids we identified in both the literature and our own research. First, a more detailed analysis of all prospective fieldsites should be done early on in the research process. This will allow for more flexibility if a fieldsite proves to be more difficult to access. Second, a thorough textual analysis of website content, social media posts, and visible signage should be conducted. This would give researchers a better understanding of their prospective field sites and provide them more content from which to develop relevant interview questions. A study in which both farms are involved in the same type of agriculture may offer a different type of comparison based on needs and possibilities associated with a specific type of agriculture. Finally, we feel a consumer perspective survey would add much value to the findings through comparing the perspectives of visitors alongside the owner/managers and employees.

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U.S. International Agricultural Development: What Events, Forces, Actors, and Philosophical Perspectives Guided Its Approach?

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Abstract

The philosophical perspectives, including significant actors, events, and forces, that influenced and guided the U.S. approach to international agricultural development are somewhat unclear. The purpose of this historical narrative, therefore, was to understand the key drivers responsible for developing the U.S. framework for technical agricultural assistance abroad. The study's findings were reported by answering two questions. The first question explored historical events, including federal legislative acts, which precipitated the U.S. approach to international agricultural development. The second research question addressed the philosophical primers imbued in the U.S. approach to international agricultural development, including significant actors responsible for popularizing it. We assert the environmental pragmatism of Liberty Hyde Bailey and its other proponents was the philosophical foundation *and* worldview *that informed many of the pioneers who guided the U.S. approach to offering agricultural assistance as part of its international development efforts. As such, we recommend the inclusion of certain aspects of environmentalism in agricultural and extension educator preparation with implications for international and domestic development, including long-term sustainability initiatives.*

Introduction

In the modern era, the Cooperative Extension Service (CES) is a collaborative effort between counties, states, and the federal government (Pope, 1958). The Smith-Lever Act was premised on the purpose of the CES to diffuse "among the people of the United States useful and practical information, on subjects relating to agriculture and home economics, and to encourage application of the same" (Pope, 1958, p. 270). The CES has long embraced the strategy in which programming matched the needs of its beneficiaries. In developing countries, however, agricultural extension systems are often only linked to national governments, as opposed to local, decentralized agencies, as organized in the United States (Swanson & Claar, 1984). In describing national agricultural extension systems (NAES) in developing countries, Swanson (2006) wrote:

> [A] continuation of the dominant 20th century extension strategy of increasing the productivity of the major food crops or improving national food security will lead to declining farm incomes among small-scale farmers, increased hunger, forced rural-urban migration, and further environmental degradation. In examining trends to date, it seems clear that public agricultural research and extension systems cannot compete effectively with major multi-national life-science companies that are supplying large-scale commercial farmers with highly productive, proprietary technologies. If national extension leaders continue to pursue this strategy, these national extension systems will likely follow the pattern of agricultural extension systems in Europe, North America and Oceania, either in being progressively downsized or disbanded altogether. (p. 15)

Most NAESs in developing countries perpetuate the notion that adoption of sustainable agriculture techniques and modern technology will increase yields (Van den Ban & Hawkins, 1996), i.e., techniques diffused commonly in more developed nations such as the United States. As a counterfactual, a move toward participatory, decentralized extension systems has been successful in China and India (Swanson, 2006). In participatory extension, "[t]he focus is less on *what* we learn, and more on *how* we learn and *with whom*" (Röling & Pretty, 1998, para. 27).

Rasmussen (1989) argued the philosophical and operational foundations of agricultural extension in the United States have been thoroughly documented, however, less is known about the origins of U.S. technical agricultural expertise in international agricultural development, including historically significant actors, events, and forces. "Arguably, an understanding of agriculture's history and current economic, social, and environmental significance, both domestically and internationally, is important for all Americans" (Doerfert, 2011, p. 11). To understand the importance and evolution of the role of U.S. technical expertise in international agricultural development, it was necessary to examine the historical evidence regarding its origins. This study aimed to present a historical perspective on the significant factors influencing the U.S. approach to international agricultural development and, thereby, provide clarity to us *and* counterparts in lesser developed countries (LDC) impacted by such.

Purpose and Research Questions

The purpose of this study was to examine the historical events, forces, and actors that influenced and thereafter guided the U.S. government's approach to offering international agricultural technical expertise to other nations. Two research questions guided this inquiry: 1) What significant historical events, including interagency federal legislative acts, codified the U.S. government's approach to offering technical agricultural expertise in its international development efforts? 2) What philosophical forces, including historically significant actors, influenced the U.S. government's approach to offering technical agricultural expertise in its international development efforts?

Methods and Procedures

"Two things emerge as the central foci in all such historical works: people who have made a difference and events that signal major accomplishments or turning points in the profession's development" (Camp & Crunkilton, 1985, p. 57). As such, historical research methods were used to answer this study's research questions. In 2002, McDowell published a comprehensive guide for conducting historical investigations. He suggested examining the past could illuminate the similarities between conditions governing both past and present with attention on implications for the future. According to McDowell (2002), "[h]istorical research does not consist in the mere collection of 'facts,' but rather in the interrelationship between factual evidence and the interpretation of this evidence by historians" (p. 4). He added: "A better understanding of the past places us in a more advantageous position to appreciate change in the present and to try and learn from past mistakes" (p. 5). McDowell's (2002) recommendations were followed in conducting this study.

Historical data were derived from primary and secondary sources, including legislative acts and reports, peer-refereed journal articles, and books. The information was accessed and collected via the main library at Oklahoma State University, including searches of several databases and the Internet. Key search terms included agricultural development, environmentalism, international agricultural and extension education, sustainable agriculture, sustainability, United States Department of Agriculture (USDA), and United States Agency for International Development (USAID). The study's sources of information were subjected to internal and external criticism to ensure their accuracy and authenticity (Johnson & Christensen, 2010; McDowell, 2002). Triangulating multiple references supported the study's credibility and validity (Tracy, 2010).

Findings

Research Question #1: What significant historical events, including interagency federal legislative acts, codified the U.S. government's approach to offering technical agricultural expertise in its international development efforts?

The provision of technical assistance, including programs involving agriculture, is not a concept first dawned by the U.S. government (American Council of Voluntary Agencies for Foreign Service [ACVAFS], 1953). For example, according to the Near East Foundation [NEF], "the practice NEF established of working in tandem with foreign governments and local organizations . . . provided a model for many of today's most well-known development organizations – including USAID and the Peace Corps" ("History," 2016, para. 7).

The U.S. Congress did not authorize the Foreign Agricultural Service Act (46 Stat. 497) until 1930. This act assigned the Foreign Agricultural Service (FAS) to lead USDA's efforts to ensure LDCs improved their agricultural systems, including international trade capacity, a precursor to its modern objectives of partnering with USAID to deliver high-impact food aid programs and support for agricultural development initiatives (FAS, 2016). The FAS mission reads "linking U.S. agriculture to the world to enhance export opportunities and global food security"; its motto is "linking U.S. Agriculture to the World" (FAS, 2016, para. 6).

Franklin Delano Roosevelt (FDR) inherited immense challenges during his presidency beginning in 1933, especially the *Great Depression* – a singularly dark period in American history (McCalla, 1969). By the 1930s, persistent drought was evident throughout the Great Plains region, which manifested crop failures, soil erosion, and large dust storms (Schubert, Suarez, Pegion, Koster, & Bacmeister, 2004). According to Lal, Reicosky, and Hanson (2006), the U.S. agricultural revolution and the evolution and use of the plow in traditional production agriculture, which occurred over many generations, invariably transformed the American landscape. They noted the "[u]se of the plow expanded rapidly with the introduction of the 'steam horse' in 1910 that led to widespread severe soil erosion and environmental degradation culminating in the Dust Bowl of the 1930s" (p. 1). Beginning in the late 1800s, strong agrarian movements in rural American communities sought farming practices that would effectively reduce the negative environmental impacts of prolonged intensive tillage, such as soil, water, and wind erosion, e.g., emergence of the Grange Movement and the Farmer's Union (Lal et al., 2006). Later, "Hugh Hammond Bennett led the soil conservation movement in the U.S. in the 1920s and 1930s, and urged the nation to address the 'national menace' of soil erosion" (Lal et al., 2006, p. 5). Bennett's zeal for conservation stemmed from his experience "studying soils and agriculture nationally and internationally" (Lal et al., 2006, p. 5).

The Roosevelt Administration famously instituted its *New Deal*, i.e., the National Industrial Recovery Act, focused on relief, recovery, and reform in 1933 (Fraser & Gerstle, 1989), which included programs to assist farmers. Gilbert (2015) noted the New Deal exemplified four principles of agricultural democracy:

> 1) decentralized administration through local farmer committees; 2) referenda to determine administrative policies such as quotas and penalties; 3) group discussion and adult education to promote 'intelligent participation'; and, 4) cooperative planning in policy formulation and localization of programs. (p. 15)

As part of the *New Deal*, the Emergency Conservation Work Program (P. L. 73-5), popularized as the Civilian Conservation Corps (CCC), was a public works relief program for youth and the unemployed during the Great Depression (Maher, 2007). The framework for the CCC was largely influenced by the emergence of service-learning as a method of instruction and success of another service-learning program, i.e., the National Youth Administration [NYA] (Roberts & Edwards, 2015). Similar to the NYA, the CCC provided employment opportunities to youth and unskilled workers. Specifically, it paid these individuals to engage in civic activities directly related to conservation and management of natural resources on federal and state lands (Williams, 2005). CCC activities related to agricultural conservation were also widespread; e.g., Corps members built terraces for farmers and dug farm ponds (Urban & Wagoner, 2014).

The National Industrial Recovery Act of 1933 (P. L. 73-67) codified conservation of soil and water as a national priority, including funding to fight soil erosion as the result of a combination of drought and poor agricultural practices (*"80 Years of Helping,"* 2016). For example, excessive use of the moldboard plow on the nation's prairies had marginalized ecological stability and soil health in favor of mechanized production agriculture to meet both domestic and international demand for food and fiber products (Lal et al., 2006). Moreover, a unique wind-break program, the Shelterbelt Project of 1934, was also implemented by FDR's administration in response to the widespread wind and soil erosion, which required extensive interagency cooperation between the USDA's Soil Conservation Service, state, county, and local agencies, and farmers (Williams, 2005). The shelterbelt project integrated environmentalism and conservation concepts commonly used in forestry with novel farming practices and traditional approaches that reduced water, soil, and wind erosion, such as planting windrows (Lal et al., 2006). During this period, the Soil Conservation Act of 1935 (P. L. 74-46) established the Soil Conservation Service, renamed the Natural Resources Conservation Service (NRCS) in 1994, as a permanent agency within the USDA (Lal et al., 2006). As a consequence, USDA managers explored ways to extend *conservation assistance* to farmers for the first time (Lal et al., 2006).

In 1938, Dr. M. L. Wilson, federal director of Extension in the USDA, visited the Macedonian Project in Greece (Allen, 1953). He observed the NEF had successfully adapted the methods of U.S. county agents and other extension personnel to a culture very different from that of the United States (Curti, 1988). However, his tenure abroad did not begin there. In the late 1920s and early 1930s, the Soviets hired select U.S. agriculturists to help establish farming systems (Stock & Johnston, 2001). Among those selected, Wilson traveled to the Soviet Union with highly detailed plans for establishing integrated farming systems (Stock & Johnston, 2001). Dr. Wilson belonged to an elite group of *agrarian intellectuals,* including five economists and a sociologist, “who led the USDA during the New Deal” (Gilbert, 2015, p. 13):

> Henry A. Wallace, secretary of agriculture; M. L. Wilson, undersecretary of agriculture and director of federal Extension; Howard R. Tolley, chief of the BAE [Bureau of Agricultural Economics]; Lewis C. Gracy, premier land planner, Bushrod W. Allin, top planning official; and Carl C. Taylor, leading rural sociologist. (p. 13)

“Half organic intellectual and half low modernist as the agrarian intellectuals were, the tradition they created was short-lived” (Stock & Johnston, 2001, p. 238). Many agriculturally focused New Dealers, however, pursued international careers following the end of WWII (Gilbert, 2015). For example, Tolley served as chief economist to the United Nations Food and Agriculture Organization [FAO] (Gilbert, 2015), and others demonstrated an international agricultural development focus earlier in their careers. According to Gilbert (2015), “Henry Wallace always stood as an internationalist” (p. 259). He added: “As vice president during most of America’s participation in World War II, he took it as his mission to internationalize the New Deal, . . . [while Dr. Wilson] pushed the globalization of the 4-H youth program” (Gilbert, 2015, p. 259). Wallace began his intellectual life as a “Jeffersonian and participant in the Country Life Movement. . . . His point of view, and that of his father and grandfather, Henry C. and ‘Uncle Henry’ Wallace, had been expressed, he recalled, by Liberty Hyde Bailey” (Kirkendall, 1997, para. 3). These agrarian New Dealers “ended their long careers abroad, working on land reform, rural development, and community development projects in places far removed from their native Midwest” (Gilbert, 2015, p. xv), including, in some cases, countries with government’s more receptive to their pragmatic approaches to participatory rural development.

As president, FDR had a reputation for reorganizing governmental operations to increase their efficiency (Olson, 2001). The Reorganization Plan No. 2 of 1939 (53 Stat. 1431) instigated the regrouping of federal agencies to reduce costs and eliminate duplicitous programs (Roosevelt, 1939, para. 4). One result was the brief disbanding of the Foreign Agricultural Service (FAS) and renaming it The Office of Foreign Agricultural Relations [OFAR] (ACVAFS, 1953). OFAR “[provided] technical knowledge and personnel, on a governmental level” (ACVAFS, 1953, p. 21). During this period, U.S. international agricultural policies were heavily reliant on national economic goals (McCalla, 1969), i.e., “imports of strategic raw materials,” and less, as some critics have argued, on offering technical assistance to developing nations (Paterson, 1972, p. 126). Gifford Pinchot, first chief of the U.S. Forest Service and an early champion of international conservation efforts, held correspondence with President Franklin D. Roosevelt (Miller, 2013). In his September 8, 1944 letter, Pinchot urged FDR to convene a global summit on conservation with the United Nations (Miller, 2013). This was not the first time Pinchot had pushed for this kind of international conference. As early as 1909, he made his original request to the *lame duck* President Theodore Roosevelt, but President William Howard Taft put an end to such an initiative on his ascension to office (Jundt, 2014). FDR died in the final year of WWII, and his successor, Harry S. Truman, became president on April 12, 1945 (Truman, 2014).

After attempting to convene a global summit on conservation with three different U.S. presidents, Pinchot finally succeeded when he presented his plan to President Truman (Jundt, 2014). “In 1946, at the behest of President Truman, the United Nations (UN) announced that it would hold a conference to consider the conservation and effective utilization of natural resources” (Jundt, 2014, p. 44). This was not the only initiative in regard to the United States’ forthcoming role in integrating conservation and sustainability concepts in international agricultural development. Inspired by the success of the NEF, as observed by M. L. Wilson in Greece, the Truman administration received approval from Congress in 1947 to offer technical assistance to Turkey and Greece (USAID, 1999). Paterson (1972) noted the “Truman Doctrine[’s] assistance to Greece and Turkey was part of America’s postwar economic offensive” (p. 119).

In a speech at Harvard University, Truman’s Secretary of State George C. Marshall proposed an outline for the European Recovery Plan, better known as the *Marshall Plan* (McCalla, 1969; USDA, 1999). The 4-year Marshall Plan was authorized by the Foreign Assistance Act of 1948, which established the Economic Cooperation Agency [ECA] (USDA, 1999). According to McCalla (1969), the United States seemed ready to assume the mantle of world leadership at the end of WWII. McCalla (1969) further stated: “The postwar period was marked by efforts led by the United States to reconstruct Europe and to rationalize international trade” (p. 337).

> To that aim, President Truman announced during his January 20, 1949 inaugural address: [The United States’] [c]ontinued support of the United Nations, the Marshall Plan, and military agreements such as the North Atlantic Treaty Organization (NATO) and the Rio Pact. [And][w]ith relish, he moved beyond these three points to announce a fourth point, a bold new program of technical assistance to underdeveloped areas. (Paterson, 1972, p. 120)

As a result, the *Point 4 Program* was established in May of 1950 as Title IV of the Foreign Economic Assistance Act. Its objective was to approach international development not through aid, but rather by facilitating technical assistance and private investment (Paterson, 1972). Some observers, however, took a contrarian viewpoint and saw the program as a “[m]eans for the United States to manage the postcolonial world while keeping less developed countries out of the Soviet [Union’s] fold” (Jundt, 2014, p. 47). Moreover, “[i]n this neocolonial system the United States sold former colonies the American way of modern industrial and consumer life while collecting payment in the form of their natural resources” (Jundt, 2014, p. 47). Nevertheless, the Technical Cooperation Administration (TCA) was established within the U.S. Department of State to implement the Point 4 Program (Erb, 1985).

The Point 4 Program was a series of bilateral agreements and contracts pertaining to “agriculture and rural programs” between non-governmental organizations, foreign governments, and the U.S. government (ACVAFS, 1953, p. 33). Henry G. Bennett, the first TCA administrator, led the Point 4 Program; unfortunately, Bennett died in an airplane crash in Iran while on an assignment for the Program (Clark, Davis, & Simon, 2008). In addition to his role with the Point 4 Program, Bennett served as president of Oklahoma A&M College, now Oklahoma State University (Clark et al., 2008), a land-grant institution. The mission and vision of the Point 4 Program persisted, however, and in 1951 then U.S. Representative John F. Kennedy suggested “[y]oung college graduates would find a full life in bringing technical advice and assistance to the underprivileged and backward Middle East” (Maier, 2009, p. 200), an allusion to the forthcoming Peace Corps.

During the period following Representative Kennedy’s speech, the Mutual Security Act abolished the ECA and replaced it with the Mutual Security Agency (MSA), which launched major foreign assistance programs (Morgner, 1967). The agency's main goal was to empower developing countries while containing the spread of communism by providing technical foreign assistance, including military and economic support (Morgner, 1967). To assess the impact and efficacy of U.S. foreign assistance programs, the ACVAFS published a study, made possible by support from the Ford Foundation. The council assessed *The Role of Voluntary Agencies in Technical Assistance*, which revealed "technical aid proposed by government and intergovernmental groups must of course extend far beyond the limitations of non-tax supported agencies" (ACVAFS, 1953, p. vii).

In one of Dwight D. Eisenhower's first acts as president in 1953, he renamed the Point 4 Program the *Technical Assistance Program*, and reorganized the TCA and MSA into the Foreign Operations Administration (FOA) to harmonize their efforts (USAID, 1999). Later, in 1955, the International Cooperation Administration (ICA) replaced the FOA (Morgner, 1967). Even though USDA's technical agricultural expertise was in high demand in many LDCs at that time (USAID, 1999), two studies were implemented by the Foreign Relations Committee of the U.S. Senate to assess the nation's international development efforts because of increasing pressure from U.S. citizens: *Administrative Aspects of the U.S. Foreign Assistance Programs* and *Agricultural Surplus Disposal and Foreign Aid* (USAID, 1999). Results of the two studies stoked political uncertainties regarding further adherence to the international development framework manifested by the Marshall Plan (USAID, 1999).

In an effort to "expand and unify American aid operations and strengthen the economic development component," major policy reforms occurred in regard to U.S. aid agencies offering technical agricultural expertise to LDCs (Morgner, 1967, p. 66). In 1961, President John F. Kennedy launched the United States Peace Corps, and the ICA was renamed the United States Agency for International Development (USAID), as arranged under the Foreign Assistance Act of 1961 (Morgner, 1967). The reorganization occurred because of increased dissatisfaction with the aid program, which combined already existing U.S. aid efforts (Morgner, 1967). Moreover, in 1959, the economist Walt Whitman Rostow published his economic model *Rostow's Stages of Economic Growth*. The model stated economic growth occurs in five basic stages, including traditional society, preconditions for take-off, take-off, drive to maturity, and age of high mass consumption (Rostow, 1959). This "economic development theory . . . provided the premise for much of the development planning in the . . . U.S. Agency for International Development" (USAID, 1999, para. 16). The approach was not without critics, for example, the pushback against the trends with USAID and the Washington Consensus on Agriculture (WCA), i.e., a growing point of view casting international aid as a *business* (Kydd & Dorward, 2001).

Nonetheless, USAID is the modern standard for international and intergovernmental cooperative service through its development projects and humanitarian aid, relief, and recovery programs (USAID, 2015), including efforts devoted to agricultural development. However, *lifting the veil* on the origins and precursors of U.S. technical agricultural development assistance to other nations illustrates the need to elaborate on the many actors and philosophical influences that manifested its emergence, evolution, and status.

Research Question #2: What philosophical forces, including historically significant actors, influenced the U.S. government's approach to offering technical agricultural expertise in

its international development efforts?

As noted by Minteer and Pyne (2013), "the conventional narrative of American environmentalism is no longer very helpful for conservationists and restorationists seeking philosophical justification and guidance for their work" (p. 6). In part, this may be due to many in higher education, such as conservationists, restorationists, and agricultural scientists, including agricultural educators, extensionists, researchers, and other scholars, predisposed to becoming isolated due to their *intellectual blinders*. Rogers (2003) considered this a form of *pro-innovation bias*. According to Rogers (2003), "when a scientist follows a theoretical paradigm, a set of intellectual blinders prevents him or her from seeing certain aspects of reality" (p. 106). However, Rogers (2003) also argued a degree of *trained incapacity* was necessary to cope with the vast uncertainties inherent to the research process (Rogers, 2003). Nonetheless, "[t]he progress of a scientific field is helped by realization of its own assumptions, biases, and weaknesses" (Rogers, 2003, p. 106). The evolution of U.S. agricultural development assistance is no exception.

By examining the individuals responsible for developing the notion of *conservation of natural resources* in the United States, including the intersection of anthropocentrism, i.e., dominated by humankind, and its antithesis, nonanthropocentrism, their tremendous influence on traditional agricultural practices becomes observable (Minteer, 2006), including philosophical differences. For example, in the decades after the USDA's incorporation into the presidential cabinet in 1889, two preeminent environmental ethicists and longtime allies experienced a philosophical schism. The individuals were Gifford Pinchot, the first chief of the U.S. Forest Service and credited with establishing the definition of *conservation of natural resources*, and John Muir. Muir was founder of the Sierra Club, a naturalist, an eloquent spokesperson for the environmental movement, and author of many articles in national publications on nature (Armitage, 2007; Williams, 2005). Considered leaders of the U.S. nascent environmental movement, Pinchot and Muir fomented the notion differences existed in American conservation. Further, they argued the movement could be conceptualized as two distinct camps: *conservationists* and *preservationists* (Minteer, 2006). Moreover, Pinchot and Muir are largely credited with creating the dialogue on *how we as a nation manage and preserve our natural resources* (Minteer, 2006). Their relationships with Presidents, both Muir and Pinchot with Theodore Roosevelt and in regard to FDR and Harry Truman only Pinchot, influenced the passage of significant federal legislation protecting and preserving natural resources in the United States (Minteer, 2006). Such impact included formation of the Soil Conservation Service and other agencies within the USDA (Minteer, 2006). For example, the CCC was modeled after work camps established by Pinchot in Pennsylvania "in an attempt to relieve unemployment" during the Great Depression (Pinchot, 1998, p. xv).

Minteer (2006) noted the competing narratives created by *conservationist* Gifford Pinchot and *preservationist* John Muir were oversimplifications of the rich and moral tradition of environmental thinking in the United States. In his book, *The Landscape of Reform: Civic Pragmatism and Environmental Thought in America*, Minteer (2006) suggested the existence of a "third way tradition to the intellectual landscape of American environmentalism, a philosophical path that has been almost completely obscured . . ." (p. 2). He perceived this path to environmentalism was advanced by

> Liberty Hyde Bailey, a horticultural scientist and rural reformer who was a leading figure in the agrarian wing of Theodore Roosevelt's conservation movement; Lewis Mumford, an urban theorist, cultural critic, and regional planner-thinker active in the Regional Planning Association of America (RPAA) during the interwar period; Benton MacKaye, a forester and conservationist (and Mumford's RPAA colleague) who proposed the Appalachian Trail in the 1920s; and, finally, Aldo Leopold, the forester-philosopher and author of the environmentalist classic *A Sand County Almanac*. (Minteer, 2006, p. 2)

As Minteer (2006) noted, the *third-way tradition* offered an integrated and progressive perspective on land stewardship and traditional American production agriculture and the intersection between human ideals, interests, and non-material values. Similar to Minteer (2006), Beeman (1994) acknowledged Liberty Hyde Bailey and Aldo Leopold as major contributors to the third-way tradition, better known to Bailey as the *Nature Study Movement* (Connors, 2012). Jane Addams of *Hull House* also held similar views on using agriculture as a vehicle for achieving social justice. Further, Beeman (1994) identified Edward Faulkner as a catalyst for this movement, and cited him as an antagonist for many scholars and practitioners of the period. His approach was rejected because

> . . . doing the opposite of what Faulkner preached was easier, more economical in the short-term, and was supported by the agricultural establishment, including the land grant college scientists, the experiment stations, the Farm Bureau, the USDA, and especially those vested interests in agribusiness who had little to gain from the wholesale rejection of agricultural chemicals. (Beeman, 1994, p. 99)

Nevertheless, Beeman (1994) concluded Faulkner's message was well received by Hugh H. Bennett, the *father of soil conservation* and first head of the Soil Conservation Service (Nelson, 1997) and author Louis Broomfield, who was a frequent contributor to *Reader's Digest* and the *Saturday Evening Post*.

Foor and Connors (2010) examined the historical backgrounds and impacts of several early teacher educators of agricultural education, including Liberty Hyde Bailey. Moreover, as Connors (2012) pointed out, researchers and practitioners should revisit Liberty Hyde Bailey's idea of nature study. He recommended Bailey be "remembered along with other noted individuals, as one of the pioneers of agricultural education" (p. 51). We, however, assert recognition of Bailey's influence should be extended further and credit him with laying the *philosophical foundation of the modern third-way environmentalism movement,* which, in no small part, presaged the agricultural expertise imbued in the U.S. government's international development goals.

It was Bailey's Nature Study Movement that garnered the attention of Gifford Pinchot and President Theodore Roosevelt (Ellsworth, 1960). Pinchot and Sir Horace Plunkett, Theodore Roosevelt's second tutor on agriculture and founder of the Irish Agricultural Organization Society, "created the memorable, working partnership of the colorful Roosevelt and the talented Bailey" (Ellsworth, 1960, p. 159). Bailey was eventually appointed by Roosevelt as chairman of the Commission on Country Life (Peters & Morgan, 2004) at the behest of Pinchot after he had initially rejected an invitation to chair the group (Ellsworth, 1960). Bailey relented and accepted the appointment after Roosevelt appealed to him with a "mixture of praise and reproach"

(Ellsworth, 1960, p. 162). In his appeal, Roosevelt admonished Bailey's refusal and said that he "would not have created the commission unless he had assumed that Bailey would accept the chairmanship; that Bailey's refusal would jeopardize the greatest opportunity which had yet presented itself to influence country life conditions . . ." (Ellsworth, 1960, p. 162). Other distinguished members of the commission included Kenyon Butterfield, Walter H. Page, Pinchot, and "Uncle Henry" Wallace (Connors, 2012; Peters & Morgan, 2004), Henry A. Wallace's grandfather and editor of *Wallace's Farmer* (Shoemaker, 2010).

Ellsworth (1960) further noted: "Bailey and Pinchot proved to be Roosevelt's most influential advisors in agricultural matters" (p. 157). The *Report of the Country Life Commission* showed the "general condition of farming life in the open country, and point[ed] out its larger problems" (Commission of Country Life, 1911, p. 3); the results of which were met with ambivalence (Ellsworth, 1960). However, despite the *battles* lost, the *Report* ultimately won the *war*, including stimulus for drafting and passage of the Smith-Lever Act (Ellsworth, 1960). Other initiatives to improve rural life in the United States became a reality in 1919 with creation of the Division of Farm Population and Rural Life, and emergence later of the National Country Life Association (Ellsworth, 1960). Moreover, "[r]ural sociology became a separate and thriving academic discipline as a result of the prestige given to it by the Country Life Commission" (Ellsworth, 1960, p. 172).

The *third-way tradition* is a strand within environmentalism that cannot be deemed entirely anthropocentric or nonanthropocentric, preservationist or conservationist, nor aesthetic or utilitarian (Minteer, 2006). Bailey's point of view made it difficult to cast him in one tradition over another. Minteer (2006) referred to Bailey as an idealist *and* pragmatist – a man that transcended philosophical and intellectual boundaries. Bailey was concerned with the intersection of "intellectual, aesthetic, and social character of rural life" (Minteer, 2006, p. 21). These tendencies were manifested by his "promotion of nature study for school children and an argument for its significance in creating an environmental ethic among country dwellers, especially farmers" (Minteer, 2006, p. 21). The third-way tradition was the precursor of *natural systems agriculture* (Minteer, 2006). Vestiges of this approach can be seen today at the Land Institute in Kansas (Chamberlain, 2010), a scientifically minded community of practice committed to advancing the current agricultural paradigm beyond the ubiquitous use of synthetic fertilizers and over-reliance on fossil fuels.

Conclusions and Discussion

The U.S. approach to international agricultural development was modeled after the work of organizations such as the Near East Foundation ("History," 2016). Gifford Pinchot, first head of the U.S. Forest Service and a confidant to several U.S. presidents, led a decades-long crusade to globalize conservation and introduce an international audience to the use of natural resources as guided by sustainable and economically viable practices. The Shelterbelt Project of 1934 was the first evidence of interagency cooperation and the utility of multidisciplinary teams to integrate environmentalism and traditional agriculture concepts (Williams, 2005). Moreover, key political and governmental figures advocated for legislation promulgating international agricultural development (Gilbert, 2015).

Minteer (2006) proposed the existence of a *third-way tradition* of American environmentalism. He concluded the third-way tradition was advanced by Liberty Hyde Bailey, Aldo Leopold, Lewis Mumford, and Benton MacKaye, among other proponents. Bailey initially declined a position with the Country Life Commission, and if not for Roosevelt's, Pinchot's, and Plunkett's tireless efforts to secure his leadership as its chair the commission's success was considered uncertain (Ellsworth, 1960). Beeman (1994) also alluded to the existence of a third-way to modern environmentalism, i.e., the precepts for a paradigm of sustainable agriculture practices, which were often diffused as part of U.S. international agricultural development efforts. Based on his work with sustainable agriculture *and* the traditional American agriculture paradigm, Beeman (1994) concluded Edward Faulkner, in addition to Liberty Hyde Bailey, Mumford Lewis, Aldo Leopold, and Benton MacKaye, were responsible for popularizing the notion of sustainability and conservation, including preservationist concepts among the general U.S. populace. Aspects of this philosophy were manifested during the New Deal and led by champions that Gilbert (2015) described as *agrarian intellectuals*. Although their influence was short lived domestically, many of these individuals migrated to working in international settings, including early post-WWII projects featuring agriculture and rural development (Gilbert, 2015). Their efforts presaged the U.S. government-led international development initiatives that would become USAID (Gilbert, 2015).

In regard to participatory-democratic culture, John Dewey (1939) stated: "An immense difference divides the *planned* society from a *continuously planning* society" (p. 321). In what he called the *Great Community*, Dewey asserted "practical experience and experimentation in problem solving could teach communities and societies how to become more democratic" (Gilbert, 2015, p. 256). The notion of civic pragmatism and environmental ethics introduced significant implications concerning the philosophical underpinnings of the U.S. approach to the provision of agricultural technical expertise as foreign assistance (Gilbert, 2015; Minteer, 2006). Specifically, these worldviews suggest a philosophical chasm that grew to be deeply embedded in the U.S. approach to environmentalism, including social, political, economic, and cultural manifestations (Reid & Taylor, 2003) with implications for agriculture. However, we know this to be only a partial account of the larger phenomenon. To that end, agrarian New Dealers "believed that expertise must join with the local knowledge of farmers and that federal authority should decentralize to citizens. They sought both to merge science with citizen knowledge and to integrate government action with local participation" (Gilbert, 2015, p. 21). Unfortunately, the philosophy of the agrarian New Dealers did not materialize in rural America to the extent they had hoped (Gilbert, 2015).

The agrarian New Dealers did, however, take aspects of their third-way tradition of decentralized, participatory rural development abroad (Gilbert, 2015). "[The practice of] local social change bore fruit globally before coming home to help shape major social reforms in poor rural and urban neighborhoods throughout the United States" (Gilbert, 2015, p. 260). In addition, the crucial role of *indigenous knowledge* in the U.S. approach to domestic and international agricultural development efforts cannot be understated. For example, the *issue of equality* (Rogers, 2003), in both formal and non-formal teaching and learning environments, is important domestically and internationally. In international development, agricultural extension agents have a tendency to engage with farmers more similar to themselves, i.e., the principle of *homophily* and related communication behaviors (Rogers, 2003). As a consequence, knowledge transfer between agricultural extension agents and farmers is likely to expand the *knowledge gap* between the different groups comprising a social system (Rogers, 2003). It is prudent, therefore, that international extension professionals are sensitive to the potential pitfalls associated with widening inequalities stemming from adoption behaviors favoring the already advantaged in a social system (Rogers, 2003).

In the United States, the social science tradition of participatory-democratic, rural agrarian reform had a brief life span (Gilbert, 2015). This aspect of the New Deal was defeated by old-fashioned power politics, and many of its ideals ended with it, at least, regarding agrarian reforms (Gilbert, 2015). As such, partners in U.S. international agricultural development efforts *ought to learn from our mistakes* while emphasizing the value of local knowledge and the exchange of information and ideas among extension/advisory service providers, other educators, researchers, and host-country nationals through participatory-democratic collaborations. Navarro (2008) called such efforts the *co-creation of knowledge* by and for agricultural extension agents, researchers, and farmers such that we move “toward a vision of agricultural extension as an interactive and integrative model of shared knowledge and joint discovery” (Navarro, 2008, p. 75). Such practice could address Rogers’ (2003) admonitions regarding *pro-innovation bias* and *issue of equality*.

Implications and Recommendations

Many countries worldwide have developed deeply rooted and philosophically moored environmental traditions and, in many cases, adopted principles espoused by the U.S. government and other nations’ development agencies (Minteer, 2006). This study shone some light on the philosophical foundations of agricultural and extension education in regard to international agricultural development, with a view toward influencing contemporary policy intersecting with environmentalism and traditional agricultural production practices in the United States and abroad (Brosnan, 2007). We recommend strengthening cross-cultural understanding and communication between academic traditions and with partners around the globe by contextualizing environmental and agricultural ethics within their historical, intellectual, and geographical settings while “deemphasize[ing] the most radical aspects” of Environmentalism ideology (Chamberlain, 2010, p. 90). Instead, we encourage development specialists to embrace the earlier version, i.e., Bailey’s Nature Study Movement (Connors, 2012) and later understood as the third-way tradition taken abroad by Gilbert’s (2015) *agrarian intellectuals.*

The actors illustrated in this study argued philosophies on participatory development and conservation of natural resources and sustainable use of the same should be studied by all students in colleges of agriculture. For example, Pinchot’s works on *conservation ethic* and Aldo Leopold’s writings concerning *land ethic* have long been studied and recognized in the field of forestry, however, they are not as well known in other allied disciplines, including agricultural and extension education. It is important for these concepts to permeate the rich tradition of production agriculture in the United States. We further recommend exploring foreign influences on American agriculture and environmentalism, including their philosophical primers. In addition, attention and clarity concerning high and low modernism as well as their relation to agriculture and an educated citizenry is warranted, including the period following the New Deal era and the technocratization of federal agencies advising and regulating agriculture in the

United States. Such an inquiry could include the period beginning with the *Green Revolution* and moving forward to more recent approaches to international agricultural development and the longstanding involvement of U.S. agricultural and extension educators.

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International Student Motivations to Study at Iowa State University: in the Agricultural Education and Studies Department

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Abstract

The purpose of this study was to explore factors that affect international students' motivations to study in the Agricultural Education and Studies Department at Iowa State University. Data sources were collected from four international students from China, Malaysia, and Saudi Arabia, using interviews with open-ended questions over motivational factors, which made them want to study within the department. The findings indicated international students are motivated to study where there is a quality education, adequate living environment, institutional support, and self-determination for personal advancement. Since the findings indicated all international students positively perceived the quality of education at Iowa State University as their motivation to continue attending, educators must continue maintaining a positive learning environment for international students. Moreover, university administrators, policy makers, and educators should continue enhancing international students' living conditions and retaining financial aid for international students. Educators and policy makers can utilize these findings to help recruit and retain international students within the department. The researchers recommend future case studies to be conducted intertwining other disciplines and colleges at the university.

Introduction

Each year the number of students attending higher education institutions abroad continually increases; constitutes to international student mobility changing the global higher education atmosphere across the globe (Wei, 2012). The United Nations Educational, Scientific and Cultural Organization (UNESCO), Institution of Statistics (UIS), reported in 2009, there were 3.4 million students studying abroad, where the United States constitutes for 20% of the total number (Chien & Kot, 2012). International students have sought-out higher education institutions for academic opportunities in other countries because they attain the capability of receiving an advanced education making them incomparable to their peers. After the repercussions of World War II, the federal government in the United States, decided to invest a significant amount of money in research; which attracted international students to come to the United States and study at local universities while conducting research (Akanwa, 2015). International student mobility has made a drastic shift in the United States, making it the number one country in the world to receive the most international students to attend higher education colleges (Roberts, 2012).

In the United States, there are approximately 4,200 accredited higher education colleges with 16 million students in attendance; 565,321 are reported to be international students that contribute more than $13 billion to the United States economy in 2004 (Obst & Forster, 2005). International students contributed more than $21 billion dollars in 2012 to the United States economy, helping the universities financial well-being with the majority of international students paying full tuition (Hegarty, 2014). Not only international students contribute to the economy, but also universities' learning atmosphere. International students add a significant contribution to the personality of the institution they are attending, as Obst and Forster (2005) indicated international scholars offer American classrooms a diverse perspective which enhances the quality of teaching, discussions, and research in American campuses. Akwana (2015) concludes, although American higher education has remained an attraction for international scholars, it has some challenges which characterize international student's experiences such as the diverse academic environment. Facilitating a diverse environment for international students to interact with other international students is vital for foreigners to be successful academically. In addition, studies have shown there is a language barrier which hinders academic performance such as the proficiency of the English language. It is crucial for international students not only to be prosperous scholastically, but also to help with social adjustments to build relationships with students (Andrade, 2006; Wan, Chapman, & Biggs, 1992).

At Iowa State University, the number of international students enrolled has increased from year to year. According to The Office of the Registrar, in the fall of 2016, 4,131 international students came from more than 100 different countries. This is comprised of about 11 percent of the total number of students enrolled at Iowa State University (Iowa State University, 2016). As an internationally recognized university, the university expects to attract foreign students to enrich the diversity in the academic atmosphere. The Agricultural Education and Studies Department, as mentioned in the strategic plan, sets one of its goals as: "expand international agricultural and extension education program efforts in the department, which fosters collaboration on teaching, learning and scholarship" (Agricultural Education and Studies, 2010). The strategic plan of the department is to expand international programs; however the department must understand what motivates international students to study in the United States.

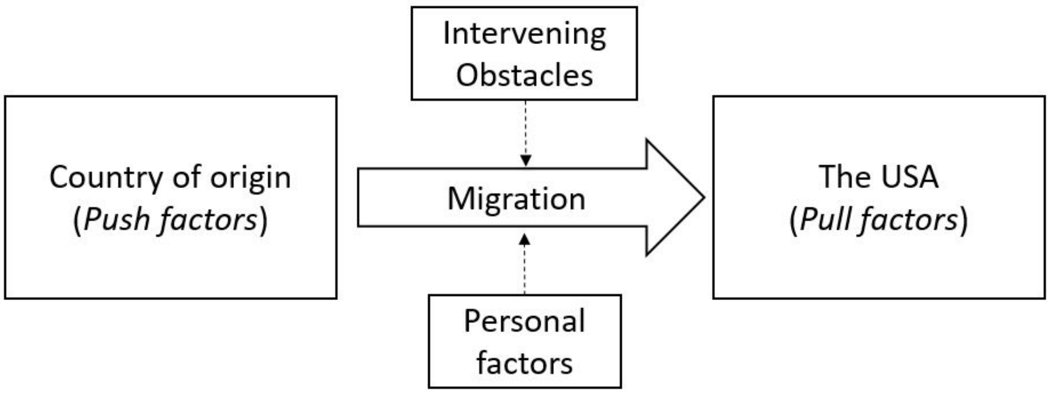
Within various studies regarding international students attending higher education institutions in the United States, some of the studies have focused on students' motivation (Bornsztein, 1987; Hwang 1998; Jenkins, 2007; and Zhou, 2014), using quantitative and qualitative approaches. Jenkins' (2007) indicated three major factors related to international students' motivation to study within the United States. These factors include: educational reputation and quality, learning and social environment, and financial reasons. Understanding an international student's decision making-process to come to the United States to achieve a higher education degree will assist faculty to recruit and retain international students.

Theoretical Framework

The push and pull factor theory were utilized as the framework for this study. This theory, also known as the theory of migration, rooted back from the study on migration (Lee, 1966). The theory implies that individual's motivations to migrate are influenced by several factors in the area of origin, destination, intervening obstacles, and personal factors. Numerous studies related to student's intention to study abroad have indicated different motivational factors to study out of their country of origin. Altbach (2004) studied about foreign students in the United States, and Li & Bray (2007) studied Chinese students pursuing education in Hong Kong and Macau. The studies revealed there are factors associated with favorable and unfavorable conditions which affected student's decision to study abroad.

This study will seek to understand the motivations of international students to study in the United States. We perceive, the decisions made by international students in selecting a university in the United States are highly related to the factors which influence their motivation. The push and pull factor theory, is a lens to frame this research, where we assume this framework will help to expose underlying reasons which may predict a student's decision (Figure 1).

Figure 1. Push and Pull Theory (Lee, 1966).



Push factors are those factors, which force the international student to move voluntarily. The pull factors are those factors in the destination country which attract the international student to study abroad (Mazzarol & Soutar, 2002). Lee (1966) indicates there are personal factors which may influence an international student's decision to leave their country of origin and find a host country to attain a higher education. However, there potential could be intervening obstacles which can prevent the international student from selecting specific host countries and/or specific higher education institutions within the host country. Personal factors and intervening obstacles can aid in understanding how international student's decision-making process occurs when selecting a host country and higher education institution within the host country.

Purpose of the Study

Upon selecting the United States as a host country, understanding what attracts international students or what pulls them in, will aid universities to recruit and retain international students. Thus, there is a need to expose factors that affect international students' decision to apply and study at Iowa State University. There are several studies related to international students' studying in the United States, nevertheless there are still minimal research which focuses on international student's motivation to study in the United States (Bornsztein, 1987; Hwang 1998; Jenkins, 2007). The need for the study aligns with the American Association for Agricultural Education (AAAE) National Research Agenda Priority Area 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century. AAAE indicated the need for "internationalization, or steps taken by an academic institution and/or individuals to manage the dynamic global academic environment"… "Institutions will have to produce cross-culturally competent citizens who can lead and complete in diverse global marketplaces" (Roberts, Harder, & Brashears, 2016, p. 32). International students offer American classrooms a diverse perspective (Obst and Forster, 2005) which could aid in producing cross-culturally competent students. The purpose of this study was to explore factors that affect international students' motivations to study at Iowa State University focusing on the Department of Agricultural Education and Studies. Our research question was:

1. What are the factors that affect the Agricultural Education and Studies Department international students' motivations to study at the university.

Methodology

This study employed an observational case study method. A case study, as defined by Merriam (2009) is an in-depth description and analysis of a bounded system. Merriam further explains the character of a case study as the unit of analysis, compromising the heart as the focus of the study and the circle as the boundary that limits what should be and what should not be studied. The heart of the study is the motivational factors which affect international student's decision to attend a university. In this research, the researchers selected the Department of Agricultural Education and Studies as the boundary of the case. Qualitative narrative gives lived experiences and a voice to the participants (Merriam, 2009).

Sample

The sampling method used was a convenient sample, where we purposely selected international students studying in the department as the informants. Merriam (2009) held that convenience sampling is when we select samples based on time, money, and location. The following criteria were set in selecting participants to be the best fit the study with convenient access:

1. First, the list of participants was obtained through the website of the department where it entails the information about graduate students in the department.
2. Four international students were selected based on geographic representation and easiness access. Participants were selected by geographic location if that country of origin had multiple of students in the department from that country of origin.
3. The researchers contacted the selected participants by visiting their office to obtain their approval.

The researchers created pseudonyms for each international student to aid in protecting their anonymity. The sample size of this case study was four international students in the department. The students were: Ahmed from Saudi Arabia, Wang Fang and Li Wei from China, and Siti from Malaysia. All participants were given names that are common within their country of origin.

Data Collection

The primary data was collected through four separate interviews per participant, held on campus with 11 open-ended questions over motivational factors impacted their decision to study in the department. Each interview lasted approximately 30-40 minutes and were conducted at the convenience of the participant. With permission from the international interviewees, we recorded the interviews using an audio recorder; in addition we took field notes. Field notes were kept under lock and key within the researcher's office. The researchers then transcribed the audio recordings manually to written form. Upon transcribing the audio recordings, the transcripts were sent back to the participants to validate the transcript to create trustworthiness of the data. This was a form of triangulation known as member check (Creswell, 2007). Feedback given by the participants improved the reliability of the findings. Once the transcripts were validated, audio recordings were deleted to keep the identity of the participants protected.

Data Analysis

In data analysis, the researchers looked for the major common theme amongst the transcripts for motivational factors to study in the United States. To accomplish the objective; the researchers used a thematic analysis as a method to identify, analyze, and describe the major themes found amongst the transcripts (Bruan & Clark, 2006). The researchers used a six-phase process created by Bruan and Clark (2006) to identify the recurring themes:

Figure 1: Thematic Analysis Six Phases

Phase 1: Becoming familiar with the data
Procedure: Read over transcript and became familiar with the data and what it means
Result: Finding preliminary codes and taking notes

Phase 2: Generating initial codes
Procedure: Generated comprehensive codes to answer the objective by reducing data
Result: Found initial codes after data was reduced

Phase 3: Searching for themes
Procedure: Looked over initial themes to further analyze and see if they work well
Result: Comprehensive themes emerged

Phase 4: Reviewing themes
Procedure: Reviewed current themes to ensure they meet the objective of the study
Result: The researchers recognized how the themes are patterned to explain the objective

Phase 5: Defining and naming themes
Procedure: Defined the theme; along with giving it a suitable name
Result: Defined the theme to ensure the theme is understandable to others

Phase 6: Producing the report
Procedure: The researchers wrote the report of themes for the objective in a thick description
Result: Explained the final result of the coded themes found amongst the transcripts

Note: Adapted from Bruan and Clark 2006

Limitations and Positionality

The sample size of this case study was four international students in the department at Iowa State University. This limits the availability to generalize the findings.

The principal investigator was responsible for conducting interviews, transcribing data, coding, and academic writing of the case study. She is an American female, so her identity and characteristics are very different from international students. Therefore, she may not understand what the informants are meaning by specific statements in responses to the questions. Thus, to understand what the informants meant by something she would have them explain their answers in further detail. The research assistant was responsible for carrying out interviews, transcribing data, coding, and academic writing of the study. As an international student, his position might lead to a bias as he can understand the meaning and feeling of the respondents. Therefore, to limit the bias, he frequently consulted with the principal investigator and provided her with more space in reviewing the writings. Both researchers have a constructivist perspective as their epistemological lens. According to this paradigm, the researchers believe the nature of inquiry is interpretive and its sole purpose is to understand a particular phenomenon (Farzabfar, 2005). Farzabfar (2005) indicates constructivist are naturalistic whom tend to be non-manipulative or controlling.

Results

Participants were selected based off their different geographic locations including: Malaysia, Saudi Arabia, and China. Each geographic location has more than one international student within the department at Iowa State University. The population of the study was comprised of (n = 2) females and (n = 2) males; ages ranged from 31-33 years old. Participants were all graduate students pursuing a doctoral graduate degree in the department. The intent of this study was not to generalize the results to all international students, but further describe the population of international graduate students who took part in this study. Results from the study cannot be generalized to all international students, however; valuable information can still be derived from the study (Creswell, 2007).

The objective of the study sought to determine which motivational factors affect international student's decision to study in the department. Upon analyzing the transcripts and coding the data, researchers found four common themes: quality of education, living environment, institutional supports, and self-determination for personal advancement are the major motivational factors which affect their decision to obtain a graduate degree.

The Quality of Education

The most common theme which emerged regarding international student's motivation was the quality of education in the United States, specifically at Iowa State University. All participants mentioned this to be the factor that influenced their decision to study in the United States. We elaborated this theme into two sub themes i.e., *Reputation of education quality* that reflects the students' knowledge about the quality of education before they started their study, and *experience on education system* which shows the students' perception on the education system after attending the university.

Reputation of education quality. The universities reputation, especially in agriculture, has been internationally recognized by the participants even before they came to study in the United States. Wang Fang, a student from China stated, *"While I was studying my Bachelor's degree in China Agricultural University in Beijing, people talked about agricultural education globally, and Iowa State University agricultural education has been talked more frequently."* The quality of education has impacted perceptions of people abroad, which eventually affected their decision. Ahmed from Saudi Arabia echoed that statement, he stated, *"I knew the university was a well-known and appreciated school in terms of agriculture as a college, and agricultural education as a department."*

Experience in education system. Another statement related to the educational system mentioned frequently was the academic support from the university, such as the professors and staff. Positive attitudes showed by academic advisors are deemed important as an encouraging factor. Support and encouragement reflected the academic quality, which motivates the students during their study at the university. Li Wei says, *"Iowa State University has professors who spend more time with students. You feel more comfortable and respected more than other universities… I believe the university gives me a personal experience of a platform to do my research and professors show support with that."*

Another important point, which reflected the quality of education at the university, was the academic system, especially as related to the student's specialization in the department. The academic system included the topics and subjects they learned throughout the courses, which influenced their motivation to study, as Ahmed mentions:

> Agricultural education in Saudi Arabia, we focus on just agricultural extension, a part of agricultural education in the United States. In the United States, I have learned about agricultural education in general, which includes school based learning, post-secondary institutions, agricultural extension, agricultural communication, leadership, and I feel this is the most beneficially part of studying agricultural education here in the United States.

We perceived the universities quality of education was the utmost important factor, which influenced international students' motivation either to decide to enroll at Iowa State University and/or continue their study.

Living Environment

The second emerging theme related to the student's living environment both on campus and in housing was related to social relationships with other people. We divided the section into three parts, which included reputation of multicultural society, experience on hospitality, and adaptability to the new environment.

Reputation of multicultural society. All the participants indicated they had heard about the social life from their colleagues. Participant's former experiences contributed greatly as students found out about the hospitality through word of mouth. Li Wei says, *"I heard it is a really friendly town to get your education in as an international student."* Ahmad mentioned more specifically regarding how international students were treated on campus. *"Most people I have spoken to have recommended the university because they know how to deal with international student. They have more experience dealing with international students, more diversity on the community"*, he said.

Experience on hospitality. International students felt convenient in living and studying at the university, whereas this experience affected their motivation to stay and study. Ahmed describes his experience in living with people in different states across the United States. *"I came to the United States and have lived in three different states. I found American people are friendly and easy going, and open to people from outside of the United States, in general"*, he said. On some occasions, students have compared their perceptions with their other friends who have lived in other English speaking countries. For example, Wang Fang mentions, *"I do believe compare to other countries that speak English, America is the most hospitality. I thought I'll be more welcomed in this country at that time, and I still believe that.*" Similar thought was expressed by Siti. She stated, *"The best thing about the United States is understanding a new culture and system, this is far beyond my expectation. The United States is more exceptional when compared to other countries."*

Adaptability to the new environment. Several keywords were mentioned, which could be associated with the students' ability to adapt to a university, such as learning new language (English) as a requirement in studying in the United States and socializing with other people from different countries. Ahmed implicitly believed that although English was not his first language, studying English in America is easier than other countries. He says, *"I know some people who went to study in China, or Germany… The language was the most important in their education, but learning English here in the United States is easier than in other countries."* However, although studying in the United States could be a benefit in learning English, Wang Fang and Li Wei mentioned it was a barrier the first time they came to the United States. For example, Li Wei indicated, *"Sometimes people cannot understand your intentions because you cannot clearly tell them. Sometimes it feels like you are being offensive, but it is not. It is just the way they acted to our ideas."*

Another aspect related to student's adaptation to a new environment was being far from family. Ahmad mentions, *"The distance between Saudi Arabia and the United States is around 16 hours' flight. It's a long distance, I can only go back to visit one time in two academic years."* A similar response was stated by Siti, she said *"Learning you know, far away from family."* However, experiencing a multicultural society can be a benefit, which had been expected by the students, despite their current situation in living away from their families. For example, Ahmed says, *"Iowa State University encourages and supports international student clubs… It hosts events that include culture. When you come here you learn about new culture, new tradition, new countries, this university met my expectation."* Siti mentions, *"The best thing about the United States understands a new culture and system this is far beyond my expectation. The United States is more exceptional when compared to other countries."*

Institutional Supports

Our analysis of the data also found students' motivation to study at the university was affected by the institutional support (financial support or encouragement) provided by the students' home country government. Institutions included the government in the participants' origin countries, the students past and current employers, and the university. Supports could be given either in the form of encouragement or financial assistances.

Institutional encouragement. Ahmed mentioned that it was his government who encourage him to pursue a degree in the United States. He says, *"The government of Saudi Arabia encourages people [who want to study abroad], or required people to go to American institutions. I looked for admissions at Purdue University, Texas A&M, and North Carolina University, and Iowa State University."* Siti mentions her employer encouragement contributed to her decision, as she mentions, *"I am working with my university which requires for me to get a PhD from the United States, and so I began to work on the requirements."* Encouragement from the institutions ensured the students they were given full support if they decided to study in the United States.

Financial supports. Some students indicated they obtained sponsorship either from the government or the university to pay for their study. Two of our respondents, Ahmed and Siti said their government paid them to study at the university. Siti indicated, *"The government offered sponsorship… Financial support motivated me to come to the United States because they provided me some money so I didn't have to worry about finances"*. Ahmed mentioned, *"I received a scholarship from the government of Saudi Arabia. A full scholarship provided this opportunity and they pay for living expenses."* It is also interesting to see the financial support which was given not only by the government, but also from the university. Li Wei said, *"At this university I used my personal funds to support myself until after the first year. After the first year, I was provided a ¼ assistantship and later I received a ½ assistantship."* With financial supports, international students could be more focused on their study without worrying about their living costs and other expenses.

Self-Determination for Personal Advancement

The fourth theme, which emerged was international students' self-determination for personal advancement. Students' willingness to boost their career as well as their plan to contribute to the society by obtaining a degree motivated them to study at this university.

Willingness to improve career. All the students studied mentioned the quality of education, which accommodates their desires to improve their abilities would eventually affect their future career. Li Wei mentions, *"The big trend is globalization… I feel my generation people tend to enjoy studying abroad. Some people get their education from other countries and then come back with a broader perspective"*. Wang Fang said,

> Actually, I was in the bottleneck in my career at that time, so I was trying to look for another option in my life. I was provided one shot, I only apply to this university. I thought that if I got accepted, I would congratulate myself, otherwise, I would stay at my desk working on my daily activities.

Willingness to contribute to the society. Another point that marked students' determination in personal advancement was the students' desire to contribute to the society. Li Wei, a student from China says:

> I must go to rural families each week, sometimes two times, generally every week I had to go to a rural field to do interviews, to talk with farmers, to talk with the

> agricultural expertise, try to figure out to covering farming issues by the season and try to find solution and write articles about that in the newspaper. After five years working, I want to do better, but I don't know how. I can see the issues, I know what the farmers are questioning about, but I don't know how to solve them. The only thing I can do is to bring other people here and help. Are there any other things that I can do to make the decision better. I thought a higher degree, with more study, and knowing how to do research and use my research achievement to benefit the whole rural community would be a better option to me.

Li Wei believed knowledge gained from her study at this university would be an important element to serve her community in China. Ahmed mentioned he did not always mean he must work within his country, *"I would like to work in (other) countries… collaborating with other colleges in Malaysia, Indonesia, or even countries in Africa… Agricultural extension has a direct connection with rural communities, especially those who depend on agriculture as an economic factor"*. Self-determination is also an important component in motivating students to continue their study in the United States. It shows a students' decision is not only affected by factor outside, but also their personal intentions, either economically or socially.

Discussion/Conclusion

The purpose of this research was to explore international student motivations to study at Iowa State University focusing in the Department of Agricultural Education and Studies. The most common themes, which were observed, included the quality of education, living environment, institutional supports, and self-determination for personal advancement. The findings showed there are four major factors that affected students' motivation to study at the university. The intent of this study was not to generalize the results to all international students, but further describe the population of international graduate students who took part in this study.

The first reason, which encouraged the students to apply, was the quality of education students would acquire at the university. This data was aligned with previous research of why international students perceive the quality of education has a positive impact on people in their countries (Jenkins, 2007). The push and pull factor theory explained favorable conditions in destination place might encourage people to migrate (Lee, 1966). International students were eager to look for a high quality education system that could facilitate their learning, where they perceived the quality of education was better at this university than those of universities in their origin countries.

Another factor affecting student's motivation was the living environment in the United States, particularly at Iowa State University. The universities reputation as an institution provided good services to international students, as well as the local people's treatment toward multicultural diversity have become a positive remark. The push and pull factor theory as explained by Lee (1966), the positive environment could decrease intervening obstacle as one of the factors affecting motivation to migrate. Student perceived the university promised a positive atmosphere and suitable condition to live and study, which decreased the students' concerns in leaving their own countries.

A unique finding focused on language adaptation, one student mentioned studying in the United States benefited him in terms of language adaptation because studying in the United States made it easier to learn English, while others mentioned it as an obstacle. This is due to different perspectives in viewing English as a second language of learning opportunity and language adaptation. It is perceived students who were eager to learn English felt more prepared to learn it in an English-speaking country because they could easily practice the language they were learning in an academic setting and daily life. However, during a student's initial adaptation in the United States, a gap in language could be a barrier to communicate with others. Wan et al. (1992) indicated the language barrier could be a stressful academic situation for international students in the United States who possess less English skills to perform in the academic life.

Institutional supports such as financial and encouragement were considered a factor which affects student's motivation. Both the government in the student's original country and the university played a big role to encourage the student to study in the United States. Financial assistance was given to the students to help them pay fees and living costs. This assistance reduces the obstacles of living in another country. This situation was also pointed out by Jenkins (2007) that financial assistantship was an important factor which influenced a student's decision to study in the United States.

Self-determination on personal advancement was discovered as the students mentioned the degree they were pursuing was useful to advance their career. The degree was deemed as an added value which could bring better position, either in academia or another professional career. Moreover, we revealed that education is highly valued in their origin countries, meaning a higher degree can boost their value when they return to their home country. Likewise, Zhou (2014) pointed out doctoral students' perceived education in the United States, both in research and teaching, was a path to realize career dream.

Our analysis shows students' motivation to study in the United States, particularly at Iowa State Universtiy was affected not by a single factor, but by several factors that were interrelated. The quality of education in the United States, cannot be a single pull factor alone, as the gaps between the quality of education in the United States and students' origin countries could strengthen or weaken the pull-push factors. Researchers also revealed the institution reputation alone was inadequate to pull the students to come and study. Other factors such as financial or encouragement supports from the students' origin countries as well as their personal intention could be factors that affect their motivation to enroll.

In conclusion, there are several motivations which become reason for international students to pursue their study. The reasons were the quality of education in the university, living environment, institutional support, and self-determination on personal advancement. The motivations most likely perceived by international students as the most important reason to drive them to study.

Implications/ Recommendation

The study provides information for educators and policy makers at this university. Since the findings shows international students positively perceived the education quality at the university as their motivation to continue attending, educators need to continue to maintain a positive learning environment will make international students feel comfortable, safe, and engaged. Providing social gatherings and/or clubs for international students will aid in making them feel at ease. In addition, the institution should continue to enhance financial assistance and living conditions for international students. By better understanding international students' needs and motivations, the department and the university might design a better policy related to international student recruitment. For instance, the department's international students claimed financial support and encouragement as a reason for them to pursue their study. Therefore, by providing an opportunity for assistantships and to apply for jobs in the university, the institution will induce the motivations among international students to study in the United States.

This study sheds light on international students' recruitment in the department. As this study was limited to one department, we encourage future researchers to conduct case studies of other disciplines and colleges at the university, to analyze the probability of diverse motivational factors across international students. Understanding the diverse motivational factors will strengthen the decisions made by the policy makers at the university. International students bring academic and cultural diversity to the host country (Slaughter and Rhoades, 2004). Graduate programs and their respective institution harbor the responsibility to support their student's ambitions and aid in developing their intellectual ability. Longitudinal studies are needed to determine if the motivating factors that pulled the international student in are still being sustained over the course of their program.

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U.S. International Agricultural Development: What Events, Forces, Actors, and Philosophical Perspectives Guided Its Approach?

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Abstract

The philosophical perspectives, including significant actors, events, and forces, that influenced and guided the U.S. approach to international agricultural development are somewhat unclear. The purpose of this historical narrative, therefore, was to understand the key drivers responsible for developing the U.S. framework for technical agricultural assistance abroad. The study's findings were reported by answering two questions. The first question explored historical events, including federal legislative acts, which precipitated the U.S. approach to international agricultural development. The second research question addressed the philosophical primers imbued in the U.S. approach to international agricultural development, including significant actors responsible for popularizing it. We assert the environmental pragmatism of Liberty Hyde Bailey and its other proponents was the philosophical foundation *and* worldview *that informed many of the pioneers who guided the U.S. approach to offering agricultural assistance as part of its international development efforts. As such, we recommend the inclusion of certain aspects of environmentalism in agricultural and extension educator preparation with implications for international and domestic development, including long-term sustainability initiatives.*

Introduction

In the modern era, the Cooperative Extension Service (CES) is a collaborative effort between counties, states, and the federal government (Pope, 1958). The Smith-Lever Act was premised on the purpose of the CES to diffuse "among the people of the United States useful and practical information, on subjects relating to agriculture and home economics, and to encourage application of the same" (Pope, 1958, p. 270). The CES has long embraced the strategy in which programming matched the needs of its beneficiaries. In developing countries, however, agricultural extension systems are often only linked to national governments, as opposed to local, decentralized agencies, as organized in the United States (Swanson & Claar, 1984). In describing national agricultural extension systems (NAES) in developing countries, Swanson (2006) wrote:

> [A] continuation of the dominant 20th century extension strategy of increasing the productivity of the major food crops or improving national food security will lead to declining farm incomes among small-scale farmers, increased hunger, forced rural-urban migration, and further environmental degradation. In examining trends to date, it seems clear that public agricultural research and extension systems cannot compete effectively with major multi-national life-science companies that are supplying large-scale commercial farmers with highly productive, proprietary technologies. If national extension leaders continue to pursue this strategy, these national extension systems will likely follow the pattern of agricultural extension systems in Europe, North America and Oceania, either in being progressively downsized or disbanded altogether. (p. 15)

Most NAESs in developing countries perpetuate the notion that adoption of sustainable agriculture techniques and modern technology will increase yields (Van den Ban & Hawkins, 1996), i.e., techniques diffused commonly in more developed nations such as the United States. As a counterfactual, a move toward participatory, decentralized extension systems has been successful in China and India (Swanson, 2006). In participatory extension, "[t]he focus is less on *what* we learn, and more on *how* we learn and *with whom*" (Röling & Pretty, 1998, para. 27).

Rasmussen (1989) argued the philosophical and operational foundations of agricultural extension in the United States have been thoroughly documented, however, less is known about the origins of U.S. technical agricultural expertise in international agricultural development, including historically significant actors, events, and forces. "Arguably, an understanding of agriculture's history and current economic, social, and environmental significance, both domestically and internationally, is important for all Americans" (Doerfert, 2011, p. 11). To understand the importance and evolution of the role of U.S. technical expertise in international agricultural development, it was necessary to examine the historical evidence regarding its origins. This study aimed to present a historical perspective on the significant factors influencing the U.S. approach to international agricultural development and, thereby, provide clarity to us *and* counterparts in lesser developed countries (LDC) impacted by such.

Purpose and Research Questions

The purpose of this study was to examine the historical events, forces, and actors that influenced and thereafter guided the U.S. government's approach to offering international agricultural technical expertise to other nations. Two research questions guided this inquiry: 1) What significant historical events, including interagency federal legislative acts, codified the U.S. government's approach to offering technical agricultural expertise in its international development efforts? 2) What philosophical forces, including historically significant actors, influenced the U.S. government's approach to offering technical agricultural expertise in its international development efforts?

Methods and Procedures

"Two things emerge as the central foci in all such historical works: people who have made a difference and events that signal major accomplishments or turning points in the profession's development" (Camp & Crunkilton, 1985, p. 57). As such, historical research methods were used to answer this study's research questions. In 2002, McDowell published a comprehensive guide for conducting historical investigations. He suggested examining the past could illuminate the similarities between conditions governing both past and present with attention on implications for the future. According to McDowell (2002), "[h]istorical research does not consist in the mere collection of 'facts,' but rather in the interrelationship between factual evidence and the interpretation of this evidence by historians" (p. 4). He added: "A better understanding of the past places us in a more advantageous position to appreciate change in the present and to try and learn from past mistakes" (p. 5). McDowell's (2002) recommendations were followed in conducting this study.

Historical data were derived from primary and secondary sources, including legislative acts and reports, peer-refereed journal articles, and books. The information was accessed and collected via the main library at Oklahoma State University, including searches of several databases and the Internet. Key search terms included agricultural development, environmentalism, international agricultural and extension education, sustainable agriculture, sustainability, United States Department of Agriculture (USDA), and United States Agency for International Development (USAID). The study's sources of information were subjected to internal and external criticism to ensure their accuracy and authenticity (Johnson & Christensen, 2010; McDowell, 2002). Triangulating multiple references supported the study's credibility and validity (Tracy, 2010).

Findings

Research Question #1: What significant historical events, including interagency federal legislative acts, codified the U.S. government's approach to offering technical agricultural expertise in its international development efforts?

The provision of technical assistance, including programs involving agriculture, is not a concept first dawned by the U.S. government (American Council of Voluntary Agencies for Foreign Service [ACVAFS], 1953). For example, according to the Near East Foundation [NEF], "the practice NEF established of working in tandem with foreign governments and local organizations . . . provided a model for many of today's most well-known development organizations – including USAID and the Peace Corps" ("History," 2016, para. 7).

The U.S. Congress did not authorize the Foreign Agricultural Service Act (46 Stat. 497) until 1930. This act assigned the Foreign Agricultural Service (FAS) to lead USDA's efforts to ensure LDCs improved their agricultural systems, including international trade capacity, a precursor to its modern objectives of partnering with USAID to deliver high-impact food aid programs and support for agricultural development initiatives (FAS, 2016). The FAS mission reads "linking U.S. agriculture to the world to enhance export opportunities and global food security"; its motto is "linking U.S. Agriculture to the World" (FAS, 2016, para. 6).

Franklin Delano Roosevelt (FDR) inherited immense challenges during his presidency beginning in 1933, especially the *Great Depression* – a singularly dark period in American history (McCalla, 1969). By the 1930s, persistent drought was evident throughout the Great Plains region, which manifested crop failures, soil erosion, and large dust storms (Schubert, Suarez, Pegion, Koster, & Bacmeister, 2004). According to Lal, Reicosky, and Hanson (2006), the U.S. agricultural revolution and the evolution and use of the plow in traditional production agriculture, which occurred over many generations, invariably transformed the American landscape. They noted the "[u]se of the plow expanded rapidly with the introduction of the 'steam horse' in 1910 that led to widespread severe soil erosion and environmental degradation culminating in the Dust Bowl of the 1930s" (p. 1). Beginning in the late 1800s, strong agrarian movements in rural American communities sought farming practices that would effectively reduce the negative environmental impacts of prolonged intensive tillage, such as soil, water, and wind erosion, e.g., emergence of the Grange Movement and the Farmer's Union (Lal et al., 2006). Later, "Hugh Hammond Bennett led the soil conservation movement in the U.S. in the 1920s and 1930s, and urged the nation to address the 'national menace' of soil erosion" (Lal et al., 2006, p. 5). Bennett's zeal for conservation stemmed from his experience "studying soils and agriculture nationally and internationally" (Lal et al., 2006, p. 5).

The Roosevelt Administration famously instituted its *New Deal*, i.e., the National Industrial Recovery Act, focused on relief, recovery, and reform in 1933 (Fraser & Gerstle, 1989), which included programs to assist farmers. Gilbert (2015) noted the New Deal exemplified four principles of agricultural democracy:

> 1) decentralized administration through local farmer committees; 2) referenda to determine administrative policies such as quotas and penalties; 3) group discussion and adult education to promote 'intelligent participation'; and, 4) cooperative planning in policy formulation and localization of programs. (p. 15)

As part of the *New Deal*, the Emergency Conservation Work Program (P. L. 73-5), popularized as the Civilian Conservation Corps (CCC), was a public works relief program for youth and the unemployed during the Great Depression (Maher, 2007). The framework for the CCC was largely influenced by the emergence of service-learning as a method of instruction and success of another service-learning program, i.e., the National Youth Administration [NYA] (Roberts & Edwards, 2015). Similar to the NYA, the CCC provided employment opportunities to youth and unskilled workers. Specifically, it paid these individuals to engage in civic activities directly related to conservation and management of natural resources on federal and state lands (Williams, 2005). CCC activities related to agricultural conservation were also widespread; e.g., Corps members built terraces for farmers and dug farm ponds (Urban & Wagoner, 2014).

The National Industrial Recovery Act of 1933 (P. L. 73-67) codified conservation of soil and water as a national priority, including funding to fight soil erosion as the result of a combination of drought and poor agricultural practices (*"80 Years of Helping,"* 2016). For example, excessive use of the moldboard plow on the nation's prairies had marginalized ecological stability and soil health in favor of mechanized production agriculture to meet both domestic and international demand for food and fiber products (Lal et al., 2006). Moreover, a unique wind-break program, the Shelterbelt Project of 1934, was also implemented by FDR's administration in response to the widespread wind and soil erosion, which required extensive interagency cooperation between the USDA's Soil Conservation Service, state, county, and local agencies, and farmers (Williams, 2005). The shelterbelt project integrated environmentalism and conservation concepts commonly used in forestry with novel farming practices and traditional approaches that reduced water, soil, and wind erosion, such as planting windrows (Lal et al., 2006). During this period, the Soil Conservation Act of 1935 (P. L. 74-46) established the Soil Conservation Service, renamed the Natural Resources Conservation Service (NRCS) in 1994, as a permanent agency within the USDA (Lal et al., 2006). As a consequence, USDA managers explored ways to extend *conservation assistance* to farmers for the first time (Lal et al., 2006).

In 1938, Dr. M. L. Wilson, federal director of Extension in the USDA, visited the Macedonian Project in Greece (Allen, 1953). He observed the NEF had successfully adapted the methods of U.S. county agents and other extension personnel to a culture very different from that of the United States (Curti, 1988). However, his tenure abroad did not begin there. In the late 1920s and early 1930s, the Soviets hired select U.S. agriculturists to help establish farming systems (Stock & Johnston, 2001). Among those selected, Wilson traveled to the Soviet Union with highly detailed plans for establishing integrated farming systems (Stock & Johnston, 2001). Dr. Wilson belonged to an elite group of *agrarian intellectuals,* including five economists and a sociologist, "who led the USDA during the New Deal" (Gilbert, 2015, p. 13):

> Henry A. Wallace, secretary of agriculture; M. L. Wilson, undersecretary of agriculture and director of federal Extension; Howard R. Tolley, chief of the BAE [Bureau of Agricultural Economics]; Lewis C. Gracy, premier land planner, Bushrod W. Allin, top planning official; and Carl C. Taylor, leading rural sociologist. (p. 13)

"Half organic intellectual and half low modernist as the agrarian intellectuals were, the tradition they created was short-lived" (Stock & Johnston, 2001, p. 238). Many agriculturally focused New Dealers, however, pursued international careers following the end of WWII (Gilbert, 2015). For example, Tolley served as chief economist to the United Nations Food and Agriculture Organization [FAO] (Gilbert, 2015), and others demonstrated an international agricultural development focus earlier in their careers. According to Gilbert (2015), "Henry Wallace always stood as an internationalist" (p. 259). He added: "As vice president during most of America's participation in World War II, he took it as his mission to internationalize the New Deal, . . . [while Dr. Wilson] pushed the globalization of the 4-H youth program" (Gilbert, 2015, p. 259). Wallace began his intellectual life as a "Jeffersonian and participant in the Country Life Movement. . . . His point of view, and that of his father and grandfather, Henry C. and 'Uncle Henry' Wallace, had been expressed, he recalled, by Liberty Hyde Bailey" (Kirkendall, 1997, para. 3). These agrarian New Dealers "ended their long careers abroad, working on land reform, rural development, and community development projects in places far removed from their native Midwest" (Gilbert, 2015, p. xv), including, in some cases, countries with government's more receptive to their pragmatic approaches to participatory rural development.

As president, FDR had a reputation for reorganizing governmental operations to increase their efficiency (Olson, 2001). The Reorganization Plan No. 2 of 1939 (53 Stat. 1431) instigated the regrouping of federal agencies to reduce costs and eliminate duplicitous programs (Roosevelt, 1939, para. 4). One result was the brief disbanding of the Foreign Agricultural Service (FAS) and renaming it The Office of Foreign Agricultural Relations [OFAR] (ACVAFS, 1953). OFAR "[provided] technical knowledge and personnel, on a governmental level" (ACVAFS, 1953, p. 21). During this period, U.S. international agricultural policies were heavily reliant on national economic goals (McCalla, 1969), i.e., "imports of strategic raw materials," and less, as some critics have argued, on offering technical assistance to developing nations (Paterson, 1972, p. 126). Gifford Pinchot, first chief of the U.S. Forest Service and an early champion of international conservation efforts, held correspondence with President Franklin D. Roosevelt (Miller, 2013). In his September 8, 1944 letter, Pinchot urged FDR to convene a global summit on conservation with the United Nations (Miller, 2013). This was not the first time Pinchot had pushed for this kind of international conference. As early as 1909, he made his original request to the *lame duck* President Theodore Roosevelt, but President William Howard Taft put an end to such an initiative on his ascension to office (Jundt, 2014). FDR died in the final year of WWII, and his successor, Harry S. Truman, became president on April 12, 1945 (Truman, 2014).

After attempting to convene a global summit on conservation with three different U.S. presidents, Pinchot finally succeeded when he presented his plan to President Truman (Jundt, 2014). "In 1946, at the behest of President Truman, the United Nations (UN) announced that it would hold a conference to consider the conservation and effective utilization of natural resources" (Jundt, 2014, p. 44). This was not the only initiative in regard to the United States' forthcoming role in integrating conservation and sustainability concepts in international agricultural development. Inspired by the success of the NEF, as observed by M. L. Wilson in Greece, the Truman administration received approval from Congress in 1947 to offer technical assistance to Turkey and Greece (USAID, 1999). Paterson (1972) noted the "Truman Doctrine['s] assistance to Greece and Turkey was part of America's postwar economic offensive" (p. 119).

In a speech at Harvard University, Truman's Secretary of State George C. Marshall proposed an outline for the European Recovery Plan, better known as the *Marshall Plan* (McCalla, 1969; USDA, 1999). The 4-year Marshall Plan was authorized by the Foreign Assistance Act of 1948, which established the Economic Cooperation Agency [ECA] (USDA, 1999). According to McCalla (1969), the United States seemed ready to assume the mantle of world leadership at the end of WWII. McCalla (1969) further stated: "The postwar period was marked by efforts led by the United States to reconstruct Europe and to rationalize international trade" (p. 337).

> To that aim, President Truman announced during his January 20, 1949 inaugural address: [The United States'] [c]ontinued support of the United Nations, the Marshall Plan, and military agreements such as the North Atlantic Treaty Organization (NATO) and the Rio Pact. [And][w]ith relish, he moved beyond these three points to announce a fourth point, a bold new program of technical assistance to underdeveloped areas. (Paterson, 1972, p. 120)

As a result, the *Point 4 Program* was established in May of 1950 as Title IV of the Foreign Economic Assistance Act. Its objective was to approach international development not through aid, but rather by facilitating technical assistance and private investment (Paterson, 1972). Some observers, however, took a contrarian viewpoint and saw the program as a "[m]eans for the United States to manage the postcolonial world while keeping less developed countries out of the Soviet [Union's] fold" (Jundt, 2014, p. 47). Moreover, "[i]n this neocolonial system the United States sold former colonies the American way of modern industrial and consumer life while collecting payment in the form of their natural resources" (Jundt, 2014, p. 47). Nevertheless, the Technical Cooperation Administration (TCA) was established within the U.S. Department of State to implement the Point 4 Program (Erb, 1985).

The Point 4 Program was a series of bilateral agreements and contracts pertaining to "agriculture and rural programs" between non-governmental organizations, foreign governments, and the U.S. government (ACVAFS, 1953, p. 33). Henry G. Bennett, the first TCA administrator, led the Point 4 Program; unfortunately, Bennett died in an airplane crash in Iran while on an assignment for the Program (Clark, Davis, & Simon, 2008). In addition to his role with the Point 4 Program, Bennett served as president of Oklahoma A&M College, now Oklahoma State University (Clark et al., 2008), a land-grant institution. The mission and vision of the Point 4 Program persisted, however, and in 1951 then U.S. Representative John F. Kennedy suggested "[y]oung college graduates would find a full life in bringing technical advice and assistance to the underprivileged and backward Middle East" (Maier, 2009, p. 200), an allusion to the forthcoming Peace Corps.

During the period following Representative Kennedy's speech, the Mutual Security Act abolished the ECA and replaced it with the Mutual Security Agency (MSA), which launched major foreign assistance programs (Morgner, 1967). The agency's main goal was to empower developing countries while containing the spread of communism by providing technical foreign assistance, including military and economic support (Morgner, 1967). To assess the impact and efficacy of U.S. foreign assistance programs, the ACVAFS published a study, made possible by support from the Ford Foundation. The council assessed *The Role of Voluntary Agencies in Technical Assistance*, which revealed "technical aid proposed by government and intergovernmental groups must of course extend far beyond the limitations of non-tax supported agencies" (ACVAFS, 1953, p. vii).

In one of Dwight D. Eisenhower's first acts as president in 1953, he renamed the Point 4 Program the *Technical Assistance Program*, and reorganized the TCA and MSA into the Foreign Operations Administration (FOA) to harmonize their efforts (USAID, 1999). Later, in 1955, the International Cooperation Administration (ICA) replaced the FOA (Morgner, 1967). Even though USDA's technical agricultural expertise was in high demand in many LDCs at that time (USAID, 1999), two studies were implemented by the Foreign Relations Committee of the U.S. Senate to assess the nation's international development efforts because of increasing pressure from U.S. citizens: *Administrative Aspects of the U.S. Foreign Assistance Programs* and *Agricultural Surplus Disposal and Foreign Aid* (USAID, 1999). Results of the two studies stoked political uncertainties regarding further adherence to the international development framework manifested by the Marshall Plan (USAID, 1999).

In an effort to "expand and unify American aid operations and strengthen the economic development component," major policy reforms occurred in regard to U.S. aid agencies offering technical agricultural expertise to LDCs (Morgner, 1967, p. 66). In 1961, President John F. Kennedy launched the United States Peace Corps, and the ICA was renamed the United States Agency for International Development (USAID), as arranged under the Foreign Assistance Act of 1961 (Morgner, 1967). The reorganization occurred because of increased dissatisfaction with the aid program, which combined already existing U.S. aid efforts (Morgner, 1967). Moreover, in 1959, the economist Walt Whitman Rostow published his economic model *Rostow's Stages of Economic Growth*. The model stated economic growth occurs in five basic stages, including traditional society, preconditions for take-off, take-off, drive to maturity, and age of high mass consumption (Rostow, 1959). This "economic development theory . . . provided the premise for much of the development planning in the . . . U.S. Agency for International Development" (USAID, 1999, para. 16). The approach was not without critics, for example, the pushback against the trends with USAID and the Washington Consensus on Agriculture (WCA), i.e., a growing point of view casting international aid as a *business* (Kydd & Dorward, 2001).

Nonetheless, USAID is the modern standard for international and intergovernmental cooperative service through its development projects and humanitarian aid, relief, and recovery programs (USAID, 2015), including efforts devoted to agricultural development. However, *lifting the veil* on the origins and precursors of U.S. technical agricultural development assistance to other nations illustrates the need to elaborate on the many actors and philosophical influences that manifested its emergence, evolution, and status.

Research Question #2: What philosophical forces, including historically significant actors, influenced the U.S. government's approach to offering technical agricultural expertise in

its international development efforts?

As noted by Minteer and Pyne (2013), “the conventional narrative of American environmentalism is no longer very helpful for conservationists and restorationists seeking philosophical justification and guidance for their work” (p. 6). In part, this may be due to many in higher education, such as conservationists, restorationists, and agricultural scientists, including agricultural educators, extensionists, researchers, and other scholars, predisposed to becoming isolated due to their *intellectual blinders*. Rogers (2003) considered this a form of *pro-innovation bias*. According to Rogers (2003), “when a scientist follows a theoretical paradigm, a set of intellectual blinders prevents him or her from seeing certain aspects of reality” (p. 106). However, Rogers (2003) also argued a degree of *trained incapacity* was necessary to cope with the vast uncertainties inherent to the research process (Rogers, 2003). Nonetheless, “[t]he progress of a scientific field is helped by realization of its own assumptions, biases, and weaknesses” (Rogers, 2003, p. 106). The evolution of U.S. agricultural development assistance is no exception.

By examining the individuals responsible for developing the notion of *conservation of natural resources* in the United States, including the intersection of anthropocentrism, i.e., dominated by humankind, and its antithesis, nonanthropocentrism, their tremendous influence on traditional agricultural practices becomes observable (Minteer, 2006), including philosophical differences. For example, in the decades after the USDA’s incorporation into the presidential cabinet in 1889, two preeminent environmental ethicists and longtime allies experienced a philosophical schism. The individuals were Gifford Pinchot, the first chief of the U.S. Forest Service and credited with establishing the definition of *conservation of natural resources*, and John Muir. Muir was founder of the Sierra Club, a naturalist, an eloquent spokesperson for the environmental movement, and author of many articles in national publications on nature (Armitage, 2007; Williams, 2005). Considered leaders of the U.S. nascent environmental movement, Pinchot and Muir fomented the notion differences existed in American conservation. Further, they argued the movement could be conceptualized as two distinct camps: *conservationists* and *preservationists* (Minteer, 2006). Moreover, Pinchot and Muir are largely credited with creating the dialogue on *how we as a nation manage and preserve our natural resources* (Minteer, 2006). Their relationships with Presidents, both Muir and Pinchot with Theodore Roosevelt and in regard to FDR and Harry Truman only Pinchot, influenced the passage of significant federal legislation protecting and preserving natural resources in the United States (Minteer, 2006). Such impact included formation of the Soil Conservation Service and other agencies within the USDA (Minteer, 2006). For example, the CCC was modeled after work camps established by Pinchot in Pennsylvania “in an attempt to relieve unemployment” during the Great Depression (Pinchot, 1998, p. xv).

Minteer (2006) noted the competing narratives created by *conservationist* Gifford Pinchot and *preservationist* John Muir were oversimplifications of the rich and moral tradition of environmental thinking in the United States. In his book, *The Landscape of Reform: Civic Pragmatism and Environmental Thought in America*, Minteer (2006) suggested the existence of a “third way tradition to the intellectual landscape of American environmentalism, a philosophical path that has been almost completely obscured . . .” (p. 2). He perceived this path to environmentalism was advanced by

> Liberty Hyde Bailey, a horticultural scientist and rural reformer who was a leading figure in the agrarian wing of Theodore Roosevelt's conservation movement; Lewis Mumford, an urban theorist, cultural critic, and regional planner-thinker active in the Regional Planning Association of America (RPAA) during the interwar period; Benton MacKaye, a forester and conservationist (and Mumford's RPAA colleague) who proposed the Appalachian Trail in the 1920s; and, finally, Aldo Leopold, the forester-philosopher and author of the environmentalist classic *A Sand County Almanac*. (Minteer, 2006, p. 2)

As Minteer (2006) noted, the *third-way tradition* offered an integrated and progressive perspective on land stewardship and traditional American production agriculture and the intersection between human ideals, interests, and non-material values. Similar to Minteer (2006), Beeman (1994) acknowledged Liberty Hyde Bailey and Aldo Leopold as major contributors to the third-way tradition, better known to Bailey as the *Nature Study Movement* (Connors, 2012). Jane Addams of *Hull House* also held similar views on using agriculture as a vehicle for achieving social justice. Further, Beeman (1994) identified Edward Faulkner as a catalyst for this movement, and cited him as an antagonist for many scholars and practitioners of the period. His approach was rejected because

> . . . doing the opposite of what Faulkner preached was easier, more economical in the short-term, and was supported by the agricultural establishment, including the land grant college scientists, the experiment stations, the Farm Bureau, the USDA, and especially those vested interests in agribusiness who had little to gain from the wholesale rejection of agricultural chemicals. (Beeman, 1994, p. 99)

Nevertheless, Beeman (1994) concluded Faulkner's message was well received by Hugh H. Bennett, the *father of soil conservation* and first head of the Soil Conservation Service (Nelson, 1997) and author Louis Broomfield, who was a frequent contributor to *Reader's Digest* and the *Saturday Evening Post*.

Foor and Connors (2010) examined the historical backgrounds and impacts of several early teacher educators of agricultural education, including Liberty Hyde Bailey. Moreover, as Connors (2012) pointed out, researchers and practitioners should revisit Liberty Hyde Bailey's idea of nature study. He recommended Bailey be "remembered along with other noted individuals, as one of the pioneers of agricultural education" (p. 51). We, however, assert recognition of Bailey's influence should be extended further and credit him with laying the *philosophical foundation of the modern third-way environmentalism movement,* which, in no small part, presaged the agricultural expertise imbued in the U.S. government's international development goals.

It was Bailey's Nature Study Movement that garnered the attention of Gifford Pinchot and President Theodore Roosevelt (Ellsworth, 1960). Pinchot and Sir Horace Plunkett, Theodore Roosevelt's second tutor on agriculture and founder of the Irish Agricultural Organization Society, "created the memorable, working partnership of the colorful Roosevelt and the talented Bailey" (Ellsworth, 1960, p. 159). Bailey was eventually appointed by Roosevelt as chairman of the Commission on Country Life (Peters & Morgan, 2004) at the behest of Pinchot after he had initially rejected an invitation to chair the group (Ellsworth, 1960). Bailey relented and accepted the appointment after Roosevelt appealed to him with a "mixture of praise and reproach"

(Ellsworth, 1960, p. 162). In his appeal, Roosevelt admonished Bailey's refusal and said that he "would not have created the commission unless he had assumed that Bailey would accept the chairmanship; that Bailey's refusal would jeopardize the greatest opportunity which had yet presented itself to influence country life conditions . . ." (Ellsworth, 1960, p. 162). Other distinguished members of the commission included Kenyon Butterfield, Walter H. Page, Pinchot, and "Uncle Henry" Wallace (Connors, 2012; Peters & Morgan, 2004), Henry A. Wallace's grandfather and editor of *Wallace's Farmer* (Shoemaker, 2010).

Ellsworth (1960) further noted: "Bailey and Pinchot proved to be Roosevelt's most influential advisors in agricultural matters" (p. 157). The *Report of the Country Life Commission* showed the "general condition of farming life in the open country, and point[ed] out its larger problems" (Commission of Country Life, 1911, p. 3); the results of which were met with ambivalence (Ellsworth, 1960). However, despite the *battles* lost, the *Report* ultimately won the *war*, including stimulus for drafting and passage of the Smith-Lever Act (Ellsworth, 1960). Other initiatives to improve rural life in the United States became a reality in 1919 with creation of the Division of Farm Population and Rural Life, and emergence later of the National Country Life Association (Ellsworth, 1960). Moreover, "[r]ural sociology became a separate and thriving academic discipline as a result of the prestige given to it by the Country Life Commission" (Ellsworth, 1960, p. 172).

The *third-way tradition* is a strand within environmentalism that cannot be deemed entirely anthropocentric or nonanthropocentric, preservationist or conservationist, nor aesthetic or utilitarian (Minteer, 2006). Bailey's point of view made it difficult to cast him in one tradition over another. Minteer (2006) referred to Bailey as an idealist *and* pragmatist – a man that transcended philosophical and intellectual boundaries. Bailey was concerned with the intersection of "intellectual, aesthetic, and social character of rural life" (Minteer, 2006, p. 21). These tendencies were manifested by his "promotion of nature study for school children and an argument for its significance in creating an environmental ethic among country dwellers, especially farmers" (Minteer, 2006, p. 21). The third-way tradition was the precursor of *natural systems agriculture* (Minteer, 2006). Vestiges of this approach can be seen today at the Land Institute in Kansas (Chamberlain, 2010), a scientifically minded community of practice committed to advancing the current agricultural paradigm beyond the ubiquitous use of synthetic fertilizers and over-reliance on fossil fuels.

Conclusions and Discussion

The U.S. approach to international agricultural development was modeled after the work of organizations such as the Near East Foundation ("History," 2016). Gifford Pinchot, first head of the U.S. Forest Service and a confidant to several U.S. presidents, led a decades-long crusade to globalize conservation and introduce an international audience to the use of natural resources as guided by sustainable and economically viable practices. The Shelterbelt Project of 1934 was the first evidence of interagency cooperation and the utility of multidisciplinary teams to integrate environmentalism and traditional agriculture concepts (Williams, 2005). Moreover, key political and governmental figures advocated for legislation promulgating international agricultural development (Gilbert, 2015).

Minteer (2006) proposed the existence of a *third-way tradition* of American environmentalism. He concluded the third-way tradition was advanced by Liberty Hyde Bailey, Aldo Leopold, Lewis Mumford, and Benton MacKaye, among other proponents. Bailey initially declined a position with the Country Life Commission, and if not for Roosevelt's, Pinchot's, and Plunkett's tireless efforts to secure his leadership as its chair the commission's success was considered uncertain (Ellsworth, 1960). Beeman (1994) also alluded to the existence of a third-way to modern environmentalism, i.e., the precepts for a paradigm of sustainable agriculture practices, which were often diffused as part of U.S. international agricultural development efforts. Based on his work with sustainable agriculture *and* the traditional American agriculture paradigm, Beeman (1994) concluded Edward Faulkner, in addition to Liberty Hyde Bailey, Mumford Lewis, Aldo Leopold, and Benton MacKaye, were responsible for popularizing the notion of sustainability and conservation, including preservationist concepts among the general U.S. populace. Aspects of this philosophy were manifested during the New Deal and led by champions that Gilbert (2015) described as *agrarian intellectuals*. Although their influence was short lived domestically, many of these individuals migrated to working in international settings, including early post-WWII projects featuring agriculture and rural development (Gilbert, 2015). Their efforts presaged the U.S. government-led international development initiatives that would become USAID (Gilbert, 2015).

In regard to participatory-democratic culture, John Dewey (1939) stated: "An immense difference divides the *planned* society from a *continuously planning* society" (p. 321). In what he called the *Great Community*, Dewey asserted "practical experience and experimentation in problem solving could teach communities and societies how to become more democratic" (Gilbert, 2015, p. 256). The notion of civic pragmatism and environmental ethics introduced significant implications concerning the philosophical underpinnings of the U.S. approach to the provision of agricultural technical expertise as foreign assistance (Gilbert, 2015; Minteer, 2006). Specifically, these worldviews suggest a philosophical chasm that grew to be deeply embedded in the U.S. approach to environmentalism, including social, political, economic, and cultural manifestations (Reid & Taylor, 2003) with implications for agriculture. However, we know this to be only a partial account of the larger phenomenon. To that end, agrarian New Dealers "believed that expertise must join with the local knowledge of farmers and that federal authority should decentralize to citizens. They sought both to merge science with citizen knowledge and to integrate government action with local participation" (Gilbert, 2015, p. 21). Unfortunately, the philosophy of the agrarian New Dealers did not materialize in rural America to the extent they had hoped (Gilbert, 2015).

The agrarian New Dealers did, however, take aspects of their third-way tradition of decentralized, participatory rural development abroad (Gilbert, 2015). "[The practice of] local social change bore fruit globally before coming home to help shape major social reforms in poor rural and urban neighborhoods throughout the United States" (Gilbert, 2015, p. 260). In addition, the crucial role of *indigenous knowledge* in the U.S. approach to domestic and international agricultural development efforts cannot be understated. For example, the *issue of equality* (Rogers, 2003), in both formal and non-formal teaching and learning environments, is important domestically and internationally. In international development, agricultural extension agents have a tendency to engage with farmers more similar to themselves, i.e., the principle of *homophily* and related communication behaviors (Rogers, 2003). As a consequence, knowledge transfer between agricultural extension agents and farmers is likely to expand the *knowledge gap* between the different groups comprising a social system (Rogers, 2003). It is prudent, therefore, that international extension professionals are sensitive to the potential pitfalls associated with widening inequalities stemming from adoption behaviors favoring the already advantaged in a social system (Rogers, 2003).

In the United States, the social science tradition of participatory-democratic, rural agrarian reform had a brief life span (Gilbert, 2015). This aspect of the New Deal was defeated by old-fashioned power politics, and many of its ideals ended with it, at least, regarding agrarian reforms (Gilbert, 2015). As such, partners in U.S. international agricultural development efforts *ought to learn from our mistakes* while emphasizing the value of local knowledge and the exchange of information and ideas among extension/advisory service providers, other educators, researchers, and host-country nationals through participatory-democratic collaborations. Navarro (2008) called such efforts the *co-creation of knowledge* by and for agricultural extension agents, researchers, and farmers such that we move "toward a vision of agricultural extension as an interactive and integrative model of shared knowledge and joint discovery" (Navarro, 2008, p. 75). Such practice could address Rogers' (2003) admonitions regarding *pro-innovation bias* and *issue of equality.*

Implications and Recommendations

Many countries worldwide have developed deeply rooted and philosophically moored environmental traditions and, in many cases, adopted principles espoused by the U.S. government and other nations' development agencies (Minteer, 2006). This study shone some light on the philosophical foundations of agricultural and extension education in regard to international agricultural development, with a view toward influencing contemporary policy intersecting with environmentalism and traditional agricultural production practices in the United States and abroad (Brosnan, 2007). We recommend strengthening cross-cultural understanding and communication between academic traditions and with partners around the globe by contextualizing environmental and agricultural ethics within their historical, intellectual, and geographical settings while "deemphasize[ing] the most radical aspects" of Environmentalism ideology (Chamberlain, 2010, p. 90). Instead, we encourage development specialists to embrace the earlier version, i.e., Bailey's Nature Study Movement (Connors, 2012) and later understood as the third-way tradition taken abroad by Gilbert's (2015) *agrarian intellectuals.*

The actors illustrated in this study argued philosophies on participatory development and conservation of natural resources and sustainable use of the same should be studied by all students in colleges of agriculture. For example, Pinchot's works on *conservation ethic* and Aldo Leopold's writings concerning *land ethic* have long been studied and recognized in the field of forestry, however, they are not as well known in other allied disciplines, including agricultural and extension education. It is important for these concepts to permeate the rich tradition of production agriculture in the United States. We further recommend exploring foreign influences on American agriculture and environmentalism, including their philosophical primers. In addition, attention and clarity concerning high and low modernism as well as their relation to agriculture and an educated citizenry is warranted, including the period following the New Deal era and the technocratization of federal agencies advising and regulating agriculture in the

United States. Such an inquiry could include the period beginning with the *Green Revolution* and moving forward to more recent approaches to international agricultural development and the longstanding involvement of U.S. agricultural and extension educators.

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Describing Parents' Perceptions, Valuation, and Support of Study Abroad Programs at Three Southern Land-Grant Universities

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Abstract

Keywords: International Experiences, Study Abroad; College of Agriculture; Parent Perceptions

Parents are an integral part of the decision to study abroad, but little research investigates parents' perceptions about study abroad. This study uses the Theory of Planned Behavior as a conceptual framework to explain perceptions and value of study abroad by parents of agriculture students at Land-Grant universities based on previous international experiences and other beliefs. Researchers delivered a questionnaire to 1511 parents at three universities to measure perceptions and value of study abroad, and intent to support their students' participation in study abroad. We found that parents had little international experience, which may limit their behavioral beliefs and impact their decision to support study abroad. We also found that parents believed short-term, summer programs, that cost between $2000 and $4000 were ideal. Finally, we found that parents believed that study abroad programs were somewhat important and that they were somewhat likely to support their students' participation. Administrators and faculty should consider parent expectations and value when planning study abroad, and work to provide education and outreach to enhance value beliefs and normative beliefs of parents. Further research should explore the predictive value of previous experiences in parents' likelihood to support a student's decision to study abroad.

Introduction and Literature Review

"Travel is educational" (Stone & Petrick, 2013, p. 741). This statement has been verified for a variety of situations, ranging from independent travel (Inkson & Myers, 2003; Kuh, 1995) to formal international experiences such as study abroad programs (Parsons, 2010). Specifically, study abroad programs have been referred to as "one of the most important experiences students can have during their undergraduate years" (Paige, Fry, Stallman, & Jon, 2009, p. S41). Further, global learning and international experiences have been identified as important components of higher education by the by the Association of American Colleges and Universities (Hovland, 2009), the American Association for Agricultural Education (Roberts, Harder, & Brashears, 2011), and the Association of Public and Land-grant Universities (2010).

Researchers in higher education have sought to determine the benefits of study abroad. The benefits identified include: (a) greater global awareness and mindset (Ingraham & Peterson, 2004; Paige et al., 2009; Parsons, 2010; Rexeisen, Anderson, Lawton, & Hubbard, 2008; Ricketts & Morgan, 2009; Zhai & Sheer, 2002), (b) increased cultural awareness and higher acceptance of cultural diversity (Childress, 2009; Dwyer, 2004; Parsons, 2010; Freestone & Geldens, 2008, Zhai & Scheer, 2002), (c) increased levels of confidence and self-efficacy (Bachner & Zeutschel, 2009; Chieffo, 2007; Zhai & Scheer, 2002), (d) increased preparation for domestic and international careers (Childress, 2009; Ludwig, 2007), and (e) increased communication skills (Ludwig, 2007; Parsons, 2010).

Agricultural educators have pursued multiple lines of inquiry regarding international education. Previous studies have focused on determining agricultural students' perceptions, motivations, and barriers to study abroad participation (Briers, Shinn, & Nguyen, 2010; Bunch, Blackburn, Danjean, Stair, & Blanchard, 2015; Bunch, Lamm, Israel, & Edwards, 2013; Danjean, Bunch & Blackburn, 2015; Irani, Place, & Friedel, 2006), agricultural faculty beliefs about international education experience (Harder, Lamm, Roberts, Navarro, & Ricketts, 2012), and experiential learning styles of agricultural students in an international experience (Lamm et al., 2011). Additionally, Zhai and Scheer (2002) documented the influence of study abroad programs on agriculture students' global perspectives and cultural diversity attitudes, among other outcomes. Agriculture students in a study abroad program were also shown to have enhanced perspectives on culture, communication, adaptation, and knowledge value (Black, Moore, Wingenbach, & Rutherford, 2013). Sharp and Roberts (2013) noted that agricultural faculty participation in study abroad programs stimulated development of curriculum. Even high school agricultural educators have benefitted from study abroad programs (Foster, Rice, Foster, & Barrick, 2014). However, questions remain about specific factors that influence undergraduate agriculture students' decisions to participate in international education opportunities.

The increased emphasis on international experiences has produced growth of international opportunities within the higher education system in the United States (U.S.) (Paige et al., 2009). The number of U.S. students who studied abroad has more than tripled in the past 20 years, reaching a high of 304,467 students in the 2013–2014 academic year (Institute of International Education (IIE), 2014; 2015). Similarly, the number of U.S. agriculture students who studied abroad has increased, with more than 5,700 students studying abroad during the 2013–2014 academic year. However, this represents less than two percent of the total number of students who studied abroad (IIE, 2015).

Parents have been identified as influential in the decision making process of college students (Welki & Navratil, 1987; Moogan, Baron, & Harris, 1999), and although the final decision to participate rests with students, a parent's influence is undeniable and valuable. Further, parents and family have been found to be the primary source of funding for U.S. students' participation in study abroad programs (Institute of International Education, 2014). However, few studies have explored parents' perceptions of study abroad, specifically. Of the identified research, very specific populations have been examined. Bodycott (2009) surveyed 451 Chinese parents and 100 Chinese students and found differences between parents' and students' beliefs when considering studying abroad. Bodycott (2009) also noted the significance of cultural influence in the study. Al Makhmari and Amzat (2012) interviewed parents of female students in Oman and found disconnect between what parents valued in study abroad programs and what students valued. These studies provide further evidence of the need for greater understanding of U.S. parents' perceptions of study abroad programs.

Conceptual Framework

This study employed Ajzen's (1991) theory of planned behavior (TPB) as a conceptual framework. The crux of the theory revolves around the concept of *belief salience*, which is the "relation between a person's salient beliefs about the behavior and his or her attitude toward that behavior" (Ajzen, 1991, p. 192). The theory posits that behavioral beliefs, normative beliefs, and control beliefs guide human behavior by influencing intention to perform the given behavior (see Figure 1). Behavioral beliefs influence whether individuals have favorable or unfavorable attitudes toward a given behavior (Ajzen, 1991). Further, normative beliefs impact subjective norm, which is "perceived social pressure to perform or not perform the behavior" (Ajzen, 1991, p. 188). Finally, control beliefs affect the individual's perceived behavioral control, which are often operationalized in research as benefits and barriers to behavior performance (Ajzen, 1991). Per the theory, manipulation of one or more beliefs can elicit increased chances of behavior modification (Ajzen, 2006).

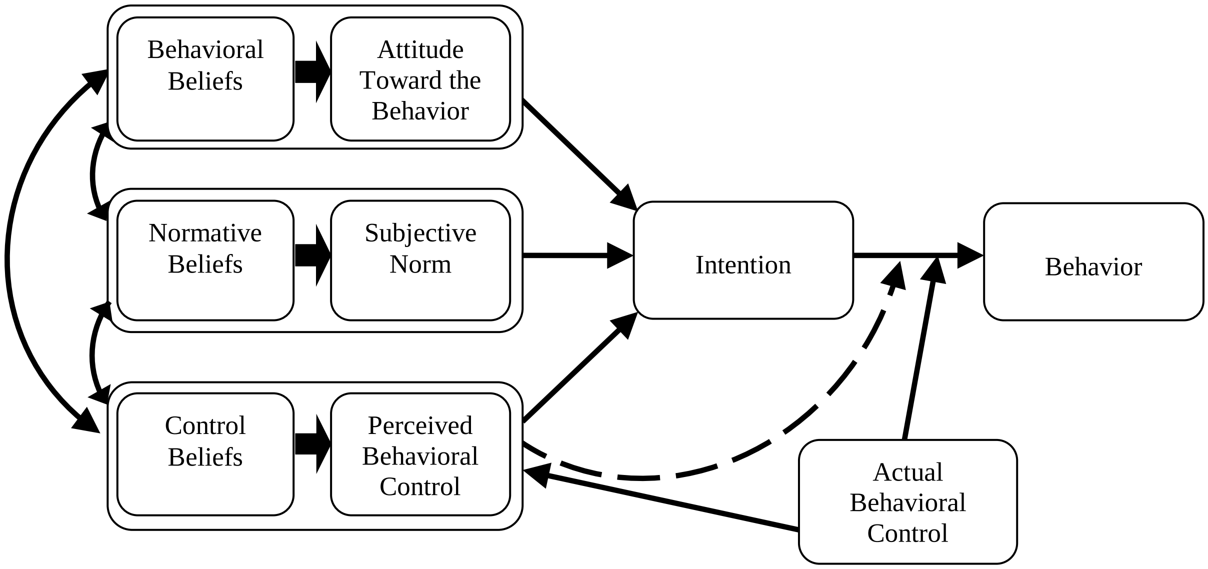

Figure 1. The Theory of Planned Behavior. Adapted from "The Theory of Planned Behavior," by I. Ajzen, 1991, *Organizational Behavior and Human Decision Processes, 50*(2), p. 182. Copyright 2006 by Icek Ajzen.

Specifically related to this study, the behavior in question was parents' decision to support their students' participation in study abroad programs (see Figure 2). Parents' intention to perform the behavior is influenced by their behavioral beliefs, as well as their control beliefs. The present study is concerned with the area of normative beliefs. An individual's perception of social norms and societal reactions to a planned behavior constitute their normative beliefs (Ajzen, 2006). In the context of this study, we specifically address intention to support study abroad, and the influence of factors on that intention—including behaviors, perceived norms, and perceived control (Ajzen, 1991, p. 195). Therefore, it is important to investigate parents' beliefs and perceptions of normal programmatic functions and features of study abroad. Parents and family structure are considered part of the students' normative belief structure, highlighting the connection between parents and students in the study abroad program decision-making process.

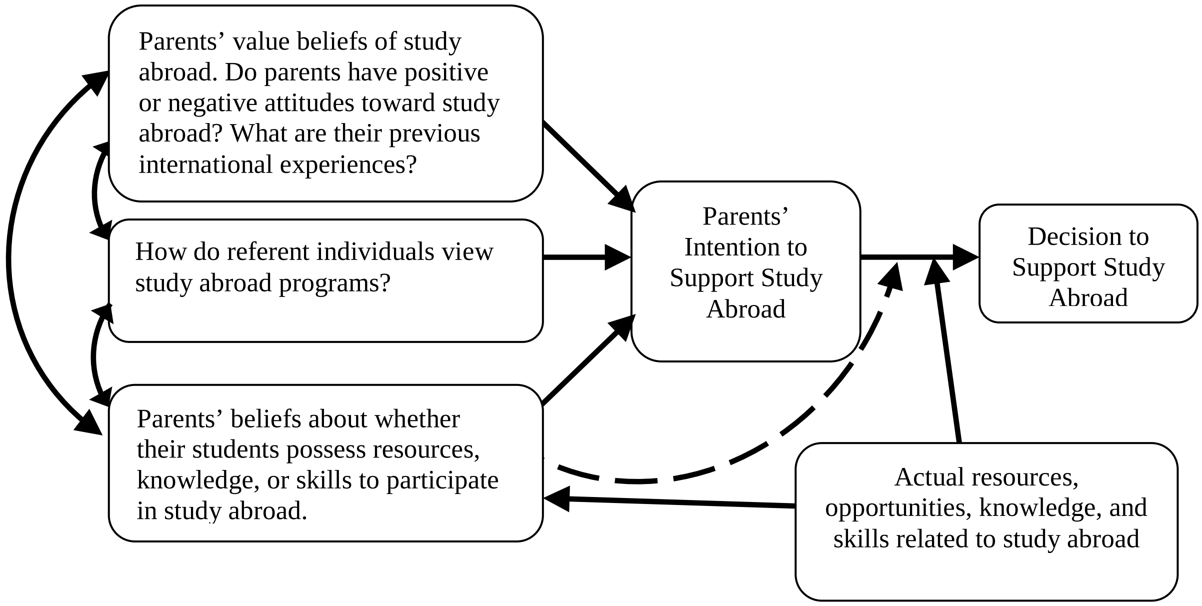

Figure 2. Conceptualized factors that could affect agriculture students' decision to study abroad.

As such, behavioral beliefs, normative beliefs, and control beliefs are all integral parts to understanding planned behavior (Ajzen, 2006). Investigation into parents' perceptions and values related to international experiences, such as study abroad, should provide decision makers in colleges of agriculture with additional information and insight as to how to increase agriculture student participation. As such, the principle question that arose from the review of the literature was: How do parents of incoming undergraduate agriculture students perceive study abroad programs?

Purpose and objectives

The purpose of this descriptive study was to determine incoming undergraduate agriculture students' parents' perception, valuation, and intention to support study abroad programs at three southern U.S. land-grant institutions. The following research objectives guided this study:

1) Determine prior international experiences of undergraduate agriculture students' parents and their households
2) Determine parents' perceptions of study abroad at each institution
3) Determine parents' valuation (i.e., perceived importance and intention to support) of study abroad at each institution

Methodology

Research Design

This study followed Fraenkel and Wallen's (2009) steps to survey research, including identifying the problem, identifying the target population, and preparing the instrument. This study utilized face-to-face completion of questionnaires to enhance data collection and maximize response rate. Four main threats to internal validity are common in survey research (Fraenkel and Wallen, 2009): mortality, location, instrumentation, and instrument decay. Mortality was controlled in this study by limiting data collection to one questionnaire, completed in one setting. Location as a threat to internal validity was controlled by utilizing anonymous responses, so participants would feel minimal pressure to answer questions about a study abroad program, despite being on university campuses. Instrument decay was minimized by designing a questionnaire that took less than 30 minutes for participants to complete. However, one limitation to attempt to control location as a threat to internal validity may exist, as questionnaires were collected on three different university campuses, making it difficult to replicate the environment in all responses.

Population and Sample

The target population of this study was parents of undergraduate agriculture students who were enrolling for the first time in a college of agriculture at three selected southern land-grant institutions (N = 1511): Texas A&M University (TAMU), Mississippi State University (MSU), and Louisiana State University (LSU). Questionnaires were collected from 868 participants (TAMU, n = 508; MSU, n = 258; and LSU, n = 102) yielding a response rate of 57.5%. Instruments were distributed to consenting participants at their respective new student orientation conferences, one of the few times when many parents accompany their student to university functions. Only one parent per household was asked to complete the instrument.

Texas A&M University.

Of the 508 parents who completed the instrument at TAMU, the majority (n = 363; 71.5%) were female and most (n = 414; 81.5%) were married. Regarding level of education, more than 44% (n = 225) of parents held bachelor's degrees, followed by some college (n = 86; 16.9%), master's degrees (n = 69; 13.6%), high school diploma/GED (n = 44; 8.7%), associate's degrees (n = 28; 5.5%), professional school degrees (n = 17; 3.3%), no high school diploma (n = 16; 3.3%), and doctoral degrees (n = 11; 2.2%). Nearly three-fourths (n = 376; 74%) of parents indicated they were not multilingual, while 117 (23%) indicated they were multilingual. Nearly 70% of parents indicated their total household income was greater than $74,000 per year. The next most frequent choice (n = 40; 7.9%) of annual household income was $59,000 – 73,999.

Mississippi State University.

In all, 258 parents completed the instrument at MSU. The majority (n = 204; 79.1%) were female and most (n = 201; 77.9%) were married. Regarding level of education, 40.3% (n = 104) of parents held a bachelor's degrees, followed by master's degrees (n = 57; 22.1%), some college (n = 30; 11.6%), associate's degrees (n = 30; 11.6%), high school diploma/GED (n = 15; 5.8%), and professional school degrees (n = 10; 3.9%). Two (0.8%) did not have a high school diploma and five (1.9%) did not respond. The majority (n = 231; 89.5%) of parents indicated they were not multilingual, while 19 (7.4%) indicated they were multilingual. The majority of parents (n = 170; 65.9%) indicated their total household income was greater than $74,000 per year. The next most frequent choice (n = 26; 10.1%) of annual household income was $59,000–73,999.

Louisiana State University.

A total of 102 parents completed the instrument at LSU. The majority (*n* = 77; 75.5%) were female and most (*n* = 82; 80.4%) were married. Regarding level of education, 37.3% (*n* = 38) of parents held a bachelor's degrees, followed by master's degrees (*n* = 20; 19.6%), some college (*n* = 16; 15.7%), associate's degrees (*n* = 12; 11.8%), high school diploma/GED (*n* = 9; 8.8%), and professional school degrees (*n* = 5; 4.9%). Two (2.0%) did not respond to the level of education item. The majority (*n* = 89; 87.3%) of parents indicated they were not multilingual, while 12 (11.8%) indicated they were multilingual. The majority of the parents (*n* = 72; 70.0%) indicated their total household income was greater than $74,000 per year. The next most frequent choice (*n* = 10; 9.8%) of annual household income was $59,000–73,999.

Instrumentation

A researcher-designed instrument was used to collect data. Researchers followed Ajzen's (2013) guide to constructing a questionnaire based on the theory of planned behavior. Ajzen (2013) recommends that items be specifically written to align with attitude, perceived norms, perceived behavioral control, and intention. As such, items that measured attitude included questions such as "How important is participating in a study abroad program to your student's academic experience?" Items that measured perceived norms included questions such as, "What is the appropriate length of time for a study abroad program," and "At which academic level is it most suitable for your student to participate in a study abroad?" Items employed to measure perceived behavioral control included questions such as, "What is the most appropriate amount to spend on a study abroad program?" Items utilized to measure intention included questions such as, "How likely are you to support your student's participation in a study abroad program?"

A panel of subject matter experts reviewed the instrument; including four faculty members and two graduate students, for content and face validity. The panel recommended minimal changes to increase clarity and readability, as such, all recommended changes were incorporated prior to administration. Cronbach's alpha was not calculated because no questionnaire items were summed to represent a singular perception or attitude toward study abroad. Data were analyzed via descriptive statistics.

Findings

Research Objective 1: Determine Prior International Experiences of Undergraduate Agriculture Students' Parents and their Households

Objective one sought to determine prior international experiences of participants and their households. Participants were asked to mark all experiences from a list they or anyone in their household had experienced (see Table 1). The four most commonly reported responses were the same at each institution: (a) eating at an international restaurant, (b) listening to an international speaker in a school or workplace setting (c) listening to an international speaker in a religious setting, and (d) an international festival or arts. The two least commonly reported responses were the same at each institution (a) participating in a semester-long study abroad, and (b) participating in a short-term study abroad.

Table 1

Previous International Experiences had by members of Participants' Households

	TAMU (*n* = 508)		MSU (*n* = 258)		LSU (*n* = 102)	
	f	%	*f*	%	*f*	%
Eat at an International Restaurant	360	70.90	183	70.93	88	86.27
Listen to international speaker in school/ workplace	219	43.11	98	37.98	61	59.80
Listen to international speaker in religious setting	215	42.32	93	36.05	49	48.04
International Festival or Arts (music, dance, play, museum) in the U.S.	207	40.75	97	37.60	62	60.78
Host an international visitor	113	22.24	51	19.77	19	18.63
International Church Mission	110	21.65	49	18.99	12	11.76
Lived abroad	103	20.28	26	10.08	15	14.71
Take a class on international issues	94	18.50	42	16.28	25	24.51
International Trip	93	18.10	51	19.77	23	22.55
Military Service	69	13.58	37	14.34	11	10.78
Host an exchange student	48	9.45	23	8.91	10	9.80
Short-term Study Abroad (1-6 weeks)	46	9.06	17	6.59	10	9.80
Semester-long Study abroad	31	6.10	7	2.71	6	5.88

Objective Two: Determine Parents' Perceptions of Study Abroad Based on each Institution

The goal of objective two was to describe parents' perceptions of study abroad at each institution. To understand perceptions of study abroad, participants were asked (a) what academic level is most appropriate to study abroad, (b) what time of year would be most valuable to study abroad, (c) the appropriate amount of time to spend on a study abroad, and (d) the appropriate cost for a study abroad (see Table 2).

Table 2

Parents of Incoming Undergraduate Agriculture Students Perceptions of Study Abroad

	TAMU (*n* = 508)		MSU (*n* = 258)		LSU (*n* = 102)	
Category	*f*	%	*f*	%	*f*	%
Academic Level						
Freshman	21	4.13	4	1.55	9	8.82
Sophomore	88	17.32	45	17.44	25	24.51
Junior	258	50.79	149	57.75	48	47.06
Senior	56	11.02	26	10.08	5	4.90
Graduate Student	36	7.09	17	6.59	1	0.98

No Response	49	9.65	17	6.59	14	13.73
Time of Year						
Fall semester	20	3.94	19	7.36	5	4.90
Spring Semester	93	18.31	68	26.36	15	14.71
Summer	297	58.46	131	50.78	54	52.94
Intercession periods	59	11.61	28	10.9	24	23.53
No Response	39	7.68	12	4.65	4	3.92
Length of Time						
None	14	2.76	6	2.33	1	0.98
1-3 Weeks	98	19.29	38	14.73	46	45.10
4-6 Weeks	238	46.85	117	45.35	33	32.35
11-15 Weeks	40	7.87	17	6.59	3	2.94
Full Semester	84	16.54	73	28.29	14	13.73
6 Months to 1 year	9	1.77	1	0.39	1	0.98
No Response	25	4.92	6	2.33	4	3.92
Appropriate Cost						
Less than $1000	55	10.83	33	12.79	12	11.76
$1,000 - $2,000	73	14.37	41	15.89	23	22.55
$2,001 - $3,000	110	21.65	68	26.36	26	25.49
$3,001 - $4,000	133	26.18	56	21.71	24	23.53
$4,001 - $5,000	73	14.37	37	14.34	8	7.84
More than $5,000	30	5.91	16	6.20	5	4.90
No Response	29	5.71	7	2.71	4	3.92

At each institution, parents identified junior year as the ideal time to study abroad (see Table 2), and summer as the ideal time of year to study abroad (see Table 2). Regarding length of time, participants at all institutions reported that they preferred shorter-term study abroad programs. At TAMU and MSU, 4-6 weeks was the most common answer, while at LSU, 1–3 weeks was the most common answer. Regarding parents' perceptions about appropriate cost of a study abroad program, the most common response at TAMU was $3001–$4000, while the most frequent response at MSU and LSU was $2001–$3000.

Objective Three: Determine Parents' Valuation of Study Abroad

Objective three was to describe parents' valuation (i.e., perceived importance and likelihood of support) of study abroad programs at each institution (see Table 3). Parents were asked to rank how important they believed studying abroad was to their students' academic experience, and how likely they were to support their student's participation in a study abroad program.

Table 3
Parents of Incoming Undergraduate Agriculture Students Perception the Importance of and Likelihood to Support Study Abroad

	TAMU (n = 508)		MSU (n = 258)		LSU (n = 102)	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ

Importance of Study Abroad	2.75	1.00	2.51	0.88	2.95	0.99
Likelihood to Support Child's Study Abroad	3.21	0.89	2.99	0.95	3.29	0.95

Note. Scale: Very Unimportant/Not Likely = 1.00–1.49; Somewhat Unimportant/Somewhat Unlikely = 1.50–2.49; Somewhat Important/Somewhat Likely = 2.50–3.49; Very Important/Very Likely = 3.50 – 4.00.

Parents of incoming agriculture students at each institution perceived study abroad to be somewhat important. Parents at LSU ($\overline{x}$ = 2.95; σ = 0.99) held the highest perception of the importance of study abroad, while parents at MSU had the lowest ($\overline{x}$ = 2.51; σ = 0.88). Further, parents at each institution indicated they were somewhat likely to support their child's decision to study abroad. Parents at LSU had the highest mean ($\overline{x}$ =3.29; σ = 0.95), while parents at MSU held the lowest mean ($\overline{x}$ = 2.99; σ = 0.95).

Conclusions and Discussion

Respondents' most common international experiences were eating at an international restaurant, listening to an international speaker at school/workplace, listening to an international speaker in a religious setting, and attending an international festival in the U.S. Very few parents indicated they or someone in their household had traveled abroad for any reason. This aligns closely with research by Bunch et al. (2013) who reported the most frequent international experience of undergraduate agriculture students was eating at an international restaurant and any form of study abroad was the least common experience.

Regarding perceptions of study abroad programs, parents believed that study abroad should be completed during their student's junior year. Further, they believed that 4–6 weeks is the most appropriate duration and summer is when they would like their student to complete a study abroad experience. These results are similar to research conducted at Louisiana State University that found college of agriculture students believed that 4–6 weeks in the summer of their junior year was the most appropriate time to include a study abroad in their course of study (Bunch et al., 2015; Danjean et al., 2015). Overall, U.S. students typically do study abroad during their junior year, but since 2010, an increasing number of freshman and sophomores have studied abroad (Institute of International Education, 2014). Per TPB, Ajzen (2002) would describe parents' perceptions as normative beliefs that could affect students' decisions to engage in the behavior of studying abroad. The perceived norm regarding cost of an experience is particularly noteworthy, given that parents and family are a primary fund source for most U.S. students' participation in study abroad (Institute of International Education, 2014).

Overall, parents at each institution believed that study abroad is somewhat important to their student's undergraduate experience. Additionally, parents indicated they are somewhat likely to support their child's decision to study abroad. When viewing these results through the TPB lens, parents' perceptions that study abroad is important to the undergraduate experience indicates favorable normative beliefs surrounding the behavior of participating in a study abroad program (Ajzen, 2002). Assuming these students possess motivation to perform the behavior, their parents' beliefs, as referent individuals, should not hinder their intention to study abroad (Ajzen, 1991).

Recommendations

Additional research is warranted to better understand parental perceptions of international experiences. Regional and national studies of this nature should be conducted to determine if differences exist based on location to further strengthen the body of knowledge. Employing qualitative approaches to inquiry could provide additional understanding of parental perceptions to study abroad.

Parental beliefs and values may impact their decision to support study abroad. Further research should explore potential factors, such as previous international experiences or additional psychographics that may be predictors of likelihood to study abroad. Administrators and faculty should consider parent expectations and value when planning study abroad, and work to provide education and outreach to enhance parents' value beliefs and normative beliefs.

University faculty and administration should consider these findings when designing study abroad opportunities for agriculture students. Specifically, these opportunities should focus on short-term, summer programs, as these would be most consistent with parents' expectations and beliefs. Offering short-term, summer based international experience opportunities has the potential to match parents' expectations, and increase likelihood that their beliefs would align with a decision to support student participation. Additionally, universities should strive to ensure study abroad programs are affordable for all students. Relationships should be built and maintained with host sites to ensure the most efficient use of funds. Further, scholarship opportunities should be created to supplement student and/or parent funds to reduce the cost apprehension that may be associated with study abroad.

Finally, universities and practitioners should seek to engage parents with current and accurate information about the nature, benefit, and cost of study abroad. Evidence that parents value study abroad, but also have unrealistic expectations of actual program costs, highlights possible knowledge gaps, communication disconnect, or barriers to study abroad. Enhanced marketing efforts, outreach, and education may impact those possible barriers. These linkages should be explored in future research. One starting point is to research parents' perceptions of costs associated with an international family vacation lasting 1-3 or 4-6 weeks, compared to their expected costs of study abroad programs of similar duration. Discovery of factors affecting parents' cognitive dissonance regarding true cost and value of international education experiences can help program planners develop improved promotional materials for study abroad and/or other international education experience programs.

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Agricultural Mechanics Skills Possessed by Post-Secondary Students Prior to Enrolling In an Agricultural Mechanics Teaching Methods Course

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Abstract

With expectations of Agricultural Education Teachers to teach agricultural mechanics, it is important that Agricultural mechanics courses are taken by pre-service agricultural education students. Student teachers reported high levels of anxiety associated with teaching agricultural mechanics prior to and during their student teaching (Foster, 1986). The theoretical framework that guided this present study is Ericsson's Expertise theory (Ericsson, & Smith, 1991). The Expertise theory suggests that the amount of practice that an individual engages in, along with quality curriculum and coaching, has appeared to have a correlation with the development of expertise in a given domain. The purpose of this study was to identify the agricultural mechanics skills possessed by pre-service Agricultural Education students prior to enrolling in the only required agricultural mechanics course. The results from this study indicate that a majority of the students had no prior experience in all four of the constructs explored. Based on Ericsson's Theory of Expertise, the authors recommend Iowa State University to develop an introductory-level agricultural mechanics course that focuses on basic content and skill development in agricultural mechanics. In addition to the introductory course, the authors also recommend developing two upper-level agricultural mechanics courses that focus on the four construct areas investigated in this study that are prerequisites for the methods-based agricultural mechanics course.

Introduction

Agricultural mechanics have historically been considered an important construct in secondary Agricultural Education programs (Burris, Robinson, & Terry, 2005). Agricultural mechanics applications in the classroom give students the opportunity to engage in experiential learning, and develop skills that they may not attain from anywhere else. Agricultural mechanics laboratories provide students with the opportunity to engage in scientific inquiry and hands-on real world learning experiences (Osborne & Dyer, 2000). Shinn (1987) found that the amount of time devoted to laboratory instruction may comprise one-third to two-thirds of the total instructional time in many agricultural education programs. Agricultural courses, specifically those in agricultural mechanics, provide students with the opportunity to develop hands-on skills, concepts, and mechanical skills attainment (Parr, Edwards, & Leising, 2009). The experiential learning processes provide opportunities for personal development, increased comprehension of skills, and valuable educational opportunities that emphasize real-world learning; all of which are emphasized in the secondary agricultural education philosophy (Roberts, 2006). Given the previous research it is apparent that agricultural mechanics makes up an important piece in the agricultural education classroom. With expectations of agricultural education teachers to teach agricultural mechanics apparent, it is vital that they receive training at the post-secondary level (Wells, Perry, Anderson, Shultz, & Paulsen, 2013).

Teacher education programs face a myriad of challenges in preparing secondary agricultural education teachers. With the growing number of challenges associated with teacher preparation programs, teaching agricultural mechanics content in an agricultural mechanics laboratory is an issue that agricultural education teachers face. Agricultural education students are entering into post-secondary education with very little knowledge in agricultural mechanics, and are tentative to enroll in agricultural mechanics courses further compounding the issue (Wells et. al, 2013). The lack of experience and avoidance of additional coursework has lead student teachers to report high levels of anxiety associated with teaching agricultural mechanics prior to and during their student teaching experience (Foster, 1986). Perhaps with more coursework and training at the post-secondary level the high levels of anxiety in teaching agricultural mechanics could be reduced.

Burris, McLaughlin, McCulloch, Brashears, & Fraze (2010) concluded that pre-service teachers need greater exposure and understanding of agricultural mechanics before becoming agricultural education teachers. On average, teacher education institutions require 128 hours for graduation. Of those 128 hours, only 45 hours are dedicated to technical content (Connors & Mundt, 2001). Previous research has indicated that on average, agricultural education teachers are required to enroll in two, three-credit hour agricultural mechanics courses to meet certification requirements (Hubert and Leising, 2000). Based on the previous research in Agricultural mechanics, we can assume that Agricultural Education students are unprepared to teach agricultural mechanics due to a lack of preparation at both the secondary and the post-secondary levels (Wells et. al. 2013).

Schlautman & Siletto (1992) indicated that teacher knowledge of agricultural mechanics was in need of improvement both prior to and after accepting teaching positions. Burris, et al. (2010) indicated that agricultural education teachers (particularly early-career teachers) felt less comfortable teaching agricultural mechanics than other agricultural content areas. Further exploration, of where the agricultural education teacher received additional training in agricultural mechanics, revealed that on–the-job/self-study made the greatest contributions to the preparation of first year agricultural education teachers (Borne & Moss, 1988). Foster (1986) recommended that agricultural education students get involved in early experience programs that address those factors of highest anxiety; one being agricultural mechanics.

Research has indicated that previous experience in a particular content area (i.e., agricultural mechanics) creates higher self-confidence regarding the given subject (Burris et al., 2010; Stripling & Roberts, 2012). Hands-on learning in these skill areas will enable agricultural education students to gain new knowledge and allow for personal development in areas that they feel weak. The more exposure pre-service agricultural education students receive with agricultural mechanics, can lead to an increase in desire to teach the subject material (Wells et. al, 2013). The more positive experiential learning activities in agricultural mechanics coursework could result in agricultural education students gravitating toward more advanced coursework of this particular content area (Krysher, Robinson, Montgomery, & Edwards, 2012). With more positive learning experiences in agricultural mechanics, agricultural educations students will be more apt to participate in teaching such subjects at the secondary level.

In previous research, Cano (1990) stated that agricultural mechanics was the only content area within agricultural education where sex equity had not been achieved. The number of females entering into agricultural education has increased over the past decade (Kantrovich, 2009). At the beginning of the 21st century, 22% of secondary agricultural education teachers were women (Camp, Broyles, & Skelton, 2002). By 2008, 41% of potential agricultural education teachers were women, increasing 19% over six years. Dillingham Ramirez, & Amsden (1993) indicated that college courses had the greatest impact on female's agricultural mechanics content knowledge. With a large influx in the number of women entering into the agricultural education profession, do they pursue additional training in agricultural mechanics courses that will impact their content knowledge or will the lack of previous experience continue the trend of avoiding additional training?

Theoretical Framework

The theoretical framework that guided the present study is Ericsson's Expertise Theory (Ericsson, & Smith, 1991). The Expertise theory suggests that the amount of practice that an individual engages in, along with quality curriculum and coaching, has appeared to have a correlation with the development of expertise in a given domain. The expertise theory accounts for what distinguishes those outstanding individuals in that particular area from individuals that are less outstanding in that area. This theory requires a specific set of standardized tasks where outstanding performance can be measured and the reliability can be reproduced. This theory heavily relies on experiential learning/practice as the main source as to how much expertise that individual has in a particular domain. The Expertise Theory can be viewed in Figure 1 below.

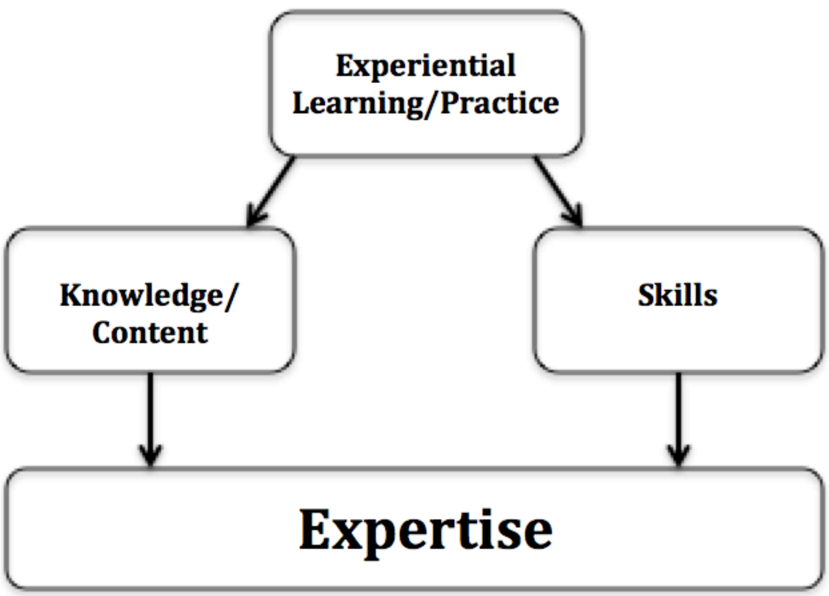

Figure 1. Expertise Theory (Ericsson, 1991).

There are three main construct areas that are embedded in the expertise theory. The three construct areas that comprise this theory are experiential learning/practice, knowledge/content, and skills. Ericsson based this theory on the main construct of experiential learning/practice as a precursor to more broad/basic content and skills (Ericsson, 1991). By building knowledge and content after the experiential learning has accrued, allows for the individual to relate their experience back to the specific topic. After building a background knowledge in that learning experience will allow for a specific set of specialized skills to be developed. If these pieces have been achieved, from Ericsson's theory, a person can be outstanding in that particular area.

This theory was selected based on the nature of the majority of agricultural mechanics courses. Experiential learning, such as agricultural mechanics courses, provide opportunities for increased comprehension of skills, real-world learning, and retention of skills, which are emphasized in secondary Agricultural Education (Roberts, 2006). Agricultural mechanics coursework provides students with opportunities to gain hands-on learning experiences that help develop cognitive skills, develop mechanical skills, and academic concept application through a technology-rich context (Wells, et al, 2013, Hubert & Leising, 2000). Agricultural mechanics coursework taken at the post-secondary level gives agricultural education teachers the necessary content and skill set to be able to teach these skills/concepts at the secondary level.

Purpose and Objectives

The purpose of this study was to identify the agricultural mechanics skills possessed by pre-service Agricultural Education students enrolled in an agricultural mechanics course. This study aligns with the American Association for Agricultural Education's (AAAE) National Research Agenda (NRA) (Roberts, Harder, & Brashears, 2016) Research Priority Area 3: Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century. As agricultural education students and the agricultural industry desire basic education in the principles of agricultural mechanics (Ramsey & Edwards, 2011), Agricultural Education teachers are primarily responsible for providing the training in the content area. Training in a technology-rich field, such as agricultural mechanics, can help to prepare secondary students for the rigors, needs, and challenges of the real world (Roberts, Harder, & Brashears, 2016). The following research objectives were used to guide this study:

1. Identify the demographic characteristics of students enrolled in AGEDS 488
2. Determine the agricultural mechanics skills possessed by post-secondary students prior to enrolling in an agricultural mechanics teaching methods course

Methods

The population consisted of students enrolled in an agricultural mechanics teaching methods course (Four sections) at Iowa State University from spring 2015 to Fall 2016 (N = 58). Faculty in Agricultural Systems Technology developed the instrument. Survey questions were based on the basic skills that students possess in the following four constructs: electricity, small engines, surveying/precision farming, and metal work. The questionnaire was presented to a panel of experts consisting of agricultural education and agricultural system technology faculty members to establish face and content validity and determined the instrument viable for this study. The reliability coefficient (Cronbach's Alpha) for the questionnaire was 0.868. Per George and Mallery (2003), the instrument was rated as *Good*. The agricultural mechanics experience was measured on a 5-point scale: 0 = no experience, 1= have observed, 2= done with assistance, 3= can perform without supervision and 4= perform(ed) routinely. Surveys were administered on the first day of each course to measure the skills of the incoming students. Using the Statistical Package for the Social Sciences (SPSS) 24.0 software, all collected data were coded and entered into the data set used within the present study. All data were analyzed using descriptive statistics; more specifically, frequencies and percentages were used.

Results

Objective one sought to determine the demographic characteristics of the students enrolled in AGEDS 488. The students were asked to report their gender, year in school, major, number of agricultural mechanics courses completed in high school, and if they lived and/or worked on a farm. The students enrolled in the course were seniors (55.2%), females (75.9%), and majoring in Agricultural Education (94.8). Further, they had lived and/or worked on a farm (82.8) and had not complete an agricultural mechanics course at the secondary level (79.3) as shown in Table 1.

Table 1.

Summary of Respondents' Demographic Characteristics

Demographic Characteristics	*f*	%
Gender		
Female	44	75.9
Male	14	24.1
Year in School		
Senior	32	55.2
Junior	18	31.0
Graduate	6	10.3
Sophomore	2	3.4
Major		
Agricultural Education	55	94.8
Family & Consumer Science	2	3.4
Other	1	1.7
Completed An Agricultural Mechanics Course in High School		
No	46	79.3
Yes	12	20.7
Lived and/or worked on a farm		
Yes	48	82.8
No	10	17.2

Objective two sought to determine the agricultural mechanics skills possessed by post-secondary students enrolled in an agricultural mechanics teaching methods course. Students were asked to report their experience with thirty-three skills that were divided into four construct areas (Electricity, Metal Working, Precision Agriculture & Small Engines). Overall, the majority of respondents reported having no experience in all four constructs. Within these construct areas; metal working had the highest percentage of respondents indicating no experience (65.7%), followed by Precision Agriculture (60.6), then Electricity (57.1%) and finally Small Engines

(55%). Furthermore, the small engines construct had the highest reported percentage of skills performed routinely (6.7%). Finally, collapsing the three performance options (adding with assistance, with supervision and perform routinely) only 21.5% of the students have physically performed the welding skills while 25.3% have performed the Small Engine skills as detailed in Table 2.

Table 2.
Average Response Frequency by Construct Area (n=58)

Area	No. of Skills	(0) No Experience *f*	(%)	(1) Observed *f*	(%)	(2) With Assistance *f*	(%)	(3) With Supervision *f*	(%)	(4) Perform Routinely *f*	(%)
Electricity	11	364	(57.1)	131	(20.5)	87	(13.6)	30	(4.7)	26	(4.1)
Metal Working	5	190	(65.7)	37	(12.8)	34	(11.8)	21	(7.3)	7	(2.4)
Precision Ag.	9	318	(60.6)	84	(16.0)	61	(11.6)	42	(8.0)	20	(3.8)
Small Engines	8	254	(55.0)	91	(19.7)	56	(12.1)	30	(6.5)	31	(6.7)

Note: Response frequencies from each of 33 individual skills averaged within the four constructs.

Students were asked to report their experience with eleven skills in the electrical construct. The respondents reported having no experience (81%) installing a receptacle while only one of respondents reported being able to perform the task routinely. Furthermore, only one student reported routinely installing lights, three-way and four-way switches. 75.9% of the respondents had no experience using the National Electric Code, with no respondents reporting performing the task routinely. 69% of the respondents reported having no experience install 4-way switches. Using wire strippers was the only skill where a majority (62.1%) of the students reported having some physical experience (combing with assistance, with supervision & perform routinely) as shown in Table 3.

Students were asked to report their experience with five welding skills within the metal working construct. The majority of the students reported having no experience with all five skills. Students reported having the least amount of experience with both Oxy-Acetylene/Propane and using wire wheels (70.7). Conversely, three students reported routinely performing Oxy-Acetylene/Propane skills and no one reported routinely using a wire wheel. Finally, collapsing the three performance options (adding with assistance, with supervision and perform routinely) only 17.3% of the students have physically performed the Oxy-Acetylene/ Propane skills, while 29.3% have performed the SMAW Welding skills as detailed in Table 4.

Table 3.

Average Response Frequency by Electricity Area (n=58)

Skills Assessed	(0) No Experience *f*	(%)	(1) Observed *f*	(%)	(2) With Assistance *f*	(%)	(3) With Supervision *f*	(%)	(4) Perform Routinely *f*	(%)
Install a Light	17	(29.3)	24	(41.4)	9	(15.5)	7	(12.1)	1	(1.7)
Install 3 Way Switch	36	(62.1)	12	(20.7)	9	(15.5)	0	(0.0)	1	(1.7)

Install 4 Way Switch	40	(69.0)	10	(17.2)	7	(12.1)	0	(0.0)	1	(1.7)
Install Receptacle	47	(81.0)	6	(10.3)	2	(3.4)	2	(3.4)	1	(1.7)
Use Wire Stripper	14	(24.1)	8	(13.8)	15	(25.9)	11	(19.0)	10	(17.2)
Use Linesman Pliers	34	(58.6)	11	(19.0)	5	(8.6)	3	(5.2)	5	(8.6)
Use Cable Rippers	35	(60.3)	10	(17.2)	8	(13.8)	3	(5.2)	2	(3.4)
Use Wire Nuts	30	(51.7)	8	(13.8)	12	(20.7)	3	(5.2)	5	(8.6)
Wire a Series Circuit	32	(55.2)	17	(29.3)	8	(13.8)	1	(1.7)	0	(0.0)
Wire a Parallel Circuit	35	(60.3)	15	(25.9)	8	(13.8)	0	(0.0)	0	(0.0)
Follow National Electric Code	44	(75.9)	10	(17.2)	4	(6.9)	0	(0.0)	0	(0.0)

Students were asked to report their experience with nine different skill areas within the precision agriculture construct. The majority of the students reported having no experience with seven of the nine skills. Students reported having the least amount of experience with reading a rod (82.8%), with only one student reporting performing the skill routinely. Six (10.3%) students reported routinely using handheld GPS units. Finally, collapsing the three performance options (adding with assistance, with supervision and perform routinely) only 6.9% of the students have physically read a rod, while 68.9% have used a handheld GPS unit as detailed in Table 5.

Table 4.

Average Response Frequency by Metal Working Area (n=58)

	(0) No Experience		(1) Observed		(2) With Assistance		(3) With Supervision		(4) Perform Routinely	
Skills Assessed	*f*	(%)	*f*	(%)	*f*	(%)	*f*	(%)	*f*	(%)
SMAW Welding	35	(60.3)	5	(8.6)	7	(12.1)	9	(15.5)	1	(1.7)
GMAW Welding	38	(65.5)	7	(12.1)	6	(10.3)	5	(8.6)	2	(3.4)
Use Plasma Cutter	35	(60.3)	12	(20.7)	9	(15.5)	1	(1.7)	1	(1.7)
Use Propane and/or Oxy-Acetylene	41	(70.7)	7	(12.1)	4	(6.9)	3	(5.2)	3	(5.2)
Use Wire Wheel	41	(70.7)	5	(8.6)	8	(13.8)	3	(5.2)	0	(0.0)

Table 5.

Average Response Frequency by Precision Agriculture Area (n=58)

Skills Assessed	(0) No Experience *f*	(%)	(1) Observed *f*	(%)	(2) With Assistance *f*	(%)	(3) With Supervision *f*	(%)	(4) Perform Routinely *f*	(%)
Read Rod	48	(82.8)	6	(10.3)	3	(5.2)	0	(0.0)	1	(1.7)
Use Pacing	42	(72.4)	8	(13.8)	5	(8.6)	2	(3.4)	1	(1.7)
Use Taping	42	(72.4)	10	(17.2)	4	(6.9)	1	(1.7)	1	(1.7)
Use Odometer	24	(41.4)	8	(13.8)	11	(19.0)	10	(17.2)	4	(8.6)
Handheld GPS	10	(17.2)	8	(13.8)	16	(27.6)	18	(31.0)	6	(10.3)
Setup Laser Level	32	(55.2)	14	(24.1)	8	(13.8)	2	(3.4)	2	(3.4)
Setup Boundaries	36	(62.1)	11	(19.0)	6	(10.3)	5	(8.6)	0	(0.0)
Establish Waypoints	41	(70.7)	8	(13.8)	6	(10.3)	2	(3.4)	1	(1.7)
Differential Leveling	43	(74.1)	11	(19.0)	2	(3.4)	2	(3.4)	4	(9.1)

Students were asked to report their experience with eight skills in the small engines construct. The majority of the students reported having no experience with four of the eight skills. Students reported having the least amount of experience with using a blade balancer (82.8%), using a thickness gauge (75.9%), adjusting a carburetor (67.2%), and installing a spark plug (55.2%). Students also most frequently reported having no experience using a torque wrench, sharpen a blade or installing an air filter (48.3). Students reported the most experience changing oil, with the most frequent response was observing (25.9), while 19% reporting they performed the skill routinely and 19% reporting no experience. Finally, collapsing the three performance options (adding with assistance, with supervision and perform routinely) only 3.4% of the students have physically used a blade balancer, while 55.4% have physically changed oil as detailed in Table 6.

Table 6.

Average Response Frequency by Small Engines Area (n=58)

Skills Assessed	(0) No Experience *f*	(%)	(1) Observed *f*	(%)	(2) With Assistance *f*	(%)	(3) With Supervision *f*	(%)	(4) Perform Routinely *f*	(%)
Service/Install Spark Plug	32	(55.2)	10	(17.2)	8	(13.8)	2	(3.4)	6	(10.3)
Service/Install Air Filter	28	(48.3)	14	(24.1)	9	(15.5)	2	(3.4)	5	(8.6)
Change Oil	11	(19.0)	15	(25.9)	12	(20.7)	9	(15.5)	11	(19.0)
Sharpen Blade	24	(41.4)	13	(22.4)	11	(19.0)	6	(10.3)	3	(5.2)

Adjust Carburetor	39	(67.2)	11	(19.0)	7	(12.1)	1	(1.7)	0	(0.0)
Use a Thickness Gauge	44	(75.9)	8	(13.8)	2	(3.4)	3	(5.2)	1	(1.7)
Use a Blade Balancer	48	(82.8)	7	(12.1)	1	(1.7)	1	(1.7)	0	(0.0)
Use a Torque Wrench	28	(48.3)	13	(22.4)	6	(10.3)	6	(10.3)	5	(8.6)

Conclusions and Implications

The purpose of this study was to determine the agricultural mechanics skills possessed by pre-service Agricultural Education students prior to them enrolling in the only required agricultural mechanics course for teacher certification at Iowa State University. The first objective sought to collect the demographic information of the students enrolled in AGEDS 488. Approximately 75% of the students enrolled in the course were females majoring in Agricultural Education (92%). Additionally, 79% of the students enrolled in the course did not complete an agricultural mechanics course in high school. Finally, 80% of the students have either lived and/or worked on a farm. Dillingham et al. (1993) indicated that college courses, home/farm shop and high school training were three sources that had the most impact on acquiring mechanical knowledge.

While the number of females entering into Agricultural Education has increased over the past decade (Kantrovich, 2010, the percentage of females enrolled in this course is almost triple that of the percentage of females currently in the profession (22%) nationally. The percentages of females enrolled in this course were significantly higher than the 33% enrolled in a pre-service agricultural mechanics course reported by Blackburn, Robinson and Field (2015) during the approximate timespan of the current study. Based on these findings we can conclude that the percentage of females pursuing an Agricultural Education degree from this institution is congruent with, if not exceeding the national trend of females entering the teaching profession.

With a growing number of females entering the agricultural education profession some potential implications may emerge based on previous research. Cole (1985) and Dillingham et al (1993) suggested that agricultural mechanics was one content area within the agricultural education curriculum where sex equity has not been achieved. Yet, Wakefield, Brandenburg, Pense & Talbert (2006) found over 50% of females teach agricultural mechanics. However it should be noted that agricultural mechanics was the only content area they had difficulty teaching. This is concerning when you consider the findings of Walker, Garton & Kitchel (2004) where the agricultural education teachers who left the teaching profession indicated that teaching agricultural mechanics was one of the two biggest factors leading to their departure.

Further exploring objective one, seventy-nine percent of the students enrolled in the course did not complete an agricultural mechanics course at the secondary level. According to Wells et al (2013), there is a positive relationship between secondary training and intention to enroll in post-secondary courses. Fraze et al. (2011) further suggested that previous exposure at the secondary level had an influence on the pursuit of post-secondary coursework as well. Rasty, Anderson, and Paulsen (In press) indicated that the experience teachers receive (as students) at the secondary level has an impact on the content that they view as important to teach. Further complicating the matter, McKim & Saucier (2011) identified a reduction in the number of agricultural mechanics courses required in teacher certification programs. With the lack of secondary training in agricultural mechanics, this puts more of an emphasis on teacher preparation programs to reverse course in order to better prepare future agricultural education teachers to ensure agricultural mechanics remains a vital component of secondary agricultural education.

Additionally, approximately 80% of the participants have either lived and/or worked on a farm. Reis and Kahler (1997) indicated that having a farm background had one of the highest influences on students enrolling in pursuing post-secondary agricultural degree. Dillingham et al. (1993) further suggested that farm experience was one of the more influential factors when developing mechanics skills. However, Leiby, Robinson, & Key (2013) revealed that prior work experience did not affect teachers' confidence.

The second objective of this study sought to determine the agricultural mechanics skills possessed by post-secondary students prior to enrolling in an agricultural mechanics teaching methods course. As students enter the post-secondary agricultural mechanics course, the majority of students reported no experience with the four constructs. What is alarming is less than 25% of the students had physically performed any of the four constructs. Further investigation revealed that the respondents had no experience with 25 of the 33 skills. There were only three skills in which a majority of the students had reported physically performing those skills which included using wire strippers, changed oil, and used hand held GPS units.

Ericsson (2006) suggested that multiple factors influence mastering any challenging domain. However, it takes years of deliberate practice to develop the complex mechanisms that support expertise. Sustained training and effort is a prerequisite for achieving expert levels of performance. Iowa State University requires one course in agricultural mechanics, with students entering the course with no experience; this will only compound the problem of sending agricultural education teachers into the profession unprepared to teach agricultural mechanics and far from achieving expert levels. The lack of experience in agricultural mechanics further confounds the issues with teacher competency. McCubbins, Anderson, Paulsen, & Wells (2016) suggested that if a teacher has limited or nonexistent self-efficacy in agricultural mechanics, then the teacher may decline to offer agricultural mechanics instruction at the secondary level. Thus supporting Burris et al. (2010) suggestions that pre-service Agricultural Education teachers need further exposure to agricultural mechanics.

This model for teacher preparation in agricultural education will only continue to support Wakefield, et al. (2006) findings that teachers struggle with agricultural mechanics. Further implications, from the findings, support Darling-Hammond (2000) suggestions that a lack of appropriate training can result in ineffective teachers. Dillard (1991) indicated that it could be difficult to produce prepared teachers of agricultural mechanics with a minimum requirement of seven credit hours. The results of this study support Byrd, Anderson, Paulsen & Schultz (2015) recommendation that changes need to be made to pre-service programs in order to better prepare future agricultural education teachers.

Recommandations

Based on the lack of previous experience of students entering a senior level methods-based agricultural mechanics course. The authors recommend Iowa State University to develop an introductory level agricultural mechanics course that is required as a pre-requisite for the methods-based course. The authors also recommend that Iowa State University work with community colleges and secondary agricultural education programs to develop a state-wide articulation agreement for the introductory agricultural mechanics course to ensure that all students entering post-secondary agricultural education all have some experience physically performing the skills investigated in this study. Based on Ericsson's Theory of Expertise, the authors also recommend developing two upper-level agricultural mechanics courses that focus on the four construct areas investigated in this study that are prerequisites for the methods-based agricultural mechanics course. By developing a foundation that is supported by content knowledge and skills development prior to entering the methods course, the students will have an opportunity to develop the complex mechanisms that support a level of expertise.

The researchers also recommend providing professional development opportunities in agricultural mechanics for in-service agricultural education teachers. While this study did not specifically focus on in-service needs, the high percentage of students pursuing a career in agricultural education with no agricultural mechanics experience is alarming. Hopefully, by providing additional training and resources that can be immediately adopted by current teachers can help provide a positive exposure to agricultural mechanics to future agricultural education teachers. We believe the positive exposure to agricultural mechanics will be impactful regardless of gender. We also recommend that as secondary agricultural education teachers identify potential agricultural education majors from within their programs that they ensure those students are fully engaged in all aspects of agricultural education including participation in agricultural mechanics coursework. While we did not specifically collect data related to this phenomenon, it was noted that allowing students to "opt" out of the agricultural mechanics coursework that their peers are required to complete to work on other aspects of the agricultural education should be discouraged.

Additional research should be conducted to determine why agricultural education students have no experience in agricultural mechanics. The researchers question if the agricultural education majors were identified as "College-bound" therefore did not need "Career Readiness" classes like agricultural mechanics? Were these students allowed to work on other projects by their secondary agricultural education teachers in an agricultural mechanics instead of completing the course content, this leading to the students entering college with no agricultural mechanics skills despite enrolling in an agricultural mechanics course? Was the lack of training in agricultural mechanics a result of no classes offered in the secondary agricultural education programs at their respective schools? If so, what lead to the elimination of those courses? Is the lack of experience due to a deeper philosophical difference as Agricultural Education teachers navigate the fine line of academic vs. vocational as they try to establish an identity within their respective school systems?

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The Effect of a Simulated Global Experience and Guided Holistic Reflection on the Global Perspectives of Rural College Students – An Exploratory Study

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Abstract

This quasi experimental study investigated student participation in experiences related to global development and sought to determine the effect of intentional, holistic reflection on rural college-aged students engaging in a simulated international experience. Ninety-five students in a scholar group at Oklahoma State University, specifically chosen from rural communities, served as the population. Two groups, one receiving limited program reflection and one receiving a holistic reflection process, participated in a simulated domestic global experience. Using the Global Perspective Index (GPI), global perspectives were measured before and after the experience. It was found that the simulated experience did yield growth in global perspectives, especially in the area of cognition. Contrary to most literature, the holistic reflection process yielded no significant increase in perspective change. It was recommended that global simulated experiences do produce change, but additional experiences are necessary to enhance perspectives in all domains.

Introduction/Need for Research

Post-secondary educators are recognizing the importance and necessity of preparing students for meeting the challenges of and effectively interacting in an ever-changing global community, as students are still not ready for an international workplace (Bok, 2006; Braskamp, 2008; Engberg & Fox, 2011; Hurtado, 2003; Musil, 2006). The vast diversity of people and communities that students have access to underscores a need for students to understand how to interact with individuals representing a myriad of identifiers (Chickering & Braskamp, 2009). Students' global perspectives involve how "people's worldviews and cultural traditions influence how they think, feel, and relate to others" and recognizes the need of showing empathy towards people different from themselves (Reason & Braskamp, 2013, para. 2).

Shifts in global perspective may be explained by Gullahorn and Gullahorn's Cultural Adjustment Curve (1963), which anticipates emotional change throughout a cultural experience. The w-shaped curve delineates five emotional states: Everything is new, exciting and different; Frustrations/annoyance with everyday differences; Surface adjustment; Confronting deeper cultural/personal issues; Adaption and assimilation. Each emotional state is dictated by time and place which directly affects level of comfort and satisfaction. Students entering higher education now confront global issues later, which increases the pressure on post-secondary institutions to engage students in experiences to improve their global perspective (Stearns, 2009). As students' global perspectives mature, a motivation to become socially responsible and appreciate cultural differences is enlarged and development is experienced in three dimensions: cognitive development, intrapersonal development, and interpersonal development (Braskamp, 2011; Braskamp & Engberg, 2011). Thankfully, Braskamp and Engberg (2011) conclude that faculty can influence students through course structure and that off-campus experiences are effective in shaping global perspectives. Optimumly, off-campus cultural experiences are coupled with service-learning to imact development of global perspective (Braskamp & Engberg, 2011). This supports Friedman's (2005) assertion that information impacting student learning is a result of experiences.

The direct experiential encounter with a learning event requires active engagement from the student as opposed to the passive engagement commonly associated with teacher-directed instruction resulting in minimal student interaction in the learning process (Clark, Threeton, & Ewing, 2010). Recent years will be referred to as some of the most transformational in classroom instruction and educational methodology due to developments in educational literature, technological advancements and an increasingly diverse student population (Applebee, Langer, Nystrand & Gamoran, 2003; Brown & Warschauer, 2006; Froyd, Wankat & Smith, 2012; Pascarella & Terenzini, 1998). These factors have catalyzed a shift in the classroom from teacher-led strategies as the preferred method of content delivery to more impactful student-led strategies (Block & Duffy, 2008; Brown Wright, 2011). Through complex problem-solving, learners create knowledge as a means of interpreting their surroundings and solidifying knowledge through peer discussion (Doolittle & Camp, 1999; Savery & Duffy, 2001). Simply put, learning is more difficult when the majority of pedagogy is teacher-centered and students are only passively engaged (Bligh, 2000; Bonwell & Eison, 1991; Hake, 1998; Jones-Wilson, 2005; McKeachie, 2002; Spence, 2001; Svinicki, 2004). At the college level, experiential learning and student-led classrooms are linked to a similar shift towards greater utilization of constructivist educational philosophy (Splan, Porr, & Broyles, 2011).

However, there is an issue with lack of structure in student-led education (Felder & Brent, 1996). Nilson (p. 5, 2010) states, "structure is so key to how people learn and has such far-reaching implications for teaching…without it, there is no knowledge." Merely providing an experience for students does not ensure learning occurs (Dewey, 1938). According to Vygotsky's Zone of Proximal Development (1978), movement from the student's actual developmental level to the student's potential developmental level is improbable without assistance in the form of scaffolding. A student needs the teacher or a capable peer to aid in intellectual growth and content mastery (Vygotsky, 1978). Dewey (1933) discusses reflective thought as "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and further conclusions to which it tends" (p.118). The necessity of reflection is further underlined as it is the primary source of transformation leading to learning and development (Boud & Walker, 2002).

Kolb (2015) states learning is the process whereby knowledge is created through the transformation of experience. This perspective is utilized in many post-secondary classrooms as Kolb's model of experiential learning is presented as a foundational teaching theory (Nilson, 2010). Most importantly, in experiential learning theory, reflection is defined as "the internal transformation of experience" (Kolb, 2015, p.158). Reflection in education is seen as a promising innovation and experiential educators herald reflection as necessary by instructing to provide opportunity for and support reflection on both the content learned and the learning process (Kolb, 2015; Procee, 2006; Savery & Duffy, 2001). Foundationally, reflection is a mechanism for the construction of knowledge from experience as humans have the ability to reflect on the world and transform it (Freire, 1974; McAlpine & Weston, 2000).

In the field of agricultural education, experiential learning theory and problem-solving are fundamental educational strategies (Baker, Robinson, & Kolb, 2012; Moore & Moore, 1984; Parr & Edwards, 2004; Roberts, 2006; Shoulders & Myers, 2012) and teacher-centered strategies are often questioned to become more experiential (Phipps, Osborne, Dyer & Ball, 2008). It is recommended that student-centered methods should be used as they "put students at the helm of their own learning" (Thoron & Myers, 2012). The problem-solving philosophy of agricultural education can be traced to the concept of reflective thinking (Phipps, et. al., 2008). Lamm, et. al. (2011) confirm reflection is critical, from a perspective of experiential learning.

Baker, Brown, Blackburn, and Robinson (2014) recommend that if teachers want students to learn, they too must be in the laboratory encouraging reflection-in-action. Lamm, et. al. (2011) posit only one form of reflection may not meet the needs of every student, as individuals learn differently. Blackburn, Robinson, and Kacal (2015) concluded teachers should focus on providing options for students to utilize in reflection instead of guiding students in a singular manner. This collection of studies on individual reflection strategies has been completed to enhance experiential education in agriculture, however there is a lack of research on an all-inclusive approach towards reflection. This study addresses AAAE National Research Agenda (Roberts, Harder & Brashears, 2016) Research Priority 5: Efficient and Effective Agricultural Education Programs Question 5: How can quality agricultural leadership, education, and communication educational programs be delivered in a cost-effective manner? by seeking to understand the impact, if any, of a holistic approach to reflection.

Theoretical/Conceptual Framework

Kolb's Experiential Learning Theory (2015) describes learning as a cyclical process wherein learners take on four adaptive learning modes: concrete experience, reflective observation, abstract conceptualization and active experimentation. Learners gain knowledge by a combination of grasping information through either comprehension or apprehension and transforming information through either intention or extension (Kolb, 2015). Kolb (2015) stresses the importance of students completing the entire learning cycle because the dialectic nature of the modes requires learners to resolve the conflict in order to optimize learning. Kolb's model expresses the importance of reflection but does not explicitly outline how reflection should be facilitated and the important components that should be included in reflection.

Further literature outlines three dimensions of reflection: method, design and social (Epler, Drape, Broyles and Rudd, 2013; Kolb and Kolb, 2013; Schön, 1983). Kolb and Kolb (2013) describe the method or style of chosen reflection by outlining reflection as a continuum including three styles: imagining, reflecting and analyzing. Imagining requires students to transform images through immersion (Kolb, 2015). The reflecting style integrates images and symbols for the interpretation of deeper meaning (Kolb, 2015). Finally, the analyzing style requires the learner to separate their reflection from the experience and context through systematic manipulation of abstract symbols (Kolb, 2015).

Schön (1983) describes reflection as teacher-initiated design in the form of either reflection-in-action and reflection-on-action. Reflection-in-action is continuous during the teaching process and allows the learn to think about the experience in real time (Schön, 1983). On the other hand, reflection-on-action occurs after the experience and "provides the opportunity for dramatic extensive, structural changes, and is more like likely to take place in the strategic organization epistemic sphere" (McAlpine &Weston, 2000, p. 365; Schön, 1983). Baker, et. al. (2014) found the type of reflection selected, either reflection-in-action and reflection-on action, is not as important as ensuring the presence of quality initial reflection.

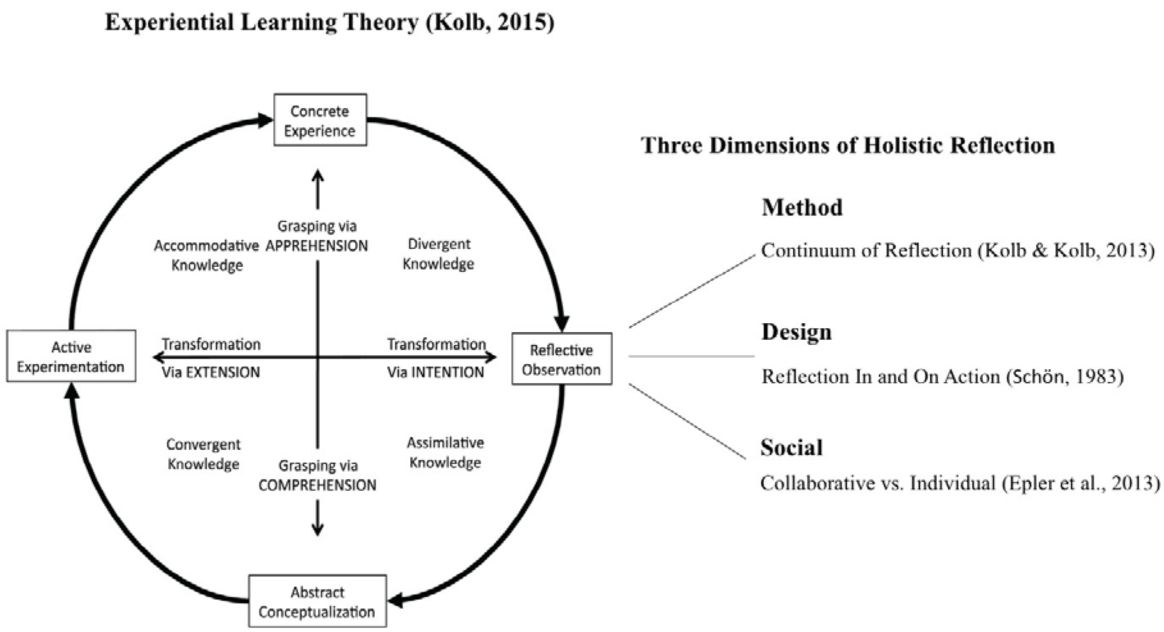

Figure 1. Conceptual model tying the three dimensions of holistic reflection to the experiential learning theory.

Epler, Drape, Broyles and Rudd (2013) described the social dimension of reflection to include individual and collaborative reflection. Individual reflection allows the learner time to deepen their beyond recall and allow for rationalization (Epler, et. al., 2013). Conversely, through collaborative reflection learners are provided with a variety of thoughts and opinions to expand their thought process and strengthen their reflection (Epler, et. al., 2013). With a combination of both individual and collaborative reflection "learners arrive at knowledge which is the most viable interpretation of their experiences" (Savery & Duffy, 200, p. 24).

The process of reflection should be an intentionally planned and equally important part of any experience (Kolb, 2015). Mary Parker Follett (1924) emphasized the value of quality holistic reflection but research has yet to examine the effectiveness of a comprehensive approach. Does providing students with a variety of reflective opportunities that encompass various reflecting styles, provide both reflection time within and post the experience, and involve both individual and collaborative opportunities encourage greater shifts in perspective than the standard post experience group reflection? The answer to this question has implications for the way educators prepare and facilitate experiences.

Purpose of the Study

The purpose of this quasi-experimental study was to investigate student participation in experiences related to global development and to determine the effect of intentional, holistic reflection on rural college-aged students engaging in a simulated international experience. The following research questions guided this study:

1. What are the demographics of the participants of this study?
2. What globally relevant experiences have students in this cohort engaged in?
3. Does a simulated international experience shift global perspective of students?
4. Does holistic reflection increase the magnitude of change in global perspective?

For the purpose of statistical analysis, the following null hypotheses were created:

$H_0$1: There is no difference in global perspective index scores due to a simulated international experiences.
$H_0$2: There is no difference in the magnitude of change in global perspective index scores due to holistic reflection.

Methodology

This study was conducted in an exploratory nature to inform future studies through data collection and allow for more "precise predictions or formulate testable models" (Kirk, 1995). Kerlinger (1964) described three purposes for experimental design: "to discover significant variables in the field situation, to discover relations among variables, and to lay the groundwork for later, more systematic and rigorous testing of hypotheses" (p. 388). This research study used a non-equivalent comparison-group design between two similar groups (Johnson & Christensen, 2014). Selection of scholars was based on factors of high school GPA, ACT score, and geographic location. Both groups completed the simulated international experience during their first year of participation in the scholar program and were of similar ages at the time of data collection.

The independent variable for this study was the type of reflection completed by each group. The dependent variable was global perspective as measured by the Global Perspective Index (GPI). This widely-used instrument contains 35 likert type questions that quantify three dimensions made up of six distinct constructs. The dimension of cognitive development contains the knowing and knowledge constructs and measures a student's ability to understand what is true and view importance of knowledge with greater complexity (Braskamp and Engberg, 2011). The intrapersonal development dimension contains the identity and affect constructs and centers on personal value identification and the inclusion of multi-cultural perspectives in decision making (Braskamp and Engberg, 2011). Finally, the interpersonal development dimension includes the social responsibility and social interaction constructs (Braskamp and Engberg, 2011). The Chronbach's alpha coefficients reported by construct were were .66, .77, .74, .73, .73, and .70 respectively. These constructs focus on "one's willingness to interact with persons with different social norms and cultural backgrounds, acceptance of others, and comfort when relating to others" (Braskamp and Engberg, 2011, p. 35). Three questions were removed from the instrument based on the recommendation of the coding manual due to their inability to load on any construct. The instrument also includes eight demographic questions and eighteen questions measuring previous interaction with global and cultural concepts.

This census study was comprised of a population of students in the McKnight Scholars Leadership Program while enrolled in their initial program leadership course, typically during their first semester at Oklahoma State University. Students in this scholar group are selected from rural communities as designated by the scholarship review board and office of admissions. This course included a three-day global challenge at Heifer International Ranch. The intention of this experience was to highlight cultural and global issues like world hunger and poverty by engaging students in conversation through a global simulation in which students live, eat and work similarly to affected citizens. The McKnight Scholars Leadership Program aims to expand the perspectives of rural students and promote global citizenship. This experimental study was conducted on two different classes of scholars in subsequent experiences (*N*=98) at the Heifer Ranch Global Village. Data were collected through identical GPI instrument forms. Instructions for completion were provided on the cover page of the instrumentation and during an explanation before the pre- and post- administrations. The control group (*n*=50) was administered the pre-experience GPI during travel immediately prior to the experience. These students completed programming including facilitator-led group discussion reflection at the end of the experience. This form of reflection was categorized as imagining, collaborative reflection-on (Epler, Drape, Broyles and Rudd, 2013; Kolb and Kolb, 2013; Schön, 1983). Students completed the post-experience GPI during return travel to [State] University.

The treatment group (*n*=45), which experienced a holistic approach to reflection, was administered the pre-experience GPI, on the bus en route to the experience, and completed the same program with imagining, collaborative, reflection-on, and facilitator-led group discussion (Epler, Drape, Broyles and Rudd, 2013; Kolb and Kolb, 2013; Schön, 1983). Several reflective techniques were added to provide holistic reflective observation. These additional reflective activities were facilitated by McKnight Scholars Leadership Program staff. Seven times throughout the experience, students in the treatment group were asked to complete a postcard with a short, reflective writing and a hand-drawn image to describe their attitudes and perspectives towards the events occurring during the simulation. This reflection technique necessitated individual reflection-in using Kolb's reflecting style (Epler, Drape, Broyles and Rudd, 2013; Kolb and Kolb, 2013; Schön, 1983). Students were asked to determine elements of culture and track shifts in perspective within their assigned simulation group using GoPro video technology. GoPro reflection was categorized as imagining, collaborative reflection-in (Epler, Drape, Broyles and Rudd, 2013; Kolb and Kolb, 2013; Schön, 1983). Finally, the treatment group completed graphic organizers over elements of their own culture and their assigned culture during the simulation. Exploring elements of culture aligned with the cognitive knowing and knowledge constructs of the GPI and allowed students to further their understanding of varying global complexities. Graphic organizers required the analyzing style and were completed individually as reflection-on. The post-treatment distribution of the GPI instrument occurred during return travel to Oklahoma State University.

Descriptive statistics and frequencies were employed to summarize selected demographic and global experiences. Likert scales were treated as ordinal, and as suggested by Field (2013), and the median and inter-quartile range was reported. A paired sample *t*-test was used to identify significant changes in global perspectives resulting from the treatment, and finally an omnibus MANOVA assisted in identifying global perspective changes based on the holistic reflection treatment. Cohen's *d* was used as a measure of effect size where the following standards are established: (a) .2 = small, (b) .5 = medium, (c) .8 = large (Cohen, 1988, 1992). Normality was examined using skewness and kurtosis analysis, visual inspection of p-p plots and normal curves, and normality analysis of the difference scores as recommended when utilizing repeated measures (Field, 2013). All data were deemed normal and all assumptions were met.

The design of this study allowed for the control of threats to internal validity. Using a nonequivalent comparison-group design controlled for five of the eight threats to validity (Johnson & Christensen, 2014). This design controls for history, maturation, testing, instrumentation and regression artifact. Differential selection, differential attrition and additive and interactive effects were potential threats due to the study design (Johnson & Christensen, 2014). Students in the McKnight Scholars Leadership Program were selected based on the same criteria and are from similar backgrounds. Many of the selection criteria used for the program are characteristics that Johnson and Christensen (2014) identified as potential differences between research participants. Differential attrition was not an issue in this study because only three students, two from the control group and one from the treatment group, were removed from the study due to incompletion of the GPI (Johnson & Christensen, 2014). Additive and interactive effects were not a threat in this study (Johnson & Christensen, 2014).

Findings

The average participant was an 18.8 year old female, European/White, freshman with educated parents and high self-reported high school success. Table 1 provides the frequencies and percentages of selected demographics.

Table 1

Selected Demographics Frequencies of Students Involved in the Study

Characteristic	*f*	Percentage
Gender		
Male	40	42.1
Female	55	57.9
Ethnicity		
European/White	84	88.4
Hispanic/Latino	5	5.3
Native American	3	3.2
Multiple Ethnicities	2	2.1
College Classification		
Freshman	88	92.6
Sophomore	4	4.2

Junior	3	3.2
Parents Education		
Less than High School	1	1.1
High School Graduate	7	7.4
Some College – No Degree	10	10.5
College Degree	38	40.0
Some Graduate School	3	3.2
Graduate Degree	36	37.9
Average High School Performance		
A or A+	70	73.7
A-	20	21.1
B+	4	4.2
B	1	1.1

Table 2 displays the coursework participation of the 95 participants in this study. Students took on average 2.6 courses in a foreign language, and they reported to have participated in .53 courses that included intensive dialogue.

Table 2

Student Course Experiences Related to Development of Global Perspectives

Experience	*n*	*M*	*SD*
Number of foreign language courses	95	2.61	.867
Number of world history courses	95	1.86	1.02
Number of service learning courses	93	.89	1.31
Number of courses focused on global issues	95	.58	.738
Number of courses that include intensive dialogue	95	.53	.977

Note. Responses to this question were (a) 1, (b) 2, (c) 3, (d) 4, (e) 5 or more. Though these are ordinal responses, a mean is reported due to the numerical value associated with the responses.

Medians and inter-quartile ranges are reported in Table 3 in response to research question two. As expected with this population of high-level campus leaders, they reported that they participate in collaborative leadership activities and service learning “very often” with little variation. In contrast, participants “rarely” participate in different cultures, attend global related lectures, or interact with students from other countries.

Table 3

Student Personal Experiences Related to Development of Global Perspectives

Experience	*Mdn*	*IQR*
Participate in your own culture	2	2
Participate in different cultures	1	2
Participate in religious activities	3	2
Participate in leadership programs that stress collaboration	4	1
Participate in community service activities	4	1

Attend a lecture on global issues	1	2
Read a newspaper or news magazine	2	1
Watch news	3	1
Follow international events/crisis	3	1
Discussed current events with other students	3	1
Interact with students from other countries	1	1
Interact with students from a different race/ethnicity	2	1

Note. IQR = Inter-Quartile Range and is an indicator of dispersion; The ordinal scale included the following stems: 0 = never, 1 = rarely, 2 = Sometimes, 3 = Often, 4 = Very Often

Paired samples *t* – tests were utilized to detect differences in global perspectives following the global experience to address research question three. As indicated in Table 4, all constructs of global perspectives were significantly different following the global experience. Thus, the first null hypothesis is rejected. It is important to note that effect sizes were large for knowledge, medium for knowing and identity, and low for affect, social responsibility, and social interaction.

Table 4

Means and Paired Samples t-Tests Comparing the Pre and Post Assessment of Global Perspective Index Scores

GPI Construct	Before *M(SD)*	After *M(SD)*	*Paired Sample M*	*SE*	*t*	*p*	ES
Knowing	18.89 (3.08)	16.73 (3.44)	2.17	.30	7.15	.00	.66
Knowledge	13.92 (2.95)	11.26 (2.65)	2.65	.29	9.11	.00	.95
Identity	11.78 (2.30)	10.28 (2.12)	1.49	.17	8.70	.00	.68
Affect	10.53 (2.25)	9.48 (2.40)	1.04	.15	7.00	.00	.45
Social Responsibility	11.41 (2.60)	10.32 (2.91)	1.09	.16	7.004	.00	.40
Social Interaction	13.41 (2.82)	12.66 (2.79)	.75	.15	4.90	.00	.27

Note. Before and after scores are mean construct scores where numbers closer to one represent more *agreeableness*, while larger numbers represent *disagreeableness.* Scores range from: (a) knowing, 0 to 35, (b) knowledge, 0 to 25, (c) identity, 0 to 30, (d) affect, 0 to 25, (e) social responsibility, 0 to 25, (f) social interaction, 0 to 20. ES = Cohen's *d* measure of effect size.

Using Wilk's lambda, there was not a significant effect of holistic reflection on the overall change in global perspectives as measured by the six constructs of the GPI, $\Lambda = .92$, $F(6, 88) = 1.37$, $p = .09$. Analysis did not extend beyond the omnibus MANOVA based on this result. The second null hypothesis failed to be rejected. Individual means by treatment group are reported in Table 5.

Table 5

Mean Changes in GPI Scores by Treatment Group

GPI Construct		*M Change*	*SD*
Knowing	Control	4.44	2.37
	Treatment	3.56	2.46
Knowledge	Control	3.54	2.48
	Treatment	3.07	2.42
Identity	Control	1.70	1.42
	Treatment	1.29	1.25
Affect	Control	1.70	1.56
	Treatment	1.29	1.12
Social Responsibility	Control	2.00	1.37
	Treatment	1.29	1.18
Social Interaction	Control	1.58	1.50
	Treatment	1.20	1.32

Note. M Change is the absolute value difference between GPI construct scores before and after the global experience.

Conclusions, Implications and Discussions

Conclusion 1: Student participants frequently engaged in leadership programs that stress collaboration and community service activities yet they rarely participated in events for different cultures, lectures on global issues or interacted with students from other countries.

Based on the demographics McKnight Scholar Leadership Program scholars were selected for, including high GPA and ACT scores and exceptional demonstrations of leadership, frequent engagement in leadership programming is not a surprise to the researchers. The results support Stearns' (2009) finding that students beginning post-secondary school now encounter global issues later. It seems that students do not arrive for study at a university with adequate preparation for life in a global environment, indicating that the university must provide this preparation. University faculty and staff now have the responsibility to provide opportunities for students to interact with other cultures and encourage student engagement in such events and programs.

Conclusion 2: Students who participated in the simulated international experience, regardless of their reflection practices, experienced shifts in global perspective.

For both control and treatment groups, change in each construct was measured. Knowledge reported a large effect size of d = .95; Knowing and Identity both reported a medium effect size of d =.66 and d =.68 respectively. Affect, Social Responsibility, and Social Interaction each reported a small effect size. These results support Braskamp and Engberg's (2011) finding that off-campus experiences are effective in shaping global perspective. Therefore, simulations such as the Heifer International Ranch global challenge are useful in shaping the global perspective of post-secondary students. In looking at the reported means, the simulation was most useful in shifting the cognitive domain. This could indicate that the first step to developing global perspective is simply knowledge of culture and global issues. Less change in other more personal domains may show that, realistically, simulations have less impact on inter- and intrapersonal domains as real, personal interactions with other cultures do not take place.

Conclusion 3: Robust reflection did not intensify shifts in global perspectives.

There were no significant differences between students who received one form of reflection and students who received comprehensive, holistic reflection. This finding does not support the conclusion of Lamm, et al. (2011) that only one form of reflection may not meet the needs of every student, as individuals learn differently. However, it does confirm the assertions of Baker, et. al. (2014) that the type of reflection chosen is not as important as ensuring the presence of quality initial reflection. Savery and Duffy (2001) recommended a combination of both individual and collaborative reflection however the findings of this study found that students shifted their perspective while only using collaborative reflection. Finally, the results of this study did not support Follett's (1924) assertion that quality, holistic reflection was more effective.

Perhaps the research findings are not supported by previous literature on the value of reflection because the experience created emotional dissonance as outlined in Gullahorn and Gullahorn's (1963) Cultural Adjustment Curve (see Figure 2). As depicted in the figure, perhaps the reflection pushed students further along the curve resulting in lower perceived global competence. This decrease, associated with dissonance and growth, would be consistent with the continual motion along the troughs and valleys of Cultural Adjustment Curve (Gullahorn & Gullahorn,1963). This could be an alternative explanation of the unexpected lack of perspective change resulting from additional reflection. Could it be we left the treatment group in the "everything is new and exciting" stage by not providing in depth reflection?

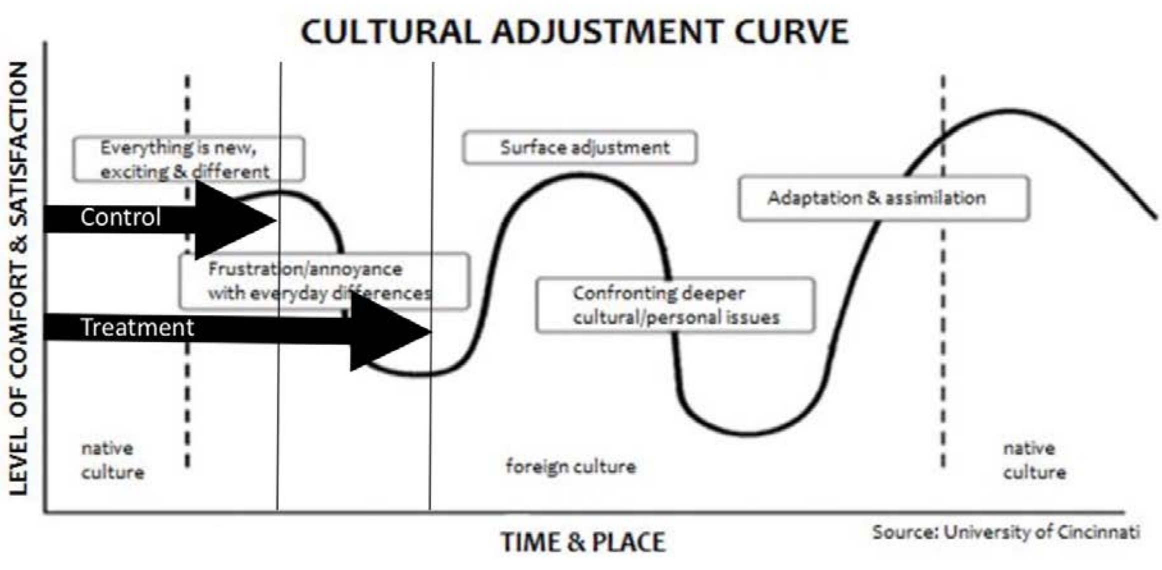

Figure 2. Depiction of potential rationale for reduced changes in global perspectives in this study. Adapted from "An extension of the U-curve hypothesis," by J.T. Gullahorn and J. E. Gullahorn (1963), *Journal of Social Issues*,*19*(3), 33 – 47.

Recommendations for Practice

First, simulated global experiences seem to have value in this population. Thus, it is recommended that those interested in shifting global perspectives consider more economical and efficient short term simulations, like Heifer International's Global Challenge, as a starting point in the growth process. However, it is also recommended that practitioners do not rely on these types of simulated experiences alone as they do not create significant change in all constructs of the GPI. Based on the low effect for the interpersonal dimension, it is recommended that opportunities for interactions with those from other cultures, whether domestically or abroad, are encouraged. At face value, it seems that efforts to include holistic reflection strategies may not provide the additional benefit expected based on previous literature. Due to a number of alternative explanations of this phenomena, such as that provided by Gullahorn and Gullahorn (1963) related to dissonance, it is recommended that practitioners approach the conclusions with caution and curiosity rather than a desire to change practice based on this study alone.

Recommendations for Research

Due to the exploratory nature of this study, more questions arose than answers. This study highlighted a need to more fully explore measures of success when evaluating the development of global perspectives. Should one expect an initial decrease in one's perceived global competence due to the cyclical process described by Gullahorn and Gullahorn (1963)? It is recommended that qualitative analysis of various artifacts associated with the global experience be analyzed to determine if the lack of perspective change in the holistic reflection group was due to dissonance, or simply that the additional support was not necessary. There are a number of simulated global experiences occurring nationally – it would be interesting to explore if simulated experiences produce similar results in other cases. Additional studies on the use of holistic reflection strategies in other contexts might provide a clearer picture of the effects expected when reflection is expanded. The findings of this study seemed to contradict many studies focused on exercises of reflection. Perhaps exploring the effects of various international experiences in a similar fashion, using the GPI, would provide insight into what experiences yield the greatest change and are certain experiences specifically suited to grow cognitive, intrapersonal, or interpersonal perspectives. One such study could include the effects of interactions with students from other cultures while studying domestically. Could interactions domestically provide the interpersonal growth not resulting from our experience?

Limitations of the Study

It is important to again note that this study was exploratory in nature, utilized a rather small sample size and two groups that were equivalent yet contain differences, and relied on the integrity of student responses to the GPI. Though this study provides insight into the effect of a simulated global experience, results should not be generalized beyond this population, and this study alone does not constitute large changes in praxis. Rather, this study seeks to spark further research and investigation.

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Climate For Creativity: A Phenomenological Study of Creativity in Agricultural Communications Students

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Abstract

Creativity plays an important role in agricultural communications. Professionals and academics have noted the necessity of creativity in the workplace and in the classroom. However, employers are unsatisfied with the creative thinking capacities of recent agricultural communications graduates, which indicate a break in the soft skills taught in the classroom and the needs of the industry. The purpose of this study was to better understand the phenomenon of creativity from a student perspective. This qualitative phenomenological study was an investigation of creativity's role in the discipline of agricultural communications. Interview data collected focused on definitions of creativity, assignments, and classroom activities that promote creativity. The findings revealed a lack of clarity in the ways students understood creativity. Students valued their independence in the classroom, as well as their freedom to express their creative ideas without fear of academic failure. Based on the participants' responses, students want to feel challenged in their coursework, but supported by the instructor. A social constructivist alignment could prove useful in facilitating a creative environment, as well as the use of scaffolding (changing the level of instructor support).

Introduction/Theoretical and Conceptual Framework

There is a growing concern among academia and employers alike that college graduates lack the creative problem solving skills necessary to prosper in the workforce, as well as solve problems that require quick thinking skills and innovation (Edwards, McGoldrick, & Oliver, 2006; Sawyer, 2012), and similar trends have been noted in agricultural communications graduates (Corder, 2016; Irlbeck & Akers, 2009). Students must possess the soft skills to think creatively and critically, communicate to broad audiences, and collaborate among peers to succeed in today's university classrooms and workforce. Priority Research Area Seven of the National Research Agenda (Andenoro, Baker, Stedman, & Weeks, 2016) recognizes the demand for creative problem solving capacities in agricultural students and acknowledges the role they will play in solving complex world problems. These skills are not only vital to student success in the workplace, but also to solving the difficult societal, political, and environmental problems these students will unavoidably face (Andenoro et al., 2016; Corder, 2016; Edwards et al., 2006). However, promoting creative thinking skills among students can be difficult as defining and assessing creative activity within an academic setting is quite subjective.

Defining Creativity

Defining creativity is a daunting task as there is no one definition of the concept. Even among academics, one can easily become entangled in the multitude of interrelated terms in any discussion regarding creativity (Amabile, 1983). Psychologists argue definitions of creativity should include elements such as intelligence, emotion and memory, while sociologists argue for the inclusion of group, social movement and society (Sawyer, 2012). Although there are many resources regarding the subject of creativity, the lack of an all-encompassing definition of creativity has led to confusion among academics and professionals alike. Amabile (1983) noted dissatisfaction among scholars in regard to a definition stating, "[academia] created a criterion problem that researchers have tried to solve in a variety of ways" (p.19). In order to research creativity, it is important to be able to define it.

Three conceptions of creativity are commonly found in literature relating to creativity in higher education: product, process, and systemic creativity. In product creativity, the creative process leads to a final product, or outcome, of response. For example, creative products in scientific disciplines include theories, experimental results, or journal articles, while in the arts, creative products include paintings, sculptures, or musical scores (Sawyer, 2012). Amabile (1996) described creativity as "a product of response" that can only be judged based on novelty and usefulness (p. 31). Product creativity has been most helpful in identifying and assessing the creative components of a final product because the finished product serves as a representative of the creator's inherent creativity (Craft, 2001).

Process creativity refers to independent expression. The quality and originality of the result are not as important as the concept of creating for the sake of being creative (Sawyer, 2012; Robinson, 2011). The ability to generate new ideas without worrying about the outcome is at the heart of this process, which positively promotes creative thinking and cognitive development (Beghetto, 2005; Robinson, 2011). This operational definition encompasses student processes and capabilities, as well as behavioral qualities seen in creative thinking, such as risk-taking, humor, open-mindedness, or capacity for fantasy (Sawyer, 2012).

Finally, systemic creativity proposes creativity is a socially-constructed process that is the result of three interrelated forces—the domain, intrinsic task motivation, and creative problem solving skills—functioning at different levels instead of as an individual process or product (Csikzentmihalyi, 1996). In other words, for an idea to have any affect it must be understood and received by an audience, and experts within the field must deem it as creative before it is included within the cultural domain. In higher education, the possibility for students to be creative exists only if students are exposed to a variety of domains and fields (Csikzentmihalyi, 1996).

Facilitating and Assessing Creativity in the Classroom

Just as there are many ways to define creativity, there are also many ways to promote creative thinking among students. According to Craft (2005), in order to facilitate creative thinking skills, it is important to first acknowledge creativity's importance, role, and value within the classroom environment. Specific classroom designs and teacher behaviors have also been noted as important elements of creative learning environments. The teacher's role should be as a facilitator and fellow collaborator, joining students in a process of constructing knowledge (Sawyer, 2012). They also play an integral role in establishing the parameters of a safe learning environment where creativity can flourish.

> [Creativity-fostering teachers] encourage students to think independently; have a co-operative, socially integrative style of teaching; do not neglect mastery of factual knowledge; tolerate 'sensible' or bold errors; promote self-evaluation; take questions seriously; offer opportunities to work with varied materials under

> different conditions; help students learn to cope with frustration and failure; reward courage as much as being right. (Cropley, 2001, p. 136)

Sensory elements within the learning environment can also have an impact on creative ability (Glaveanu, 2010). One sensory element that reflects a creative educational environment is listening to music. Considering the complexity of creative thinking and the multiplicity of ways to approach creative teaching, Feinberg (1974) argued that music is not just for entertainment, but can also “make a significant contribution to education’s most valued goals—helping each person become all that he or she can be, a fully thinking, knowing, and feeling individual” (p. 164).

Assessments are used within the classroom to provide students with constructive information and feedback, while also measuring individual improvement (Beghetto, 2005; Cowan, 2006), and arguably, creativity is one of the most difficult cognitive abilities to assess (Cowan, 2006). More than 100 creativity measures have been developed and studied (Besemer & Treffinger, 1981; Hennessey, 1994; Torrance, 1966). Creativity assessments can be quantitative, such as the Torrance Test of Creative Thinking (Torrance, 1966) or qualitative, such as the Requirements Model of Creativity (Unsworth, Wall, & Carter, 2005). Because of the multi-dimensional nature of creativity, there is not one test better than the other (Besemer & Treffinger, 1981), and both Treffinger (1986) and Cropley (2001) suggest the assessment of creativity should be based on several tests, rather than relying on a single score.

Social Constructivist Theory

In the realm of creativity, the social constructivist theory has guided numerous educational studies because Vygotsky (1978) contested it was impossible to separate learning from any social context. All knowledge derives from social circumstances; therefore, it can only be explained by social circumstances (Vygotsky, 1978). Social constructivists explain that reality is developed through shared human social activity, that meaningful learning occurs when individuals are engaged in social activities, and that knowledge is a human creation constructed by social contexts (Kim, 2001). As such, the social constructivist framework seeks to develop subjective meanings of participant experiences and constructs meaning toward certain objects or things (Creswell, 2013). From this scope of understanding, social constructivists refer to instructors as facilitators and co-constructors of knowledge (Vygotsky, 1978).

Vygotsky (1978) further argued that learning is dependent on a student’s internal drive to understand and promote the learning process because the learner actively constructs knowledge. As a result, he proposed the Zone of Proximal Development, or ZPD (Figure 1). The ZPD explains how students can, with the help of an instructor, master concepts they cannot understand on their own creating a zone where learning occurs. Outside of the ZPD, is the students’ potential ability or level of understanding (Vygotsky, 1978). The ZPD can be used to describe a student’s current level of creative development, as well as their potential understanding a topic through the use of pedagogical strategies that facilitate creative thinking (Shabani, Khatib, & Ebadi, 2010).

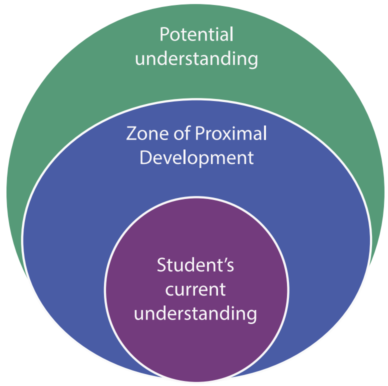

Figure 1. Conceptual Diagram of Zone of Proximal Development (adapted from Vygotsky, 1978)

The term scaffolding has often been linked with the ZPD, and it illustrates the components of a task that are, at first, beyond the learner's ability (Vygotsky, 1978). Scaffolding is an approach in which an instructor assists the student in his or her ZPD, as necessary, and eventually tapers off when it becomes unnecessary to encourage creative or critical thinking, much as a scaffold is removed from a building during construction (Shabani et al., 2010). The ZPD has often served as a model for curriculum development and classroom instruction because instructors are able to determine the learner's current and future learning.

Purpose/Objectives

Creativity has been identified to be a vital construct in the success of agricultural communications graduates both academically and professionally (Corder, 2016; Irlbeck & Akers, 2009), yet with so many definitions of creativity and expectations of creative work, students' often have a difficult time conceptualizing this construct. This qualitative phenomenological study explored the perceptions of creativity from the perspective of undergraduate agricultural communications students at Texas Tech University. The purpose of this study was to provide insight and understanding to the phenomenon of creativity from a student perspective as it relates to agricultural communications. Having a better grasp on the subject will provide insight to student creativity, instructor development, and any classroom activities or assignments associated with the concept. This study was guided by the following research objectives:

RO1: Define creativity as it relates to undergraduate students in agricultural communications at Texas Tech University.
RO2: Explore student perceptions of creative activity within the classroom.
RO3: Discover student perceptions of creative assignments within the classroom.

Methods/Procedures

A qualitative methodology was utilized because of its innate ability to deeply understand how perceptions and experiences relate to one another (Ary, Jacob, & Sorenson, 2010; Creswell, 2013). Social phenomenology was used to guide this study as it aims to provide explanations of how we produce and experience our ordinary daily lives (Schwandt, 2001). Phenomenological studies help to describe the common meaning for a group of individuals of their lived experiences of a given concept and suspend all judgments about what is real until they become more prevalent in the research (Creswell, 2013). Phenomenology is “committed to descriptions of experiences, not explanations or analysis” (Moustakas, 1994, p. 58). One of the overarching purposes of this study was to define creativity for agricultural communications students, a phenomenon which has a myriad of abstract meanings, and a phenomenological methodology allowed the researchers to make an interpretation between different meanings of a concept (Creswell, 2013). This research strategy also assisted in understanding the social culture of agricultural communications classrooms and how agricultural communications students produce and experience creativity in their daily lives.

Purposive sampling was used to identify participants from a population of undergraduate agricultural communications students at Texas Tech University. In purposive sampling, the researcher relies on their judgment to identify and select participants who are especially knowledgeable about or experienced with the phenomenon of interest (Creswell, 2013). Additionally, Creswell (2013) suggested using purposive sampling when a limited amount of participants can serve as data sources. Ten participants from a population of undergraduate agricultural communications students at Texas Tech University were asked to participate in in-depth, face-to-face interviews. The participants were identified from an upper-level, skills-based course required of all students within the degree program that emphasizes creativity in assignment rubrics. According to Dukes (1984), the ideal number of participants in a phenomenological study ranges from three to 10 participants; therefore, 10 participants were selected in order to obtain rich, detailed information about the phenomenon under investigation. Given that the participants were enrolled in an upper-level course, the sample consisted of juniors and seniors majoring in agricultural communications who possessed a thorough understanding of the departmental program. Participants were recruited for participation in-person through the use of an oral script and volunteered for the study via email. Participation was fully voluntary, and there were no incentives given. Texas Tech University Human Research Protection Program granted approval to this study prior to participant interviews.

A questioning guide consisting of 12 interview questions was used to guide the semi-structured interviews. Semi-structured interviews grant researchers the flexibility to move away from the questioning guide and form a conversation with participants, resulting in rich, detailed responses (Ary et al., 2010; Erlandson, Harris, Skipper, & Allen, 1993). The questions were adapted from a previous study regarding creativity in higher education (Justyna, 2016) to specifically reflect the agricultural communications discipline. Interviews ranged from 30 to 45 minutes in length. Each interview was audio recorded to aid in transcription and participants were assigned a pseudonym to ensure confidentiality.

The data analysis process began by transcribing interviews verbatim. The interviews were then analyzed through the constant comparative method using open and axial coding with MaxQDA, an online qualitative data collection software. The constant comparative method is a process of relating categories of information to a central phenomenon (Creswell, 2013). This method assisted in examining emergent themes and comparing the responses to previous, but similar, responses within the same category (Glaser & Strauss, 2009). During the open coding phase, data was sorted into broad themes or major categories of information. The aim of open coding is to produce concepts that fit the data and open up inquiry. This type of coding requires scrutinizing the data very closely, line by line, or even word by word (Glaser & Strauss, 2009). From this coding, the data was organized into sub-themes before using axial coding to ensure all aspects of the data were analyzed. Axial coding is an essential component of open coding. It consists of intense analysis done around one category at a time. This results in cumulative knowledge about themes and subthemes (Strauss, 1987).

According to Lincoln and Guba (1985), the standards of qualitative research need to address credibility, transferability, dependability, and confirmability. Trustworthiness was established through the researchers' use of several types of data to support or contradict the analysis (Creswell, 2013). Course documents in the form of rubrics, syllabi, and course assignments were used for triangulation, as well as the comparison of interview transcripts and literature. Additionally, research that gathers data straight from the participant displays credibility by allowing the source to expand upon opinions, beliefs, and attitudes (Foster, 2004). In-depth, face-to-face interviews generate data that are both reliable and honest (Foster, 2004). Transferability is described as the degree to which the findings can be transferred to other locations, circumstances, or participants (Creswell, 2013). The use of rich, thick description and long, detailed quotations allow readers to make decisions regarding transferability. To address confirmability and dependability, interviews were conducted straight from the source, utilized triangulation of multiple data sources, and used other relevant studies in relation to creativity in higher education to support the current study's need and interpretation of the findings (Richards & Morse, 2012; Lincoln & Guba, 1985). Additionally, an audit trail was utilized as a good record of research data to address dependability (Foster, 2004).

Results/Findings

Demographic characteristics were collected in each interview and included gender and student classification. Out of the 10 participants, two (20%) were male and eight (80%) were female. Four (40%) of the participants were classified as juniors within the program, and six (60%) students were seniors. The students also had varied and diverse levels of professional experience within agricultural communications (i.e. internships, jobs, and backgrounds). Two students had experience working for a commodity group, two had interned with a creative marketing agency, and one had a background in agricultural policy and law. The remaining five noted that their only experience in agricultural communications was simply being a student.

Research Objective One

Research objective one sought to define creativity as it relates to undergraduate students in agricultural communications at Texas Tech University. Four themes emerged during the data analysis process: beginning conceptions of creativity, dichotomies of creativity, originality of creative work, and motivations of creativity.

Beginning conceptions of creativity. When asked, "how do you define or describe creativity," all participants agreed that creativity was "different," "unique," or "outside of the box." At first, their answers were mostly indirect and digressive in regard to defining the construct. Chandler noted, "Creativity…it's such a broad term because it can be described 100 different ways" (Interview 8, p. 1). A total of six respondents focused on creativity as a process. Referring to creativity at the cognitive level, Carol stated, "Creative people have a certain ability to create things a lot of people can't see" (Interview 6, p. 2). Three participants described creativity as a final product. Susan said, "To me, creativity is taking content or taking subject matter and putting your own personal spin on it—making it different from anybody" (Interview 7, p. 2). Only one participant described creativity as a systemic process.

Dichotomies of creativity. Participants had contrasting views regarding individual creativity. Some, like Emma, viewed it as something very unique to the individual. "Everyone has creativity, and it's just at different levels or different channels" (Interview 10, p. 1). Monica, however, inferred that people could be creative in some areas, but not in others. "Well, everybody is different, but I feel like I'm creative in the way of digital photography. Not so much drawing or painting or anything like that" (Interview 2, p. 1). Phoebe described individuals have varied levels of creativity unique to them. "I think creativity just explodes out of some people. Normal people, or average people, like me, I think I am creative, but it's not this constant thing. Some people are more perceptive than others" (Interview 5, p. 3).

In contrast, some participants viewed creativity to be an inherent quality at some level. Chandler said, "Being creative in one aspect, I don't feel like that is a thing. You're either creative or not" (Interview 8, p. 3). When asked for clarification, she added:

> Let me try to explain it this way: I wouldn't say you could be creative in graphic design and not be creative in writing…If it was on a bar scale, that's how it would be…this is the creativity scale and here on the right end is the most [creative] you could be and the left is zero creativity. I don't feel like you can branch off of that. You're either some point on that linear scale. (Interview 8, p. 3)

Originality of creative work. Another theme that emerged concerned the originality of a work and what makes it creative. Participants held contrasting views on the origin of original ideas versus replicating someone else's work in unique ways. Some participants felt that the replication of ideas or "copy-catting" was not creative; while others thought creativity was born out of inspiration that came from something else. Rachel explained:

> I feel like I am good at copying and pasting other peoples' ideas. I take them and maybe change up a few things. I make them my idea, but not really my idea…I don't necessarily feel like I create a lot of ideas on my own. (Interview 1, p. 1)

Phoebe explained that she felt non-creative work could be easily replicated, but creative work was usually inspired from something else. "Creative work, whether it is music, design, or whatever, is something innovative even if it is something that is born out of inspiration for something else" (Interview 5, p. 3). Chandler described his creative process was to

> Cherry pick off a bunch of other things to create something new…You can always take someone else's work and put a spin on it. If it were different enough, I would say that that's creative. Somebody originally came up with that idea. (Interview 8, p. 4)

Motivations of creativity. All participants mentioned the creative process intrinsically motivated them. Janice stated, "If I want to learn about something or someone, I'm going to be motivated to do it" (Interview 4, p. 2). Susan had a similar response. "For me, I just have a lot of internal motivation because I enjoy being the best at whatever I'm doing" (Interview 7, p. 3). Phoebe further described how intrinsic motivation helped her creative process, "You'll see that creativity can be cultivated and can be encouraged by sitting down and focusing on what you're doing instead of just waiting for it to happen. So, I think it's something that you have to pursue" (Interview 5, p. 3).

Research Objective Two

Research objective two sought to explore student perceptions of creative activities, or facilitation practices, within the agricultural communications classroom. Three major themes emerged from this objective: foundational knowledge, support from instructor, and environmental stimuli.

Foundational knowledge. All participants stated that they sought to acquire a deeper understanding and foundational knowledge of the material taught within the courses they were enrolled in. Some of the participants noted they needed that foundational knowledge in order to be creative within the course. Emma explained, "It's harder for me to be creative in something I don't know the basics on…I'm not allowing myself to think outside the box because I'm not comfortable with it yet" (Interview 10, p. 3). Janice illustrated her struggle with being creative without foundational knowledge by stating, "I want to be able to create cute letterheads or magazine layouts, but sometimes I feel like my skills are so basic. My knowledge limits me" (Interview 4, p. 3).

Support from instructors. Another theme regarding student perceptions of facilitating creativity was the need for support from instructor. Carol described characteristics of a creative teacher by stating, "Creative teachers are encouraging, warmer, and kinder. They're more invested in their students' work. They are more "wowed" with your final project" (Interview 6, p. 4). Phoebe also noted a specific professor who helped her to be creative.

> She specifically allowed us to be creative by constantly reassuring us that it's not wrong whatever we do…I can't create if I'm terrified of failing or if an instructor is super intimidating or overbearing…That will kill my creativity faster than anything. (Interview 5, p. 4)

Emma added that creativity also came from course assignments. "A lot of our teachers give a broad assignment…In that way, they encourage creativity and allow us to go on whatever style we want to as long as we accomplish what they want to see" (Interview 10, p. 3).

Environmental stimuli. Four of the participants said that while their environment didn't hinder their ability to create, their surroundings did assist in the creative process. Monica explained, "In [Professor]'s class, she would play music. That helped me to think as we worked. When she didn't play it, it was harder to think" (Interview 2, p. 2). Phoebe had a similar response by adding, "[Professor] played music, which is really cool. I think that absolutely helps creativity instead of being in a classroom with just silence" (Interview 5, p. 4). Carol stated her environment was not the only factor that determined her ability to be creative, but thought it did have an impact. "If I was on a mountainside, I could probably come up with something beautiful…I wouldn't say [my environment] hinders me, but in some situations it could definitely help me" (Interview 6, p. 3).

Research Objective Three

Research objective three sought to discover students' perceptions of creative assignments within the classroom. Two themes emerged from participants: fear of failure and freedom to create.

Fear of failure. Fear of failure was an emergent theme throughout all of the interviews. Most participants mentioned that academic failure inhibited their creative freedom and that they were afraid of academic failure within the classroom, even if they did not explicitly say it. When discussing the use of rubrics, Monica stated that she liked having a very detailed rubric, "So, I don't do it wrong and get a bad grade. I'm kind of a perfectionist. I like to know everything about what I'm working on" (Interview 2, p. 2). Janice added, "I like when I'm told what's expected of me, and what I'm going to be graded by… If my work is graded, I can go back to the rubric and see if it's done the way they asked" (Interview 4, p. 3)**.** Chandler's preference of rubric was dependent on the context of the assignment.

> It depends on how much is this worth points wise. If it's a huge points-based project that's worth 30% of my grade, I would rather have a strict rubric, but if it's something that they're just trying to pull out of us to try to get us to be creative, I would say abstract and not give us those hard guidelines. (Interview 8, p. 5)

Freedom to create. While students preferred course assignments that were very structured with detailed rubrics, they also stated they wanted the freedom to choose a topic of interest to them and apply techniques creatively. Most of the participants advocated the need for freedom within the classroom in order to be creative. Some participants referred to assignments where they were given a broad topic and had the freedom to narrow it down. Emma noted this freedom to create by explaining, "We are more creative when they loosen the reins," in reference to assignments (Interview, 10, p. 3). Susan described a course she felt was creative due to the ambiguity of the assignments.

> [Assignments] like that really promote creativity because you have no choice but to be creative. You have to think about all of those components when they're not given to you. So, any assignment that a professor puts forth where they give you a broad outline of what they want, but they don't specifically have details in the rubric are must haves. (Interview 7, p. 3)

Conclusions/Recommendations/Implications

In order to have a learning environment that facilitates creativity, those within the environment must first recognize its importance and value (Craft, 2005). Based on the participants' responses, students clearly placed value and importance on creative capacity—especially within agricultural communications classrooms. They all noted the benefit of creativity to class assignments and instructor delivery. All participants agreed that creativity is "unique," "out of the box," or "different." Although there was no consensus on an all-inclusive definition in agricultural communications, most students in this study described creativity from the process viewpoint. In process creativity, the end result is not as important as the process of being creative (Sawyer, 2012). This means faculty members should account for the creative leap of the individual. In this way, faculty can focus on the cognitive development and capabilities of the individual creator (Robinson, 2011).

For these students, creativity was not really about the novelty of original ideas; it was about adapting someone else's ideas into a work of their own. Participants all agreed that creativity was intrinsically (internally) motivated; however, there were contrasting views on the creativity of the individual. Some participants viewed creativity as inherent on some level to the individual verses others who viewed creativity as a natural quality manifested at different levels. Like Craft (2005), these students' perceptions imply that all students are creative at some level. Because students' creativity is intrinsically motivated, it can be undermined when faculty members place too much emphasis on scores, grades, or academic achievements (Beghetto, 2005) Faculty members need to help student focus on mastery of core skills and understanding concepts (Beghetto, 2005). This is not to suggest that external motivators, like academic grades, are counterproductive. Beghetto (2005) suggested that when faculty members make creative thinking their goal, extrinsic motivators could improve performance on a task.

Another common theme among participants was respect and support for creative learning within the classroom. Craft (2005) recognized the role of knowledge in regard to creativity and it is increasingly being noted in creativity research. Without a solid foundational knowledge related to the content of the courses, students will not have the opportunity to cultivate creative thinking and problem solving capabilities (Craft, 2005). Since agricultural communications is largely a skill-based discipline, it is of great importance that instructors consider course design to ensure courses are setting a solid foundation for technical skills and the application of those skills. This was found to be supported in the course syllabus collected for the class from which participants were selected. Foundational knowledge was built upon throughout the semester with multiple opportunities for applying that knowledge in skills-based ways. Assignments increased in point value toward the end of the semester so students could demonstrate their mastery of course content. It is not enough to make assumptions about what students know or do not know, and successful course design begins with instructors considering the learning objectives and content of the course (Justyna, 2016). Like Janice said when attempting to implement creative thinking skills into a project, "…my knowledge limits me" (Interview 4, p. 2).

Additionally, participants expressed the need to feel challenged, yet supported by course instruction and the assignments. Students need an environment that is supportive and rewarding of creative ideas (Guilford, 1967). The instructor plays a vital role in facilitating creativity within the classroom (Sawyer, 2012); therefore, teaching for creativity is synonymous with effective teaching (Craft, 2005). As such, the impacts of the faculty-student dynamic are primarily centered on the investment of the instructor for students' cognitive and creative development. Carol noted that creative teachers are "encouraging, kinder, and warmer. They are more invested in their students' work" (Interview 6, p. 4). This student-faculty dynamic is often indicative of many successful classroom relationships and participants' responses imply that students value the opportunity to closely interact with their professors. Thus, the encouragement and support of students is essential in order to facilitate a creative classroom environment.

Students suggested instruction and assignments reflecting a level of ambiguity were necessary for fostering creative thinking in the classroom. Learning is enhanced when students can contextualize what they learn for immediate use (Livingstone, 2012). Many times, student participants described social instances where instructors encouraged creative thinking while building upon current skills, which are values reflective of a social constructivist alignment. There is a consensus among creativity researchers that students become more effective learners when they recognize and use their own creative abilities in combination with existing knowledge (Jackson, 2006). In a social constructivist alignment, students build upon existing knowledge, while faculty members take on the role of facilitator and mentor (Vygotsky, 1978). In this way, faculty can help students achieve their potential understanding by stretching them beyond their Zone of Proximal Development (ZPD) (Vygotsky, 1978). Therefore, agricultural communication faculty should set high expectations for their students which will help to push them to their highest creative potential. By the same token, it is important that faculty members set realistic and achievable expectations for their students.

While students said their environment did not hinder their ability to create, for many their environment assisted in the creative process. Participants expressed that playing music in the classroom helped them to be creative. Feinberg (1974) suggested music relaxes the body and helps students to engage in classroom activities. Although, the implementation of music might not be applicable in all classroom situations, this element has the potential to enhance students' creative thinking ability in certain courses. Faculty members should first consider the learning styles and preferences of their students before implementing music to their courses.

The role of assignments holds weight in classroom settings. It re-emphasizes the power dynamic between students and faculty, and plays an important role in designing a facilitating environment for creativity (Craft, 2005). In this study, all participants expressed the need for opportunities to explore alternatives without fear of academic failure. In regard to the course documents, grading was based on creative solutions and effort through alternative group projects. As such, the instructor allotted up to 10% of the final grade to encourage and reward student creativity. Although each assignment lent itself to creativity through the original generation of project-based assignments, only one out of five rubrics collected addressed creativity by name, encouraged students to be creative, and provided incentive for students to be creative. This may imply that although creativity is perceived as an important element of their courses, instructors may not be explicitly stating this in their syllabi. Further, because instructors may be failing to explicitly address creativity in their course assignments and syllabi, the expectations of creativity may not be fully communicated to the students.

Students also recognized the benefit of creativity in the classroom, as well as noted its importance to the discipline. However, their responses underscored a need for an improved dialogue among students and faculty in relation to creativity. This open dialogue will create a mutual understanding between students and faculty member and will allow the students to explore creative alternatives without the fear of academic failure. The result of which would likely increase creativity with respect to teaching and learning in the classroom. Additionally, students revealed several pedagogical strategies they felt best facilitated creative thinking, which should be taken into consideration when faculty members develop learning objectives and course design. Participants provided instances where faculty provided students with basic core skills and outlined that meaningful student engagement was imperative for the creative process. Finally, assignments have the ability to undermine or encourage creative thought, and students indicated assignments should have a level of ambiguity to facilitate independent thinking (Beghetto, 2005).

The results of this study determined that creativity could be further developed and fostered through instructor behavior, assignments, and effective course design. Based on the findings of this study, a social constructivist alignment in classrooms could prove useful in developing students' creative thinking capacities. Through the use of scaffolding, instructors can facilitate creative thought and determine students' current level of understanding (Vygotsky, 1978). Instructors should use formative assessments to determine the level of understanding of each student in the learning process. Having a better understanding of each student's current potential and basic knowledge will allow instructors to augment assignments to cater to the needs of students. Additionally, students expressed a need to be supported, but not too much. Faculty should provide the right amount of support for students in order to encourage independent thinking (Vygotsky, 1978). Modeling the ZPD, course assignments should reflect a level of ambiguity to encourage independent thinking, develop creative thinking skills, and push students beyond their ZPD. Using this instruction, assignments, instructions for assignments, and teacher delivery will change. Course instructors must allot extended time for these methods to be implemented within the classroom. Faculty must realize in a social constructivist alignment, they are taking on the role of mentor and facilitator rather than the traditional instructionist approach.

In order to gain a holistic understanding of how creativity is understood in the discipline of agricultural communications, additional research is needed. Some of the participants struggled to come up with a definition of creativity as it relates to the discipline. Participants often deviated from the question and provided an over-arching definition of the construct. A quantitative, broad-reaching survey could be done to give added structure to the definition of creativity. This will further help faculty and students conceptualize creativity. This study also needs to be replicated among a larger population of agricultural communications students. This would allow the current findings to be more generalizable and applicable across the discipline. It might be interesting to see the results of a broad-reaching survey sent to agricultural students nationwide. These results would give structure to the ambiguous nature of creativity and how it relates to our discipline. Additionally, the current study revealed differences in individual needs of the students regarding creativity in one class. As a result, there is a need to explore the dynamic of faculty-student interactions and its impact on creativity in the classroom.

Given the benefits of creative thinking to solve complex social, individual, environmental, global, and political problems, it would seem that the promotion and assessment of creative thinking skills would be at the forefront of higher education curriculum (Sawyer, 2012). However, what is clear is an underlying need to better understand various assessments of creativity in higher education. This will provide insight to creative thinking capacities of both instructors and students. Further research should explore different learning outcomes to determine the best assessment practices for creativity in higher education. This future research will shed light on important educational issues such as curriculum design and pedagogical tactics to encourage development of student and instructor creativity.

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Impact of a Poultry and Egg Food Safety Education Workshop on 4-H Youth

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Abstract

This study sought to create and evaluate food safety messages for youth as identified through the totality of research conducted as part of a United States Department of Agriculture project. The goal of this study and the overall program referred to as the Poultry and Egg Education Project (PEEP) is to reduce instances of foodborne illness in families and communities by evaluating knowledge, attitudes, perceptions and intentions of implementing lessons learned during a workshop on poultry and egg food safety. Among a convenience sample of 4th-6th grade 4-H youth attending various 4-H camps (n = 190), post-test knowledge scores were significantly higher than pre-test scores. The workshop teaching poultry and egg food safety themes was effective in not only knowledge creation, but post-test scores also indicated participants had positive attitudes, perceptions, and intentions regarding adopting the food safety messages. According to these findings and Ajzen's (1991) Theory of Planned Behavior, we expect participants to implement appropriate food safety behaviors related to handling and use of poultry and poultry products.

Introduction

Each year 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths are attributed to foodborne illness in the United States (US) (Centers for Disease Control and Prevention [CDC], 2016a). On average, one in six Americans become sick from foodborne illness each year (CDC, 2016a). These illnesses are a burden to public health and are expensive; yet, they are largely preventable (CDC, 2016a). Consumers can greatly reduce their risk of foodborne illness by learning safe purchasing, storing, handling and preparing practices at home (Kosa, Cates, Bradley, Godwin & Chambers, 2014). Many consumers, however, are not following recommended best food safety practices, contributing to the large numbers of foodborne illness and outbreaks (Kosa et al., 2014). Though many consumers believe it is not common for people in the U.S. to become sick from food prepared in the home, food safety experts report the home is the primary location of foodborne illnesses occurring (Kosa et al., 2014). The danger of foodborne illness is an even higher risk among children and youth. According to the Centers for Disease Control and Prevention (2016a), two of the most common foodborne illnesses are caused by *Salmonella* and *Campylobacter*, bacteria that can be found in poultry and eggs.

The Poultry and Egg Education Project (PEEP), which spawned this study, has a goal to reduce illnesses from *Salmonella* and *Campylobacter* by educating and improving consumer handling and preparation of raw poultry products in the home. PEEP is part of an Agriculture and Food Research Initiative (AFRI) Competitive Grant supported by the National Institute of Food and Agriculture (NIFA) of the United States Department of Agriculture (USDA).

Food safety is the probability of not suffering from consuming a specific food (Henson & Traill, 1993). Of the 48 million foodborne illnesses in the United States each year, *Salmonella* and *Campylobacter* cause nearly 2 million foodborne infections and at least 450 deaths ever year (CDC, 2016c; Scallan et al., 2011). Because of the high threat of these bacteria specifically, poultry and eggs pose one of the greatest risks of foodborne disease in the US when compared to other foods (Kosa, Cates. Bradley, Chambers & Godwin, 2014). *Salmonella* is a common cause of food poisoning and symptoms can last up to a week. Similarly, *Campylobacter*, is one of the most common causes of diarrhea in the US (CDC, 2016b). The risk for illnesses associated with both of these pathogens is especially high for older adults, infants and persons with chronic diseases (CDC, 2016c). *Salmonella* and *Campylobacter* are killed by safe cooking and pasteurization. The only way to prevent illnesses associated with these pathogens is to practice recommended food safety best practices. For this reason, education of food safety should include the safety of handling, preparing, and cooking poultry and eggs in the home (Kosa et al., 2014).

Theoretical Framework

This study integrated Ajzen's Theory of Planned Behavior (TPB) (Ajzen, 1991) and Rogers' (2003) Diffusion of Innovation Theory to identify variables that consistently impact behavior change. TPB helps program creators and implementers address or target specific behaviors (Lobb, Mazzocchi, & Traill, 2006) by focusing on attitudes, intentions, and subjective norms (beliefs and motivations). Diffusion of Innovation theory demands that knowledge and awareness is also a key element in the process of predicting or changing behaviors.

Behavioral beliefs are the likely outcomes of the behavior being studied as well as the evaluations of these outcomes (Ajzen, 2006). They produce a favorable or unfavorable attitude in the individual toward the behavior (Ajzen, 2006). Attitudes have been shown to influence and predict behavior (Ajzen, 1991; Wilcock, et al., 2004). Therefore, in order for educators to plan and implement food safety curriculum, it is important to understand the consumers' attitudes towards food safety (Wilcock, et al., 2004). Normative beliefs are the beliefs about the expectation of others and the desire to comply with these expectations (Ajzen, 2006). These beliefs are based on the individual's perceived social pressure to perform or not to perform a certain behavior (Ajzen, 1991). The third type of belief included in this theory, control beliefs, is the individual's perceived behavioral control that impacts the performance of the behavior (Ajzen, 2006). This belief is assumed to take into account past experiences, perceived difficulty or ease and anticipated obstacles (Ajzen, 1991).

The central factor to this theory is the individual's intention to perform a specific behavior (Ajzen, 1991,). When all three types of the beliefs describes combine, an intention is formed (Ajzen, 2006). According to the theory an individual's intention to engage in a certain behavior directly influences the likelihood of that behavior occurring (Ajzen, 1991). This concept is largely due to the assumption an individual's intentions are indicators of motivational factors such as; how much effort they are willing to exert and how hard they are willing to try in order to perform a particular behavior (Ajzen, 1991). This theory is consistent with other research findings which suggests intention to be a strong predictor of behavior (Dedobelleer, Champagne, & Potvin, 1999). According to Lobb, Mazzocchi, and Traill (2006), the theory has proved to be a successful tool for analyzing behaviors associated with risky or health-related actions. Researchers have applied the theory to studies addressing smoking, risky driving, exercise and food choices (Lobb, et al., 2006). Shapiro, Porticella, Jiang, and Gravani (2011) found the theory of Planned Behavior to provide a useful framework for understanding the adoption of safe home food handling practices. During a 5-point Likert scale questionnaire, Shapiro et al., (2011) were better able to understand the gap between awareness, attitude and behavioral intentions. Ultimately, they found knowledge about potential risks and safe practices, behavioral control and social norms played an important role in regulating food handling. However, Shapiro et al., (2011) found knowledge and awareness alone will most likely not bring about change.

Though intention is not the same as behavioral change, it can be a strong driving force to action (Lohse, 2006). Understanding both beliefs and intentions through the theory of planned behavior can help researchers or implementers understand how to impact behavioral change. Adding knowledge and awareness to interventions to bring about change The more favorable the attitude and subjective norm, and the greater the perceived control, the stronger the intention to perform the behavior (Ajzen, 1991). According to Rogers (2003), knowledge and awareness are seminal factors of adopting new new ideas and implementing behavior change. Figure 2-1 depicts a conceptual model of how the theoretical framework of this study guided our research plan. It also shows how practioners can help target improved poultry and egg safety behavior of youth by studying how their knowledge, beliefs, attitudes and intentions affect behavior.

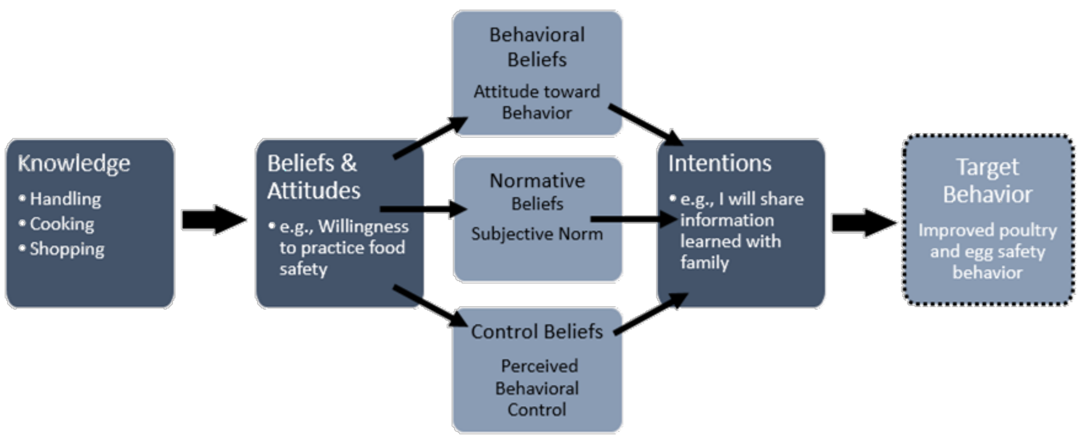

Figure 1. How youth's knowledge, beliefs attitudes and intentions affect behavior of poultry and egg safety practices: A conceptual model

Food safety experts report many Americans believe foodborne illness at home is not very common (Kosa, Cates, Bradley, Chambers & Godwin, 2015). However, approximately one-fifth of all foodborne diseases in the United States could be attributed to poor food handling practices at home (Gould et al., 2013; Redmond & Griffith, 2003). Although food safety behaviors among consumers in the US typically seem to be improving over time, risky consumer practices are still very common (Hanson, Hughes, & Liu, 2015; Fein et al., 2011). Though most of what we know about consumer food safety practices are results of self-reported surveys, it should be noted actual food handling practices often differ from self-reported practices (Jay, Cormar &

Govenlock, 1999; Wilcock, Pun, Khanona, & Aung, 2004). However, the literature base indicates a strong lack of consumer knowledge or willingness to comply to food safety recommendations.

Lack of knowledge can be a major barrier preventing consumers from changing risky food practices. According to McIntosh, Christensen, and Acuff (1994), consumer knowledge is a major factor in willingness to change current practices. Simply making people aware of foodborne pathogens could play a significant role in reducing foodborne illness (Lin, Jensen, & Yen, 2004). Altekruse, Street, Fein, and Levy (1996) reported those who had heard of *Salmonella* were more likely to follow related food safety recommendations. According to a study of US consumers conducted by Lin et al. (2004), although the majority of participants had heard of *Salmonella* (94%) as a major concern in food safety, only 7% were aware of *Campylobacter*. Additionally, only half of the participants considered food contamination by microorganisms a serious food safety problem (Lin et al., 2004). Though knowledge alone does not automatically lead to safer consumer practices, it enables the consumer to reflect upon their risky practices.

Both knowledge and attitudes of food safety recommendations and practices are found to be affected by various social, cultural, and economic demographics (Lando & Chen, 2012; Lin et al., 2005; Wilcock et al., 2004). Fein et al. (2011) reported younger consumers were more likely to consume risky foods. Additionally, Wilcock et al. (2004) noted many food safety habits and cultural preferences develop at an early age and can become deeply ingrained. Lin et al. (2004) concluded foodborne illnesses may be reduced by increasing both consumer awareness of foodborne pathogens and raising consumer motivation to use food safety information.

Because foodborne illness is a national health risk affecting all ages, it is imperative to include teaching youth at an early age about the risks associated with mishandling foods (Richards, Skolits, Burney, Pedigro, & Draughn, 2008). Middle school is an optimal time to teach food safety to youth because they are in the process of developing lifelong behaviors (Richards et al., 2008). In a research study designed to validate an interdisciplinary food safety curriculum for middle school students, Richards et al. (2008) reported a substantial gain in knowledge of food safety concepts after middle school students participated in a food safety curriculum. Additionally, the self-reported attitudes and behaviors of students increased from the post-test to the 6 month follow up test (Richards et al., 2008). Guion, Simonne and Easton (2004) discovered food safety is a topic youth are interested in during their research study of Florida 4-H youth. Additionally, they reported a large majority of youth indicated they would attend educational programs about food safety (Guion et al., 2004). However, they noted nearly one third of the youth who participated in their study reported they had not received information on food safety (Guion et al., 2004). Therefore, the need exists for a 4-H educational program on food safety (Guion et al., 2004). Additionally, research suggests the most effective food safety curriculum should be tailored towards changing the behaviors which are most likely to result in foodborne illnesses (Richards et al., 2008) as well as engaging and hands on (Guion et al., 2004).

Futhermore, this study focused on the impact of PEEP among youth, because Extension educators have long realized youth were more receptive than their parents to adopt new information and were more open to new ideas (Kress, 2014; VanHorn, Flanagan, & Thomson, 1998). Because 4-H reaches so many youth in early adolescence, it has the opportunity to significantly influence young people (Boyd, Herring & Briers, 1992). Ladewig and Thomas (1987) reported that skills and attitudes [such as safe handling and use of poultry and eggs] formed during 4-H do carry into adulthood; and just as youth in the early 1900's lead community change by teaching their families new knowledge, youth today can make an impact by becoming the early adopters of science based knowledge (Kress, 2014) like the findings from our PEEP project. In this way, 4-H is a viable avenue for Cooperative Extension in developing young people to not only become competent adults, but to pave the way to change in their communities (Fox et al., 2003; Kress, 2014).

Purpose and Objectives

The purpose of this study was to gain a better understanding of how providing 4-H youth with poultry and egg safety messages from PEEP could help reduce instances of foodborne illness by examining youths' intentions of implementation of lessons learned during an educational workshop. The objectives of this study included:

1. Determine the major themes of poultry and egg safety developed from the research findings of the PEEP to be used in poultry and egg safety education for youth.
2. Describe pre and post-test knowledge in poultry and egg safety as a result of a one-hour educational workshop at a 4-H youth camp.
3. Describe participants' perceptions, attitudes and intentions regarding proper poultry and egg food safety behaviors.

Methods and Procedures

Our study used mixed methods, content analysis in the first phase of this study, followed by a pre-test, educational intervention, post-test and post-test only survey tool among a convenience sample of 4-H youth.

Content analysis is a research methodology, which seeks to identify and evaluate themes to better understand their meaning (Krippendorff, 2013). By using this method, a large amount of information can be organized into major themes. Three goals were identified in order to complete the content analysis. These goals included:

1. Read and analyze all published findings to date from the USDA-NIFA-AFRI-funded PEEP project being conducted by Tennessee State University, Kansas State University, and Research Triangle International.

2. Identify egg and poultry food safety themes and messages and assign weight to themes based on frequencies of these themes and messages within PEEP research.

3. Determine areas of focus for PEEP lesson/curriculum development

For goal one, we critically reviewed and analyzed findings in 22 articles, posters and research presentations coming from our USDA-NIFA-AFRI PEEP project. To complete goal two, we used a frequency system (Stemler, 2001) based on keywords, to identify poultry and egg food safety themes in the aforementioned sources. Additionally, within each theme, more detailed sub themes were identified. Each theme mentioned was counted as one frequency per source. A total number of sources mentioning each theme was established. Themes and subthemes were labeled with a keyword written on sticky notes to bookmark them in articles. A sticky note with a number was also placed on each article, poster or presentation to give it a case number. Excel was used to input themes or subthemes addressed in each source. For goal three of the content analysis, frequency scores were used to determine which messages and themes were of the highest concern. The subthemes with the highest frequency scores under each major theme were labeled as crucial areas of improvement. Once the content analysis was complete and themes were identified, the results were brought before a panel of experts and scientists who conducted the studies under investigation for verification. Themes and subthemes were used to create the workshop on poultry and egg food safety that was disseminated to participants.

Objectives two and three were accomplished with a survey research design. A one-hour workshop for middle school aged 4-H youth at select locations around Tennessee was conducted on the poultry and egg food safety themes. The tone of the workshop was informal and casual, and allowed for group discussion. A PowerPoint presentation was created as a visual aid for the workshop.

The population was 4-H youth who attended 4-H summer camps and day camps in 2016. The goal was to obtain a criterion sample of youth in grades four through six, from each of the three regions of Tennessee. A total of 190 youth completed a pre-test and post-test questionnaire of poultry and egg food safety knowledge, participated in the one-hour workshop, and completed a posttest only questionnaire measuring perceptions, attitudes and intentions regarding proper poultry and egg food safety behaviors. Only participants who completed all three parts were analyzed.

An email was sent to Extension 4-H agents conducting 4-H camps in every region in May of 2016. A second email was sent two weeks after the first email to agents whom had not responded. Once an agent responded and agreed to the researcher administering the workshop at camp, parent consent forms were sent to the agents who also collected them for us. At the conclusion of each workshop, surveys and consent forms were collected and assigned a code representing each participant.

In order to measure the changes in food safety knowledge, a pre-test/post-test questionnaire with twelve items, including multiple choice and true/false questions, were administered to reflect the major themes (handling, cooking, and shopping) of PEEP identified in the content analysis. These items were validated by two experts in food science, and administered at the beginning of the workshop and then immediately after. It is important to note that the short time between the pre and post-test could be a threat to the internal validity of the content assessment.

An eighteen-item post workshop survey, with scale reliabilities from ($\alpha = .73$ to $.88$), was administered at the conclusion of the workshops to identify youths' attitudes ($\alpha = .83$), intentions ($\alpha = .88$), and perceptions ($\alpha = .73$) of the information learned during the workshop. The survey items included general statements about the effectiveness of the workshop as well as content specific intention statements relating to the themes of the content analysis. The survey was created using a 5-point summated rating scale of agreement (Vagias, 2006) with the options, strongly agree, agree, neither agree nor disagree, disagree and strongly disagree.

Questionnaires were graded and scored simply by using a red ink pen. For each individual question in the pre-test questionnaire and post-test questionnaire, the number one was entered if the participant correctly answered the question and a zero was entered if the question was answered incorrectly. Data from the Excel document was imported into a file using Statistical Package for Social Sciences (SPSS) version 18.0 for Windows. A paired samples t-test was completed to compare pre-test and post-test knowledge scores. Cohen's Interpretation of Effect Size (Cohen, 1988) was used to determine significant differences in means of scores for each individual question as well as the questionnaire as a whole. Significance was set at $p < 0.05$ and Cohen's interpretation of effect size intervals were used to interpret d, 0.2 = small, 0.5 = medium, 0.8 = large.

For the post-test only surveys of perceptions, attitudes, and intentions, the following rating scale was implemented. Strongly agree = 5, Agree = 4, Neither agree nor disagree = 3, Disagree = 2, and Strongly disagree = 1. The mean and standard deviation of each item was calculated. Frequency scores of responses were also calculated for each item. For reporting purposes, frequency and percent scores for agree and strongly agree were added together to create a total agree score. Likewise, disagree and strongly disagree responses were added together to create a total disagree score.

An Analysis of Variance (ANOVA) test was used to determine if there was a significant difference between knowledge, perceptions, attitudes and intentions among different state regions represented by youth at the workshops. There were no geographic differences for knowledge, $F(3, 186)=1.84$, $p<.05$ or perceptions, attitudes and intention (PAP), $F(3, 185)=2.13$, $p<.05$. Therefore we can surmise that the sample was representative of the population because there were no differences based on geography. It should also be noted that 4-Hers are historically a very homogenous group and we did not expect to see differences between them.

Results/Findings

In the content analysis of PEEP research, a total of 22 articles, posters and presentations of the PEEP were analyzed. Based on frequency scores, three major themes were identified. These themes were: (1) handling and storage behaviors (f=36), (2) cooking behaviors (f=25), and (3) shopping behaviors (f=26). Each major theme was then separated into sub themes. For handling and storage behaviors, three sub themes were created: cross contamination (f=13), storage of poultry and eggs at home (f=11), and hand washing and sanitizer use (f=12). The cooking behaviors theme was separated into four subthemes. The highest scoring sub theme in this category was identified as thermometers and food temperatures (f=11). Other subthemes in this category were: visual cues for doneness (f=8), runny, undercooked or raw eggs (f=5) and thawing (f=1). The shopping behaviors theme was separated into four sub themes: separating poultry from other foods when shopping (f=10), utilizing grocery store meat plastic bags (f=7), purchasing eggs (f=4), and hand sanitizers at grocery stores (f=5). To complete goal three of the content analysis, subthemes with the highest frequency scores were identified. Under the handling and storage behaviors theme, the subtheme with the highest frequency score was cross contamination (*f*=13). The other two subthemes, storage of poultry and eggs at home (*f*=11) and hand washing and sanitizer use (*f*=12) were very close behind cross contamination. The subtheme with the highest frequency score under cooking behaviors was thermometer use and food temperatures (*f*=11). The subtheme with the highest frequency score under shopping behaviors was separating poultry from other foods when shopping in the grocery store (*f*=10). Table 1 summarizes themes and subthemes identified in the content analysis and the corresponding sources in which the themes were found.

A paired-sample t-test was conducted to compare 4-H members' knowledge of poultry and egg safety before the workshop and after the workshop. A total of (*n*=190) youth completed both the pre-test and post-test questionnaires. Table 2 summarizes pre-test and post-test scores of the youth who participated in the study. There was a significant difference in the overall pre-test scores for poultry and egg safety knowledge before the workshop (*M*=6.61, *SD*=1.74) and overall posttest scores (*M*=10.46, *SD*=1.65); $t(189) = -24.61$, $p < .001$. The effect size for the difference was large, Cohen's $d = 2.21$ (Table 3). Table 3 presents a breakdown of the knowledge increases by theme.

For the handling theme, there was a significant difference in pre-test (*M*=3.38, *SD*=1.03), and post-test (*M*=4.57, *SD*=.73) knowledge scores, $t(189) = -14.682$, $p < .001$. The effect size was large, Cohen's d = 1.15, indicating an increase in knowledge on handling practices of poultry and eggs. For the cooking theme, there was a significant difference in pre-test (*M*=1.58, *SD*=1.06) and post-test (*M*=3.97, *SD*=1.10) knowledge scores, $t(189) = -23.440$, $p < .001$. The effect size was very large, Cohen's $d = 2.25$. There were five questions relating to the cooking theme, including questions six, seven, eight, nine, and eleven. For the shopping theme, there was a significant difference in pre-test (*M*=1.66, *SD*=.58) and post-test (*M*=1.90, *SD*=.33) knowledge scores, $t(189) = -5.399$, $p < .001$. The effect size was medium, Cohen's $d = .41$. There were two questions relating to the shopping theme; questions four and five.

Means and standard deviations were calculated to analyze the youth's responses to the post workshop survey describing perceptions, attitudes and intentions regarding the information they learned. Frequencies for objective three were calculated by adding agree and strongly agree answers to create a total agree, and disagree and strongly disagree answers to create a total disagree (Table 4).

Table 1. Summary of sources and themes identified in the contents analysis

Source	Source Type	H^1	H^2	H^3	C^1	C^2	C^3	C^4	S^1	S^2	S^3	S^4
Andrews (2014a)	News	1	1	1		1	1		1	1	1	1
Andrews (2014b)	News	1	1	1					1	1		
Chambers (2014)	Presentation		1	1	1				1	1		1
Chen, Godwin & Chambers (2016)	Article	1										
Chen et al. (2014)	Presentation	1							1	1		
Donelan et al. (2015)	Article	1	1						1	1		1
Freeman (2014)	News	1		1	1	1	1					1
Godwin & Cates (2015)	Presentation	1		1	1	1			1	1		
Godwin (2015)	Presentation	1	1	1					1			
Godwin (2014c)	Presentation				1	1						
Harding (2014)	Presentation	1		1	1	1	1					
Kilozo-Nthenge et al. (2016)	Article	1	1									
Koppel et al. (2016)	Article	1	1								1	
Koppel et al. (2014)	Presentation	1	1								1	
Kosa et al. (2015a)	Article		1	1	1	1	1				1	
Kosa et al. (2015b)	Article	1	1	1	1	1		1	1			
Kosa et al. (2014)	Presentation				1							
Kosa et al. (in-review)	Article				1							
Lafferty (2014)	Presentation								1			1
Maughan et al. (2015a)	Article			1	1							
Maughan et al. (2016)	Article		1	1	1	1	1					
Work (2014)	Presentation			1					1	1		
Total		**13**	**11**	**12**	**11**	**8**	**5**	**1**	**10**	**7**	**4**	**5**

Note. H^1= cross contamination, H^2= storage of poultry and eggs, H^3= hand washing and sanitizer use, C^1= thermometer use and food temps, C^2= visual cues for doneness, C^3= runny, undercooked and raw eggs, C^4= thawing, S^1= separating poultry and eggs at the grocery store, S^2= grocery store meat bags, S^3= purchasing eggs, and S^4= hand sanitizer at the grocery store

Table 2. Summary of means and differences of pre-test and post-test knowledge by theme.

Theme	*Pre-test Knowledge M (SD)*	*Post-test Knowledge M (SD)*	*t*	*df*	*p*	*Cohen's d*
Handling	3.38 (1.03)	4.57 (.73)	-14.682	189	.00	1.15
Cooking	1.58 (1.06)	3.97 (1.10)	-23.440	189	.00	2.25
Shopping	1.66 (.58)	1.90 (.33)	-5.399	189	.00	.41
Overall	6.61 (1.74)	10.46 (1.65)	-24.61	189	.00	2.21

Note. Handling (scale = 0 to 5), Cooking (scale = 0 to 5), Shopping (scale = 0 to 2); *Cohen's d*, Small (0.2), Medium (0.5), Large (0.8). $p<0.05$.

Table 3. *Pre-test and post-test knowledge of poultry and egg safety (n = 190).*

Item	*Pre-test Knowledge* % (*f*)		*Post-test Knowledge* % (*f*)	
	Correct	*Incorrect*	*Correct*	*Incorrect*
Length time for hand-washing	47 (89)	53 (102)	93 (177)	6 (12)
Using soap	90 (172)	10 (19)	92 (176)	7 (13)
Hand-washing frequency	93 (178)	7 (13)	97 (185)	3 (5)
Shopping order of placing poultry in your cart	87 (166)	13 (25)	96 (184)	3 (6)
Bagging poultry at the store	78 (149)	22 (42)	93 (178)	6 (12)
Using a thermometer to ensure safety	67 (128)	33 (63)	95 (181)	5 (9)
Safe thawing	17 (33)	83 (158)	70 (133)	30 (57)
Time to cook after thawing	30 (57)	70 (134)	58 (110)	42 (80)
Internal cooking temperature of poultry	28 (54)	72 (137)	87 (167)	12 (23)
Setting the temperature of home refrigerator	50 (95)	50 (96)	89 (170)	11 (20)
Knowing temperatures where bacteria grows best	16 (30)	84 (161)	86 (164)	14 (26)
Properly storing poultry in the refrigerator	59 (112)	41 (79)	84 (161)	15 (28)

Table 4. Youth attitudes, intentions, and perceptions regarding PEEP recommendations

Item	Agree % (*f*)	Neither % (*f*)	Disagree % (*f*)	*M*	*SD*
Attitudes about…					
This information is important to learn	82 (156)	9 (18)	5 (9)	4.20	0.98
How enjoyable learning the material was	74 (141)	14 (27)	8 (16)	4.03	1.04
Remembering where to store eggs and poultry	76 (145)	15 (28)	6 (11)	4.00	0.91
Not consuming raw or runny eggs	74 (140)	14 (26)	9 (17)	3.99	1.06
Practicing food safety procedures at home	66 (125)	23 (44)	8 (15)	3.83	0.91
Intentions to…					
Wash hands before handling or preparing food	89 (170)	5 (9)	3 (5)	4.34	0.74
Refrain from using the same plate or utensils for cooked poultry and raw poultry	83 (157)	9 (17)	5 (9)	4.16	0.9
Use soap and water for 20 seconds	81 (153)	12 (22)	4 (8)	4.15	0.95
Remind family not to thaw poultry on the kitchen counter or under hot water	74 (141)	17 (32)	4 (8)	4.03	1.02
Remind my family to use cooking thermometers to check for doneness	73 (138)	19 (36)	5 (10)	4.02	0.94
Remind family to put away leftover food within one hour	74 (140)	17 (32)	5 (10)	3.97	0.96
Help family keep kitchen area clean	73 (138)	17 (33)	6 (12)	3.95	1.02
Share information learned with family	72 (136)	20 (38)	5 (10)	3.91	0.92
Perceptions of…					
Importance of food safety at home	86 (163)	7 (13)	3 (6)	4.24	0.84
Properly washing hands	82 (156)	11 (20)	4 (7)	4.19	0.86
Safe internal temps for poultry/egg dishes	81 (154)	12 (22)	3 (5)	4.14	0.97
New knowledge about poultry and egg safety	83 (156)	6 (11)	5 (9)	4.09	1.14
Cross contamination and prevention	78 (148)	11 (20)	7 (14)	4.02	1.09
Total				**4.04**	**0.71**

Note: Agree = Agree + Strongly Agree; Disagree = Disagree + Strongly Disagree; 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree or Disagree, 4 = Agree, 5 = Strongly Agree.

Overall, youth demonstrated high intentions of practicing safe poultry and egg behaviors. For example, 89%, *M*=4.34, *SD*=0.74, of participants indicated they would remember to wash their hands before handling or preparing food and 81%, *M*=4.15, *SD*=0.95, agreed to washing their hands with soap for at least 20 seconds. Likewise, 83%, *M*=4.16, *SD*=0.90, reported they were less likely to cause cross contamination by using the same plates or utensils for cooked and raw poultry. Participants also showed high intentions of sharing what they have learned with their family members (72%, *M*=3.91, *SD*=0.92), as well as reminding them about certain safety procedures. According to the findings, youth will help keep kitchen areas clean (73%, *M*=3.95, *SD*=1.02), remind family members to put away leftovers (74%, *M*=3.97, *SD*=0.96), remind family members of safe thawing procedures (74%, *M*=4.03, *SD*=1.02), and remind family members to use cooking thermometers (73%, *M*=4.02, *SD*=0.94.

Overall 83% of participants agreed they learned something new about poultry and egg safety as a result of the workshop, *M*=4.09, *SD*=1.14. Additionally, 86% of participants agreed they understood the importance of food safety at home, *M*=4.24, *SD*=0.84. Furthermore, youth reported to learning about food safety practices, such as, safe internal temperatures for poultry and egg dishes (81%), *M*=4.14, *SD*=0.97, ways to prevent cross contamination (78%), *M*=4.02, *SD*=1.09, and how to properly wash hands with soap and running water (82%), *M*=4.19, *SD*=0.86.

Conclusions and Recommendations

Content analysis yielded themes representing poultry and egg food safety concepts that were taught to 4-H youth in Tennessee. The handling and storage behavior theme was the theme with the highest frequency score (*f*=36). This theme was separated into three subthemes: cross contamination, storage of poultry and eggs at home, and hand washing and sanitizer use. The cooking behaviors themes had a frequency score of 34 (*f* = 25) and included the subthemes: thermometer use and food temperature, visual cues for doneness, runny, undercooked or raw eggs, and thawing. The last theme identified in the content analysis was shopping behaviors, which included a breakdown of 4 subthemes: separating poultry from other foods, utilizing meat plastic bags, purchasing eggs, and hand sanitizer.

In our study using a one-hour workshop format, 4-H youth's basic knowledge of food safety concepts increased as a result of the workshop. Youth perceptions to lessons learned in the workshop were very positive. Participants reported they learned new things about poultry and egg safety. They also agreed it was important for youth to learn about poultry and egg safety. Youth attitudes or beliefs after the workshop were also very positive. Many youth indicated they were more willing to practice various food safety procedures, such as proper hand washing and food storage, as a result of participation in the workshop. Additionally, reported intentions revealed youth were more willing to implement poultry and egg safety practices at home, as well as share these practices with their family members. These findings are important because the Theory of Planned Behavior suggests favorable attitudes and reported intentions often lead to desired targeted behavior (Ajzen, 1991), and Rogers' (2003) Diffusion of Innovation Theory touts the essential nature of awareness and knowledge. Therefore, it is reasonable to believe youth who participated in this study will implement poultry and egg safety practices learned now, and as they grow into adulthood. It is also reasonable to believe that a complete curriculum with lesson plans, videos, activities, and assessments would have an even bigger impact that a one-hour workshop format. A complete curriculum developed for PEEP should include the following messages:

- Preventing cross contamination at home by cleaning and hand washing
- Correctly storing poultry and eggs at home
- Thermometer use and recommended internal cooked temperatures for poultry and eggs
- Why visual cues are unreliable when checking for doneness of egg dishes
- The consumption of runny or undercooked eggs
- Separation of poultry and other foods in shopping carts and bags at the grocery store
- The use of plastic meat bags provided at the meat section for poultry products

The following recommendations for further action and research were born from this study.

- Education in and about safe handling and use of poultry and poultry products should not only continue, but be improved upon and expanded.
- Educational materials to educate youth regarding themes should be further developed with the best of what is known about the principles of teaching and learning.
- Educational materials should also be developed for various age levels.
- This study should be replicated when more formal lesson plans and educational resources are finalized. Follow-up studies should utilize random selection and ensure that students have been exposed to respective lesson plans that were developed for each theme/subtheme.
- Participants and youth like them in replication studies should be studied with longitudinal and observational research to determine if their reported "planned behavior" is enacted.
- Parents and other members of the family and community in which youth live and move should be studied as well to determine changes in their knowledge, attitude, perception, intention, and ultimately behavior.
- Educators should be made aware of the science and be trained in content and the educational materials available that will help students with safe handling and use of poultry and poultry products.

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Making Sense of the Buzz: Providing a Taxonomy of "STEM" in Agriculture, Food, and Natural Resources Education

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Abstract

Increasingly, the world demands individuals with knowledge and skills in agriculture, food, and natural resources (AFNR) paired with knowledge and skills in science, technology, engineering, and mathematics (STEM). To date, STEM in AFNR education literature has sought to detail learning environments effectively developing AFNR and STEM knowledge and skills. However, adoption of STEM within the context of AFNR education has been without a clear and unified definition of STEM education. In the absence of such knowledge, STEM in AFNR education literature has failed to symbiotically move forward in enhancing learning environments to better prepare future generations. Therefore, a team of researchers from the Enhancing STEM through Agricultural Education Special Interest Group of AAAE collaborated to provide a taxonomy of STEM in AFNR education. Using a configurative review approach, 38 peer-reviewed STEM in AFNR education papers were analyzed for general characteristics, teaching frameworks, justifications, foci, and operationalization of STEM education. Within each category, thematic taxonomies were identified. The resultant taxonomy of STEM in AFNR education provides an opportunity for current and future literature to address significant STEM in AFNR education challenges through a clarified and coordinated approach.

INTRODUCTION

> *Once again, the education community has embraced a slogan without really taking the time to clarify what the term might mean when applied beyond a general label. When most individuals use the term STEM, they mean whatever they meant in the past. So STEM is usually interpreted to mean science or math. Seldom does it refer to technology or engineering, and this is an issue that must be remedied.* (Bybee, 2010, p. 30)

Research Priority Area three of the American Association for Agricultural Education (AAAE) National Research Agenda (Stripling & Ricketts, 2016) focuses on a sufficient scientific and professional workforce that addresses the challenges of the 21st century. Of the five research priority questions in this area, one asks: "What are effective models for science, technology, engineering, and math (STEM) integration in school-based agricultural education curriculum?" (p. 31). A research collaboration to address this question was formed from members of the

Enhancing STEM through Agricultural Education Special Interest Group of AAAE. As we began discussing potential research avenues, it became clear the discipline lacked a consistent and common definition of the terms STEM and STEM integration in an agriculture, food, and natural resources (AFNR) education context. As Bybee (2010) articulated, this is also true of the education community in general, with definitions ranging from each of the four STEM disciplines being its own silo (Bybee, 2010; NAE & NRC, 2014) to real-world, interdisciplinary approaches (Tsupros, Kohler, & Hallinen, 2009). The range of operational definitions for STEM education has profound implications for attempts to aggregate data and compare findings across studies; the current investigation is a first step in moving STEM in AFNR education toward a common understanding of STEM education, which will allow for connections to STEM work in the broader educational arena to be made.

Taxonomies have been essential tools in the development of scientific understanding and can be powerful predictive tools when supported by strong theoretical underpinnings; weaker forms may also precede robust classification systems and serve to drive development of theory (see Travers, 1980, for a thorough discussion of this topic). Travers (1980) asserted that, in education, Bloom's *Taxonomy of Educational Objectives* (1956) was an example of the latter. Reviews of this volume at the time hailed it as an indicator that "education as a discipline is maturing" (Nemetz, 1957, p. 290) and predicted that it would "facilitate communication" and "provide a stimulus for more comprehensive development and evaluation of objectives" (Sawin, 1957, p. 344). Education researchers and practitioners today easily recognize these benefits. The present study aims to work toward similar goals for STEM in AFNR education, albeit on a much more modest scale. To date, little research has been conducted to develop a common language for work in this arena. Through a systematic review of the STEM in AFNR education literature, we addressed this gap by developing a proposed taxonomy that can be utilized to help provide structure and guidance for research programs.

REVIEW OF LITERATURE

The Grand Challenge

In 1957 the Soviet Union launched Sputnik, sparking social concern of an inferior education system in the United States (Ravitch, 2010). This necessitated educational changes to mirror societal transitions from an industrial economy to a technology-driven world. Education responded by increasing focus on preparing students in mathematics and science (State Technology Directors Association, 2008), which has been expanded to an emphasis on STEM education. Today, AFNR disciplines face a different, but not unrelated set of challenges. The Employment Opportunities for College Graduates report, by the United States Department of Agriculture (2015), predicts a significant shortfall in qualified graduates to fill 57,900 jobs in AFNR between 2015 and 2020. This new wave of AFNR jobs are increasingly complex, interdisciplinary work environments requiring STEM knowledge and skills to addresses complex challenges, such as providing access to clean water, expanding sustainable alternatives to fossil fuels, and sustainably feeding the world (Andenoro, Baker, Stedman, & Weeks, 2016). AFNR education has been challenged to prepare a larger number of individuals for STEM in AFNR workplaces (Stripling & Roberts, 2016).

Funding Support

The growth of STEM education has been, in part, due to funding agencies (e.g., Department of Education, National Science Foundation) supporting interdisciplinary research on STEM teaching and learning through formal and informal education from pre-school to postsecondary education (Gonzalez & Kuenzi, 2012). The scale of STEM education support has been substantial, with an average annual allocation of $3.1 billion, supporting an average of 252 STEM programs and activities (ibid.). Within AFNR education, the National Institute of Food and Agriculture (NIFA) has demonstrated a commitment to enhancing STEM in AFNR education through myriad research and education grants (NIFA, 2017). The opportunity to capitalize on STEM education funding through an AFNR education approach emphasizes the need to make sense of existing research on STEM in AFNR education.

Progress

Throughout education, STEM efforts have focused on six areas: (a) achievement of various demographic groups, (b) international mathematics and science test performance, (c) foreign student enrollments in postsecondary STEM degrees, (d) global STEM education attainment, (e) STEM teacher quality, and (f) the STEM labor supply (Gonzalez & Kuenzi, 2012). Although progress has been made, STEM education literature similarly concludes the United States education system is failing to adequately prepare a diverse enough, and large enough, pool of graduates in STEM (Carnevale, Smith, & Melton, 2011). Teaching STEM in AFNR education offers an opportunity to simultaneously strengthen STEM education through contextualized learning, expand the STEM pipeline, and strengthen student preparedness for careers in AFNR (Mercier, 2015). AFNR education may not serve as the panacea for all the challenges of STEM education; however, through coordinated efforts, STEM in AFNR literature can illuminate a valuable approach to STEM education.

Unfortunately, STEM in AFNR education literature appears to lack the coordination required to advance both STEM and AFNR. Even a cursory review of STEM in AFNR education literature yields myriad conceptualizations, justifications, and operationalizations for STEM education. A critical next step is to systematically evaluate existing STEM in AFNR education literature to organize a taxonomy for coordinated future progress.

PURPOSE OF THE STUDY

The purpose of this study was to articulate the state of the field for STEM in AFNR education in order to inform future research and innovations in practice. Through systematic analysis of the existing peer-reviewed literature, we aim to develop a taxonomy of how researchers and practitioners are framing STEM education. To achieve our aim, the following questions were addressed for each identified piece of STEM in AFNR education literature:

1. What are the characteristics, such as educational context, target population, and type of research used within the papers?
2. What frameworks and models for STEM education in AFNR are presented?
3. How is research and teaching of STEM justified in AFNR literature?
4. What is the focus of research in STEM in AFNR education literature?
5. How is STEM operationalized in research in AFNR education literature?

METHODS

A configurative review was conducted (following Gough, Thomas, & Oliver, 2012) in order to develop a framework synthesis of the STEM in AFNR education literature. In this review, document analysis guided by the research questions was employed to identify emergent themes that allowed for development of a framework for the topic at hand.

The EBSCO search engine was utilized to simultaneously search the education databases ERIC and Education Research Complete; the platform automatically removes duplicates. The search was limited to peer-reviewed journals published in English between the years of 2010-2016. The databases were searched for the occurrence of the following terms in the title, abstract, or subject/ keyword: STEM OR "science, technology, engineering, and math (or mathematics)" AND agriculture OR food OR "natural resources." The database search resulted in 101 unique publications. Additionally, a web-based search of prominent AFNR education journals for instances of STEM or "science, technology, engineering, and math (or mathematics)" during the same period yielded 13 additional peer-reviewed papers. The journals included were: the *Journal of Agricultural Education*, the *Journal of Food Science Education*, *Natural Science Education* (formerly the *Journal of Natural Resources & Life Sciences Education*), the *North American Colleges and Teachers of Agriculture Journal*, the *Journal of Extension*, and the *Career and Technical Education Research Journal*. Abstracts of the 114 papers were systematically reviewed by one researcher to determine if they met the following four criteria for inclusion in the study: (a) at least one instance of STEM or "science, technology, engineering, and math (or mathematics)" used in an educational context, (b) addresses AFNR context or content, (c) intervention or study has some connection to instruction, and (d) there is a United States educational context. Systematic review yielded 38 papers relevant for inclusion in this study.

In the first cycle of analysis, the 38 papers were divided among the five members of the research team and each subset of papers was coded based on the research questions. This process was debriefed by the research team and the questions guiding the coding process were refined. All 38 papers were then coded and codes were recorded in a table. In the second cycle of analysis, codes within each research question were analyzed by individual researchers to develop themes that were then debriefed with the entire research team. The research team includes researchers in AFNR education with expertise in STEM education.

RESULTS

Results of this study are presented in Table 1, which summarizes the characteristics and themes for each paper that was analyzed. In the following sections, themes are described for each research area and we indicate how the analyzed studies are dispersed within each of the themes. Some papers aligned with more than one theme, while others did not have enough information for classification, so percentages within a particular theme may not total 100%.

Characteristics of the Articles

In total, 14 (37%) of the 38 articles were expert/practitioner opinions that did not include research/data and 24 (63%) articles were research articles. Of the 24 research articles, 12 (50%) were case study, 10 (42%) were cohort studies, and two (8%) were quasi-experimental. Distribution of study populations included five (13%) undergraduate, 12 (32%) high school, three (8%) middle school, five (13%) elementary school, four (11%) K-12 students in general, and five (13%) 4-H youth, which did not identify specific grade levels. Additionally, four (11%) articles were about pre-service AFNR teachers, one (3%) K-12 teachers in general, and one (3%) in-service AFNR teachers. As for the educational context, 31 (82%) articles were about formal education settings (e.g., school-based classrooms), five (13%) non-formal education settings (e.g., extension activities), and two (5%) pertinent to both formal and non-formal settings. The AFNR contexts evaluated through the research included life science, biology, food (e.g., food safety, food supplies, and food science), agricultural technologies (e.g., biogeochemical simulation and biotechnologies), animal science, environmental issues (e.g., climate change), and plant science (e.g., medical plants).

Frameworks and Models for STEM education in AFNR

In order to compare findings across studies, it is essential that researchers begin to develop a common language in order to describe how STEM is implemented in AFNR education. Our analysis revealed multiple conceptions of STEM education in the AFNR education literature in terms of the relationship between STEM and AFNR content, the number of STEM disciplines represented, the relationship between STEM disciplines, and instructional approaches used (see Table 1).

Number of STEM disciplines. Sixteen of the 38 studies (42%) highlighted a single STEM discipline with no integration of a second; science was the most common (14 of the 38 studies; 37%) with two of the 38 studies (5%) focusing on math and no studies focusing solely on technology or engineering. In these cases, mention of STEM primarily served to situate the paper in a larger context. The remainder of the studies, 22 of 38 (58%), utilized more than one STEM discipline. Nine of the 38 (24%) discussed all four disciplines; three of the 38 (8%) discussed

Table 1

Summary of characteristics and themes for peer-reviewed STEM in AFNR education literature

Paper	Type of research	Participants[1]	context/ topic	# of STEM disciplines	STEM relationship[2]	AFNR/STEM relationship[2]	Instructional approach[2]	Justification[2]	Oper. Def. of STEM[2]	Research focus[2]
Akins, 2013	expert	P-12	Ag careers	S,T,E,M	Multiple	Applied	-	Recruitment	-	-
Balschweid et al., 2014	cohort	u-grad	Life science course	S,T,E,M	Multiple	Naturally occurring	-	Recruitment	Siloed	Teacher practices & characteristics
Campbell et al., 2014	pract-itioner	ES	Ag awareness day	S	n/a	Applied	hands-on	STEM Learning	-	-
Campbell et al., 2015	pract-itioner	ES	Ag day program	S + S,M	n/a + Integrated	Applied	hands-on	STEM Learning	-	-
Chumbley et al., 2015	cohort	HS	Ag science	S	n/a	Naturally occurring	-	Recruitment	Siloed	Student career choice
Despain et al., 2016	cohort	HS	Ag biology	S	n/a	Naturally occurring	-	STEM Learning	Siloed	Standardized testing
DiBenedetto et al., 2015	case	HS	Ag in general	S	n/a	Applied	inquiry	Recruitment	Siloed	Student career choice
Dodd et al., 2015	pract-itioner	4-H	Food challenge	S,M	Multiple	Naturally occurring	competition	STEM Learning	-	-
Foutz et al., 2011	case	MS/ HS	Ag engineering	S,M	Integrated	Applied	problem-based	STEM Learning	Siloed	Teacher practices & characteristics
Graves et al., 2016	case	ES	School garden	S	n/a	Applied	problem-based	STEM Learning	Siloed	Perceptions of STEM
Haynes et al., 2014	cohort	Pre-service	Ag Ed curriculum	S,M	-	External	-	STEM Learning	Siloed	Perceptions of STEM
Henry et al., 2014	case	HS	General Ag courses	S,T	Siloed	Applied	-	Recruitment STEM learn.	Siloed	Teacher practices & characteristics
Hilby et al., 2014	case	Pre-service	math ability	M	n/a	Naturally occurring	-	STEM Learning	Siloed	Teacher practices & characteristics
Horton & House, 2015	cohort	K-12	Fish farm challenge	S,E	Real-world	Naturally occurring	problem-based	Inter-disciplinary	Siloed	Application of STEM
Horton et al., 2013	case	ES	ChickQuest curriculum	S	n/a	Applied	problem-based	STEM Learning	Siloed	Application of STEM
Israel et al, 2012	quasi-exp	HS	CTE programs	S	n/a	Naturally occurring	-	STEM Learning	Siloed	Standardized testing
Kahler & Valentine, 2011	pract-itioner	4-H	4-H STEM program	S,T,E,M	Multiple	-	-	Recruitment	-	-
Kellog et al., 2016	case	HS/ u-grad	Medicinal plants	S	n/a	Applied	multiple	STEM Learning	Siloed	Application of STEM

Ketchledge & Cantu, 2013	pract-itioner	ES	Food products	S,E	Integrated	Applied	problem-based	STEM Learning	-	-
Lant et al., 2016	case	MS	Biogeochemistry	S,E	Real-world	Applied	problem-based	STEM Learning	Siloed	Application of STEM
Musante, 2011	pract-itioner	u-grad	Biology	S	n/a	Applied	-	Problem Solving	-	-
Odera et al., 2015	case	u-grad	FAES internship	-	-	-	experiential learning	Recruitment	-	-
Parker & Lazaros, 2015	pract-itioner	ES	Food safety	S,T,E,M	Siloed	Naturally occurring	hands-on	STEM Learning	-	-
Preble, 2015	pract-itioner	-	Apple grafting	S,T,E	Integrated	Naturally occurring	hands-on	STEM Learning	-	-
Reeve, 2015	expert	K-12 teacher	Ag in general	S,T,E,M	Real-world	Applied	problem-based	STEM Learning	-	-
Ripberger & Blalock, 2015	cohort	HS/ 4-H	biotech, ag, Geospatial	S,T	Multiple	Naturally occurring	competition	STEM Learning	Acronym	Perceptions of STEM
Robinson et al., 2013	cohort	Pre-service	SBAE program	S,T	-	-	-	STEM Learning	Siloed	Perceptions of STEM
Sallee & Peek, 2014	case	4-H	General AFNR	S,T,E	Multiple	Naturally occurring	-	Recruitment	Siloed	Application of STEM
Schmidt et al., 2012	pract-itioner	K-12	Food	S	n/a	Applied	hands-on	STEM learn., Career ready	-	-
Skelton et al., 2014	cohort	MS	Ag in general	S	n/a	Applied	inquiry, experiential	STEM learn., Recruitment	Siloed	Standardized testing
Smith et al., 2015	cohort	HS	Ag courses in general	S,T,E,M	Siloed	External	multiple	STEM learn., Recruitment	Acronym	Perceptions of STEM
Sorensen, 2011	pract-itioner	u-grad	Climate change	S,T,E	Real-world	Applied	multiple	Problem Solving	-	-
Stripling & Roberts, 2013	case	Pre-service	Math in Ag courses	M	n/a	Naturally occurring	-	Career Readiness	Siloed	Teacher practices & characteristics
Stubbs & Meyers, 2015	case	HS	SBAE program	S,T,E,M	Integrated + Siloed	Applied + External	multiple	Career ready, ID,Prob.solv.	Siloed	Perceptions of STEM
Stubbs & Myers, 2016	case	Ag teacher	perception of STEM integ.	S,T,E,M	Integrated	Naturally occurring	-	STEM learn., ID, Career	Siloed	Perceptions of STEM
Velez et al., 2015	quasi-exp	HS	CASE curriculum	S	n/a	External	inquiry	-	Acronym	Perceptions of STEM
Wagner, 2015	expert	HS	Food science	S	n/a	Applied	multiple	Recruitment	-	-
Wooten et al., 2013	cohort	FFA/ 4-H	livestock	S,T,E,M	Real-world	Naturally occurring	problem-based	-	Siloed	Application of STEM

[1]ES = elementary, MS = middle school, HS = high school, Pre-service = pre-service agriculture teachers, u-grad = undergraduate; [2]See text for description of themes

science, technology, and math; four of the 38 (11%) discussed science and math; three of the 38 (i.e., 8%) discussed science and engineering; and three of the 38 (8%) discussed science and technology.

Relationship between STEM disciplines. There were four different themes that emerged from the analysis of the relationship between the disciplines of science, technology, engineering, and math in the studies. Of the 22 studies that addressed more than one STEM discipline, six (27%) employed multiple STEM disciplines, but the relationship between the disciplines was unspecified. In four of the studies (18%), the STEM disciplines were *siloed*, with each one addressed separately in relationship to the AFNR context; papers in this theme are distinguished by the absence of efforts to integrate STEM disciplines with each other. In six of the studies (27%) at least two STEM disciplines were *integrated through the AFNR context*. In these studies, STEM disciplines are taught together in an AFNR context. Exactly how the STEM disciplines are integrated with each other within the learning episode was typically not described, but there was some indication that they are not in isolation (e.g., learning science and engineering together). Finally, in five of the studies (23%) learners use multiple STEM disciplines to engage in *real-world problem solving*. In this theme, the emphasis is on addressing and/or developing solutions to real-world, interdisciplinary, AFNR-related problems and the integration of STEM disciplines arises through this work.

Relationship between STEM and AFNR. Three themes emerged for how the relationship between STEM and AFNR content was framed - *STEM as naturally occurring* in AFNR, *STEM as external* to AFNR, and AFNR as a context for *applied STEM*. These relationships, while in some cases applied to a single learning episode or unit, were often expressed at a curricular or programmatic level. Papers that framed STEM as naturally occurring in AFNR, 14 of the 38 studies (37%), emphasized student learning of AFNR content with STEM learning occurring as a result of engaging in AFNR learning episodes. This theme includes papers in which this relationship is assumed and those that explicitly seek out alignment with STEM standards/ content; the defining characteristic is that the intent is not to alter the AFNR content, but illuminate the STEM concepts within the content. In contrast to this, a second theme includes papers that frame STEM content as external to AFNR. In this theme, representing only four of the 38 studies (11%), there was an emphasis on adding STEM disciplinary content to AFNR learning episodes and/or intentional efforts to integrate STEM content standards into AFNR curriculum. Finally, 17 of the 38 studies (45%) framed AFNR as a context for applied STEM. In this theme, the curricular and/or instructional emphasis was on the STEM content (e.g. science content standards) and AFNR is used as a context to teach STEM.

Instructional approach. A range of instructional approaches were mentioned in the articles, but few were described very thoroughly, limiting analysis to coding for approaches mentioned. The instructional approach was not specified in 14 of the 38 papers (37%), and five of the 38 papers (13%) list multiple approaches without particular emphasis. Eight of the 38 papers (21%), the highest frequency, utilized a *problem-based learning* approach in which learners engage with a real-world problem or project that is AFNR related; this theme includes engineering design challenges. The second most common approach (5 of 38, 13%) was *"hands-on" learning*, in which no specific model was employed, but there was some mention of hands-on activities. *Inquiry-based learning* (3 of 38, 8%), *experiential learning* (2 of 38, 5%), and youth participation in and/or training for *competitions* (2 of 38, 5%) describe the remaining studies.

Justifications for Research and Teaching STEM in AFNR

An important component to making sense of STEM in AFNR education literature is identifying and analyzing justifications used for studying and implementing STEM. From our analysis, five themes of justifications were identified - *recruitment, STEM learning, career readiness, problem solving,* and *interdisciplinary connections* (see Table 1). The most common justification was *STEM Learning*, which was used to justify 23 of the 38 papers (61%). The STEM learning justification was defined as papers highlighting AFNR as an appropriate context to teach STEM concepts (e.g., learning standards in STEM); therefore, STEM education within AFNR was justified. The second most common justification was *recruitment*, accounting for 11 of the 38 studies (29%). Recruitment was defined as papers that highlighted the need for additional professionals in STEM or AFNR as a justification for exploring STEM in AFNR. *Career readiness* was cited as a justification less frequently, as only four of the 38 studies (11%) used career readiness to justify the work. Career readiness, a distinct theme from recruitment, was defined by acknowledging STEM knowledge and skills being critical to success within myriad professions; therefore, educational environments teaching STEM concepts, and developing STEM skills, were worthy of analysis or implementation. The remaining justifications, *problem solving* and *interdisciplinary connections*, were both used to justify three of the 38 papers (8%). Problem solving was defined by noting that complex problems require STEM knowledge; therefore, STEM learning environments were appropriate. Interdisciplinary connections was defined by authors describing AFNR and STEM knowledge as mutually reinforcing; therefore, STEM learning was predicted to enhance and support student learning of AFNR content.

Framing of STEM in Research Studies

Identifying how STEM is used in research associated within the AFNR education context introduces further insight and connections. Twenty-four of the 38 articles in the sample were identified as having conducted research and reporting the findings.

Research focus. The focus of the research represented in the sample was categorized into five groups. The largest grouping, eight studies (33%), focused research efforts on *teacher and learner perceptions* of STEM in AFNR. This was followed closely by research investigating the *application of STEM in AFNR*, which included six studies (25%) focused on the use of project-based curriculum to apply STEM in AFNR. *Teacher practices and characteristics* represented 21% of the research sub-sample with five studies identified for their interest in professional development, best-practices related to STEM teaching, or self-efficacy for teaching STEM disciplines. *Standardized testing* was the focus of three studies and, finally, two studies focused on *student career choice*.

Operationalizations used in STEM Research. Four themes emerged from the analysis determining how STEM was operationalized in the research. Twenty of the 24 research studies implied through research findings that STEM was viewed as siloed disciplines. A *single discipline* within the STEM disciplines represented nine (38%) studies with seven of these focused only on science. *Unspecified silos*, identified in seven studies (29%), were characterized by researchers operationalizing STEM education as either science, technology, engineering, or mathematics; however, no specific STEM discipline, or combination of disciplines, were the focus. The remaining five studies (21%) in this siloed approach to STEM research, required *at least two disciplines* to be included to be STEM. Three research studies (13%) reported STEM as an *acronym* which left the research associated nonspecific to disciplines but rather a general sense of STEM. It is noteworthy that engineering is largely absent in STEM in AFNR education research, with only one study in the sample investigating engineering as a significant component of the research.

DISCUSSION, IMPLICATIONS, and CONCLUSIONS

The STEM education phenomenon provided an opportunity for scholars to explore STEM within AFNR contexts (Stripling & Ricketts, 2016). The cumulative body of STEM in AFNR education literature suggests scholars readily and haphazardly embraced the STEM slogan, yielding a body of literature lacking a uniform definition, operationalization, or analysis. The increasingly chaotic literature justified our systematic review of STEM in AFNR education. As we conducted the systematic review, certain limitations occurred. Specifically, the analysis was limited to peer-reviewed articles which included “STEM” or “science, technology, engineering, and math (or mathematics)” in the title or abstract. While necessary for selecting a digestible number of relevant articles, the selection technique did not include non-peer reviewed practitioner pieces (e.g., Agricultural Education Magazine) or peer-reviewed articles lacking the selected verbiage in the title or abstract. While limitations were inevitable, our analysis maintains an informative evaluation of STEM in AFNR education literature.

Included in our analysis was the identification of thematic taxonomies to situate different perspectives, justifications, foci, and operationalizations of STEM in AFNR education literature (see Table 2). Future contributors to STEM in AFNR education literature are encouraged to use this taxonomy to better coordinate efforts to understand, and advance, STEM in AFNR education. This taxonomy can help practitioners teach STEM in AFNR contexts by giving them options to consider in terms of the relationships between STEM disciplines and AFNR content.

In addition to providing a taxonomy of STEM in AFNR education literature, we considered the potential for existing STEM in AFNR education literature to address emerging challenges and

Table 2

Taxonomy of STEM in AFNR Education

Taxonomic Name	Definition
Relationship between STEM Disciplines	
Disciplinary Silos	No relationship between STEM disciplines.
Integrated through AFNR	Two or more STEM disciplines addressed in an AFNR context.
Real-World Problem Solving	STEM is an integrated approach used to address complex problems.
Relationship between AFNR and STEM	
STEM as Naturally Occurring	STEM learning occurs naturally as students engage in AFNR education.
STEM as External	STEM learning outcomes can be incorporated into AFNR education.
Applied STEM	AFNR education is an appropriate context for STEM learning.
Justifications for Research	
STEM Learning	AFNR education is an appropriate context for STEM learning.
Recruitment	More professionals are needed in STEM and/or AFNR.
Career Readiness	STEM learning is needed for success within professional careers.
Problem Solving	STEM learning is needed to solve complex problems.
Interdisciplinary Connections	AFNR and STEM learning are mutually reinforcing.
Research Focus	
Perceptions of STEM	Interested in how individuals conceptualize STEM.
Application of STEM	Exploring project-based curriculum to engage students in STEM.
Teacher Practices and Characteristics	Identifying characteristics and approaches of STEM among AFNR educators.
Standardized Testing	Evaluating standardized assessments of STEM knowledge.
Student Career Choice	Evaluating STEM career choice.
Operationalization of STEM in Research	
Single Discipline	One STEM discipline within the teaching process.
Two or More Disciplines	Two or more STEM disciplines within the teaching process.
Unspecified Disciplines	Involves an undescribed subset of science, technology, engineering, and/or mathematics.
Acronym Only	STEM is used as a reference, but not as a component of the research or teaching process.

opportunities. Specifically, the ability of STEM in AFNR education to inform solutions to insufficient or ineffective STEM and AFNR pipelines (USDA, 2015; Roberts et al., 2016), student underperformance in STEM (Garrett, 2008), and complex socioscientific problems (Andenoro et al., 2016) as well as the opportunity to extend research and practice via large, collaborative grants focused on enhancing STEM education (Gonzalez & Kuenzi, 2012). Three salient shortcomings within the current literature emerged, which serve as the foundation for recommendations to enhance STEM in AFNR education literature and practice.

First, literature in traditional AFNR education contexts (e.g., preservice AFNR educators, and secondary school AFNR programs) tends to conceptualize STEM as either naturally occurring within AFNR or completely external to AFNR. The presence of both beliefs in AFNR education literature belies a need to consistently define the relationship between STEM and AFNR. Additionally, neither description implies a need to improve the way AFNR content is taught in traditional education settings. Studies suggesting STEM is naturally occurring within AFNR curriculum may inculcate an idle mindset to achieving STEM aims within AFNR - i.e., "if it naturally exists, I do not need to change anything." Alternatively, studies conceptualizing STEM as an external "add-on" to AFNR content imply disciplinary silos, failing to recognize, or educate others about, the interconnectedness of STEM and AFNR. To address this challenge, we recommend adopting a common understanding of the relationship between STEM and AFNR. Consistency in defining the relationship between STEM and AFNR may help AFNR education communicate a role in broader STEM education aims. To position AFNR education to address student preparedness for increasingly interdisciplinary careers and challenges (USDA, 2015), we recommend a common understanding in which AFNR and STEM are seen as complex systems of knowledge and skills with numerous overlapping ideas, concepts, and abilities. Within this understanding, teaching STEM within AFNR contexts is not an added experience, it is a required component to preparing students to learn about, address challenges within, and be successfully employed in AFNR. If adopted, this common understanding would reinforce the essential nature of addressing STEM within AFNR learning contexts as well as the tremendous opportunity to reinforce and extend STEM learning contexts with the application of AFNR.

In addition to challenges conceptualizing STEM and AFNR, we did not identify a common teaching framework for STEM in AFNR. A commonly used framework for connecting AFNR and STEM learning within educational environments is required to provide a foundational backbone in which research can evaluate, revise, and extend. In the absence of a common teaching framework, scholars and practitioners alike are left to disparate, rather than culminating, efforts. Scholars of STEM in AFNR education are encouraged to identify or develop a common teaching framework (e.g., NAE & NRC, 2014).

The final salient challenge identified within the reviewed STEM in AFNR literature was a lack of focus on engineering and technology as a component of STEM education in AFNR. An emphasis on science and mathematics within current literature fails to align with an interdisciplinary understanding of STEM, in which STEM is seen as a unified approach, rather than four distinct disciplinary silos (Bybee, 2010). Furthermore, a failure to include engineering misses an opportunity to inform practitioners attempting to meet salient engineering learning outcomes as well as leaves researchers without momentum to capitalize on grants increasingly supporting engineering education interventions and evaluation (Gonzalez & Kuenzi, 2012). To address this challenge, researchers are encouraged to expand the focus from science and mathematics to more holistic analyses of STEM learning that include foci in engineering design and technology. Learning experiences within the Power, Structural, and Technical Systems pathway of school-based AFNR education offer a premier context to consider engineering design and technology learning within AFNR.

STEM has evolved from a buzzword to a priority in education, impacting numerous disciplines, including AFNR education, in its development. The prolific yet desultory adoption of STEM in AFNR education literature created an opportunity to concatenate existing literature to inform future work. By taking “the time to clarify what [STEM] might mean when applied beyond a general label” (Bybee, 2010, p. 30), we hoped to provide a brighter future for STEM in AFNR education.

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A Quasi-Experimental Examination: Cognitive Sequencing of Instruction Using Experiential Learning Theory for STEM Concepts in Agricultural Education

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Abstract

Understanding methods for effectively instructing STEM education concepts is essential in the current climate of education (Freeman, Marginson, & Tyler 2014). Kolb's experiential learning theory (ELT) outlines four specific modes of learning, based on preferences for grasping and transforming information. This quasi-experimental study was conducted to test the effect of cognitive sequencing of instruction in the dimension of grasping information through ELT. Two units of STEM-enhanced instruction were develop, each with two separate sequences; one with concepts presented beginning with a concrete experience and moving to an abstract conceptualization and the other in the opposite sequence. Introductory agricultural science courses in four Texas high schools were randomly assigned to one of four experimental groups (n = 121). This experiment utilized a crossover design to allow each student to experience both cognitive sequences (Shadish, Cook, & Campbell, 2002). This portion of a larger study examined the independent variables of cognitive sequence of instruction and student preference for grasping information in relation to the dependent variables of student change score from pretest to posttest for both units of instruction. Findings indicated significant interactions on both units of instruction ($F(2,115) = 38.19$, $p = 0.01$, $\eta_p^2 = 0.40$ and $F(2,115) = 17.58$, $p = 0.01$, $\eta_p^2 = 0.23$) between student preference for grasping information and cognitive sequence of instruction.

Introduction

In the last ten years, secondary education has been called upon for more than preparing students for a recall of basic information (Carnoy & Rothstein, 2013). This shift in focus is not without warrant. According to the World Economic Forum, the United States ranked fifty-first in quality of math and science education when compared to all nations worldwide (Schwab, 2011). Secondary students in the U.S. have demonstrated declining comparative performance in STEM areas over the last two decades (Carnoy & Rothstern, 2013), and there are growing concerns that students are not completing their education with the skills and knowledge required to enter higher education and skilled careers (Maltese, Potvin, Lung, & Hochbein, 2014).

The abstract nature of many STEM concepts has led researchers to conclude that these topics are best taught using subjects that allow a connection to their real-world application (Boaler, 1998; Kieran, 1992; Stone, 2011; Woodward & Montague, 2002). Career and Technical Education (CTE) courses, including agricultural education, have been seen as a possible context for teaching STEM concepts, as these courses often include a contextual frame for abstract STEM topics (Stone, 2011).

Agricultural education is rooted in experiential learning (Baker, 2012; Roberts, 2006). The process of integrating abstract concepts in an agricultural setting can be facilitated through the use of Kolb's (1984) experiential learning theory (ELT) as the model through which to deliver, reinforce, and evaluate student learning (Baker, 2012; Roberts, 2006). Quality educators use multiple instructional methods during a given unit, and even within the same class period to help facilitate learning (Marzano, Pickering, & Pollock, 2001).

Although research on single instructional methods may not be a realistic approach to examining effectiveness, studies of the overarching principles of instruction common to all instructional methods could yield viable results (Eggen, Kauchak, & Harder, 1979; Tallmadge & Shearer, 1971). One of the overarching principles of instructional methods is the concept of sequencing instruction (Reigeluth, 2013). One approach to understanding how agricultural education could assist students in grasping STEM concepts would be to use the ELT model as a framework for exploring the sequencing of STEM instruction in agricultural education courses.

Conceptual Framework

The conceptual framework for this study was developed from Kolb's (1984) experiential learning theory using Gagne's (1965) theory of instruction as a frame for controlling variables in delivering experimental treatments. Gagne's model is widely accepted as a complete overview of the instructional process, provides methods for independent evaluation of variables (Driscoll, 2004; Reigeluth, 1983). This study was heavily influenced by Kolb's experiential learning theory as the method for presenting the stimulus to students. The model shows the cyclical process of learning as a relationship between the four modes of active experimentation (AE), concrete experience (CE), reflective observation (RO) and abstract conceptualization (AC) (Kolb, 1984, 2015). The resulting conceptual model for this study is shown in Figure 1.

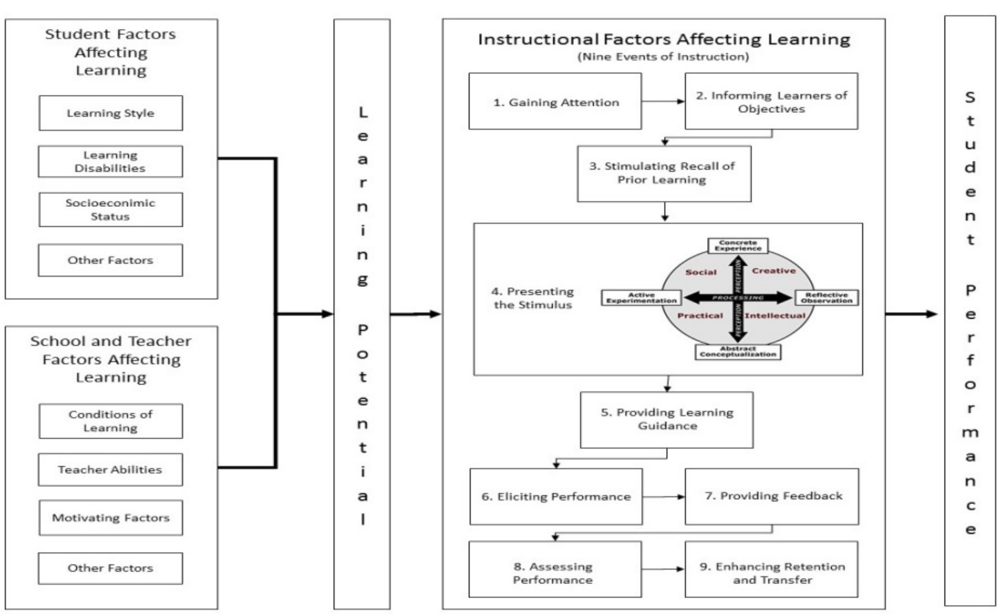

Figure 1. Conceptual model of student learning. Based on Kolb's (1984, 2015) experiential learning theory and Gagne's (1965) nine events of instruction.

This study was designed to employ the conceptual model in an examination of student performance by using experimental curricula developed to standardize the events of instruction as outlined by Gagne (1965), manipulating only the cognitive sequence with which information was presented. Resulting changes in learning between dependent measures were examined in relation to student learning preference and cognitive sequence of instruction.

Review of Literature

Almost every country has examined the importance of integrating STEM concepts into their educational programming (Freeman, Marginson, & Tyler, 2014). In the US, nearly 91% of American adults feel as though science and technology education gives students opportunities for growth and success, and over 60% believe current math and science education is inadequate (Maltese, et. al., 2014). In late 2013, a joint report from the National Science Foundation and the Department of Education highlighted suggestions for STEM education. Among these suggestions was to "provide more opportunities for hand-on, real-world STEM activities at the secondary level" (Ferrini-Mundy, 2013).

Career and Technical Education (CTE) courses have been suggested as a platform for teaching STEM concepts (Stone, 2007, 2011). Stone (2011) analyzed shifts in the pressure applied to CTE courses to integrate STEM concepts beginning in the 1970s. He concluded that models integrating STEM concepts into CTE courses were viable, and noted "STEM-focused education can be incorporated into any CTE delivery system, program, or curricular or pedagogical approach within CTE" (Stone, 2011, p. 13). Both the Math-in-CTE initiative (Stone, Alfeld, & Pearson, 2008) and the Science-in-CTE initiative (Pearson, 2015; Pearson, Young, & Richardson, 2013) have been conducted to examine the successful learning of STEM concepts in CTE courses. These programs have yielded positive results and longitudinal studies are underway.

Contextual learning is not new to CTE or agricultural education. Furner and Kumar (2007) and Shinn et. al. (2003) have examined the important role of agricultural education in bridging the gap between the known and unknown through contextualized learning. The contextual bridge between agricultural education and STEM concepts is well established; agriculture teachers rate the importance of integrating STEM concepts high and have an awareness of shifts in educational structure mandating integration STEM concepts (Myers & Dyer, 2004; Smith, Rayfield, & McKim, 2015). Stubbs and Myers (2015) reported integration of STEM concepts as an essential component of a quality agricultural education program.

Experiential learning theory is based on the premise that learning is a dynamic interaction between the learner, methods through with information is gathered, and methods by which information is processed in the mind (Kolb, 1984, 2015). The resulting model is the cyclical process of the experiential learning cycle. This cycle includes two sets of dialectically opposed modes of learning: Active Experimentation (AE) and Reflective Observation (RO) related to transforming experience, and Concrete Experience (CE) and Abstract Conceptualism (AC) related to grasping experience. Through ELT, Kolb outlines two distinct modes of grasping experience; apprehension, based on concrete experiences, and comprehension, based on abstract conceptualization (Kolb, 2015), and highlights that individuals will have a preference between the opposing modes of learning (Kolb, 2015).

There are those who argue learning preference cannot be used as a standalone assessment of learning ability (Pashler, McDaniel, Rohrer, & Bjork, 2008). Others have noted the importance of understanding individual student learning factors in education (Brokaw & Merz, 2000; Claxton & Murrell. 1987; Coffield, Moseley, Hall, & Ecclestone, 2004a, 2004b; Duff, 2004; Dunn and Dunn, 1989; Felder & Silverman, 1988; Fleming, 2001; Gregorc, 1979; Kolb, 1985, 2015; Tomlinson, 1999). Sousa (2011) noted, “there is little argument that people have various internal and external preferences when they are learning” (p. 59). Due to the close tie between *Kolb’s Learning Style Inventory (KLSI)* and ELT, we used this instrument as an assessment of student learning preference for grasping information.

Several researchers have examined sequence of instruction in general (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956; Reigeluth, Merrill, Wilson, & Spiller, 1980; Scandura, 1983; Webb, 1997). These concepts of sequencing instruction have often included only the sequencing of concepts and topics, rather than sequencing the modes of learning or type of instruction. The concept of sequencing an initial exposure to instructional information from a specific end of the ELT continuum has not been fully examined. Baker, Brown, Blackburn, and Robinson (2014) conducted an initial examination into presentation order of concepts within the context of experiential learning theory for post-secondary students using agriculture as the context. While their findings failed to reveal significant differences between order of abstraction and type of reflection, they recommended further research in this area, specifically within the secondary classroom.

Research into effective methods for integrating STEM concepts into agricultural education within the framework of ELT may yield important results related to instruction for individual students. Cognitive sequencing may play an important role in allowing students to grasp abstract concepts as applied in a contextual setting (Garlick, 2010; Marzano, et. al., 2001; Reigeluth, 1983). This research was conducted to fill the gap in the knowledge base by analyzing cognitive sequencing in STEM education concepts through the pedagogical approach of ELT, allowing for the most effective sequences for students based on learning preferences to be revealed, and giving agricultural education students access to the most efficacious methods for learning STEM content.

Purpose and Objectives

The purpose of this portion of a larger study was to determine the effect of cognitive sequence of instruction and student learning preference for grasping information on student learning of STEM concepts in agricultural education. To guide the research, the following objectives were developed:

1. Describe the effect an interaction between student learning preference for grasping information and cognitive sequence of instruction has on student change scores on STEM content assessments.
2. Describe the variance of student change scores attributed to student preference for grasping information.
3. Describe the variance of student change scores attributed to cognitive sequence of instruction.

This quasi-experiment was developed to test the following null hypothesis:

Ho: There is no interaction between student preference for grasping information and cognitive sequence of instruction for student change scores on STEM-based content assessments in agricultural education

Methods and Procedures

This study was conducted using a quasi-experimental design, utilizing students enrolled in Principles of Agriculture, Food, and Natural Resources (AFNR) courses in Texas as the functional experimental units. Quasi-experimental research was popularized by Campbell and Stanley (1963) and can be defined as "an experiment in which units are not randomly assigned to conditions" (Shadish et. al., 2002, p. 511). The experiment used a repeated measures crossover design including a control group (Campbell & Stanley, 1963; Shadish, et. al., 2002) to allow for multiple data collection points from each student.

Sites were recruited through purposive selection based on the diversity of school population, regional differences, location in relation to [University], and teacher qualities including commitment to project and teaching history. Fraenkel, Wallen, and Hyun (2006) noted that purposive sampling is sometimes necessary in quasi-experimental educational research due to the need for collaboration between researchers and school personnel. Of twelve identified sites, four were successful in completing authorization and data collection for both experimental rounds. The final population included students enrolled in the Principles of Agriculture, Food, and Natural Resources courses at four high schools in Texas, $n = 121$. Experimental treatments were randomly assigned to each site, as shown in Table 1. According to Shadish, et. al. (2002) quasi-experimental research may require groups of experimental units to be randomly assigned to a treatment collectively, if they are pre-organized into logistically viable groups.

Table 1

Experimental Treatment Profiles by Site

Round One	Round Two

Site		Curriculum	Sequence			Curriculum	Sequence	
1	O_1	--	--	O_2	O_3	--	--	O_4
2	O_1	Water	AC-CE	O_2	O_3	Soil	CE-AC	O_4
3	O_1	Soil	AC-CE	O_2	O_3	Water	CE-AC	O_4
4	O_1	Soil	CE-AC	O_2	O_3	Water	AC-CE	O_4

Two units of experimental curricula were developed for this study. Each unit was developed in two formats; one cognitively sequenced with each new concept beginning with a concrete experience and moving toward abstract conceptualization, and another with each new concept beginning with abstract conceptualization and moving toward a concrete experience. To ensure curricula met the rigorous requirements for use as experimental treatments and to establish content and face validity, they were designed with guidance from a cognitive psychologist and agricultural curriculum developers. Gagne's nine events of instruction (1965) were held constant during each round of testing except "presenting the stimulus" which varied based on which mode of grasping experience was presented first. Gagne (1965) theorized that by following the nine events of instruction, external learner variables can be controlled in test groups. Each test site received both content areas, sites were randomized as to which content area and cognitive sequence they would receive first. The crossover design allowed each student to experience both units of instruction and both cognitive sequences.

Experimental treatments for this study were designed to be instructed exactly as developed, using provided lesson plans, worksheets, laboratories, and information. Completing this research within the parameters of the study design relied on teachers at each experimental site instructing the curricula exactly as designed. The possibility of deviation from the intended curricula posed a limitation to this study. To overcome this limitation and ensure fidelity of treatment, extensive training and instruction on the use of the curriculum materials was provided to teachers and agreements of compliance were signed and collected from teachers administering the experimental treatments.

Three instruments were used in this study; content knowledge assessments for both the water and soil science units, and *KLSI v 3.1*, which was used to determine student preference for grasping experience in study participants. Unit assessments were developed to directly assess each of the unit objectives with exam questions at multiple levels of cognition. Linkages between individual instrument items and objectives, along with cognitive levels of exam items were established during instrument development. According to Frisbie (1988), the most appropriate method for determining the reliability of a typical teacher-made test using multiple question formats is through the employment of a *KR-20* coefficient. Resulting coefficients (*KR-20*) were 0.75 for the water science pretest and 0.78 for the water science posttest. For the soil science tests, the resulting reliability coefficients (*KR20*) were 0.81 for the pretest and 0.86 for the posttest. Reliability coefficients for teacher-made tests are considered to be acceptable at a minimum level of 0.65 (Frisbie, 1988), therefore the reliability of both unit assessments were deemed acceptable for the intended purpose of this study.

The paper version of the *KLSI v. 3.1* instrument was used to determine the learning style preference for respondents in regard to grasping information. The format of *KLSI v. 3.1* is a forced-choice response to 12 instrument items. Each item contains a statement prompt and asks respondents to rank their preferences for four answer choices, which correspond to the four learning modes of Kolb's (1984) experiential learning theory (ELT). Respondent rankings are ordinal from 4 "most like me" to 1 "least like me" (Kolb & Kolb, 2013). Validity of the *KLSI v. 3.1* has been widely established for use in the field of education (Kolb & Kolb, 2005), and was determined to be acceptable for the purposes of this study. Previous measures of reliability for the four learning KLSI learning modes range from $\alpha = 0.77$ to $\alpha = 0.84$ (Kolb & Kolb, 2005), and reliability was determined to be suitable for use in this study. To maintain group sizes large enough for statistical examination, student preference for concrete experience or abstract conceptualization was classified dichotomously, using the cut scores provided with the *KLSI v 3.1* manual (Kolb & Kolb, 2005). This decision is similar to the decision to use a bipolar classification of preference for grasping and transforming information by Baker (2012).

This quasi-experiment was conducted in the fall semester of 2015. Data were collected in two phases: collection of student characteristics, and collection of STEM assessment knowledge. The first phase of data collection was the collection of information related to participant demographic and classification variables. Per Institutional Review Board requirements, parental consent and student assent were obtained by each student in the Principles of AFNR courses for each participating school. Consent and assent were obtained for $n = 121$ of the students for an overall inclusion rate of 94.5% of all students ($N = 128$). We travelled to sites to collect information regarding student demographic characteristics and to administer the *KLSI v. 3.1* instrument to students.

The final phase of data collection was completed by the agriculture teachers who participated in the study. Prior to teaching each unit, teachers administered a pretest, and at the completion of each unit of experimental curricula, a posttest was administered. These assessments included no names, only a unique identifier for each student. Tests were hand-scored once by the teacher according to the predefined answer key, and again by the research team to ensure scoring was consistent and correct. Scores on the pre and posttests were added to the encrypted spreadsheet, and a change from pretest to posttest score was calculated.

Initial data were analyzed with an omnibus multivariate analysis using IBM SPSS v. 23. A multivariate analysis of variance was determined to be the optimal statistical tool for interpreting information from this study (Meyers, Gamst, & Guarino, 2012; Stevens, 2009). Tabachnick and Fidell (2007) mentioned the need to carefully examine the use of MANOVA in crossover designs, as the variation in treatment across measures may be due to the effects of crossing treatments, rather than true interaction when assumptions are violated. After running a MANOVA analysis, two of the assumptions of MANOVA were violated, and the decision was made to examine the two units of instruction separately using two univariate ANOVAs (Howell, 2012; Mayers, 2013; Tabachnick & Fidell, 2007). The resulting univariate analyses yielded two ANOVAs from the same data set. The alpha level for significance was adjusted using Bonferroni's adjustment (Meyers, et. al., 2013; Stevens, 2009; Tabachnick & Fidell, 2007), resulting in an adjusted alpha level of $p < 0.02$ for determining significance.

Findings

Prior to analyzing the results related to the research objective, data were analyzed using ANOVA to determine if statistically significant differences existed in the four test sites on the pretest measures. An initial examination of prior knowledge was necessary to interpret subsequent differences which may have existed based on teacher or school factors rather than the independent variables. No significant differences ($F(3,117) = 1.22$, $p = 0.30$, $\eta_p^2 = 0.03$) were found in the pretest water science assessment scores between students at the sites. The ANOVA examination of the raw scores on the soil science unit exams revealed statistically significant differences ($F(3,117) = 5.10$, $p = 0.02$, $\eta_p^2 = 0.15$) in the means between sites on the soil science pretest assessment. Post hoc analysis showed differences only between sites three and four. The nature of this study allowed for an examination of change from pretest to posttest (Shadish, et. al., 2002), and as such, the differences in pretest scores were noted for examination in the outcomes of hypothesis testing, but deemed no threat to the analysis of findings related to the objectives.

To begin the analysis related to the research objectives, the descriptive results of change from pretest to posttest on both the water science and soils science unit assessments were calculated and are shown in Table 2.

Table 2

Means and Standard Deviations of Change in Score for Water Science and Soil Science Units by Independent Variable Group

		Water Science Unit		Soil Science Unit	
Variable	Category	*n*	*M* (*SD*)	*n*	*M* (*SD*)
Grasping Preference	Apprehension	85	41.82 (24.57)	85	47.69 (26.62)
	Comprehension	36	30.53 (28.93)	36	32.31 (23.84)
Sequence of Respective Unit	AC to CE	72	43.69 (17.97)	31	33.81 (16.87)
	CE to AC	31	48.45 (31.04)	72	57.64 (19.52)
	Control	18	0.33 (3.24)	18	1.06 (2.56)

Note: The crossover design allowed for students receiving the water science unit in the AC to CE sequence to receive the opposite treatment for the soil science unit, which accounts for the differences in *n* between sequences

Following an analysis of the descriptive means, the means for each of the units of instruction were compared by using univariate analyses. The results of the omnibus ANOVA examination for the water science unit revealed significant differences ($p \leq 0.02$) in the dependent variable. Significant differences were found for both preference for grasping experience ($F(1,115) = 11.07$, $p = 0.01$, $\eta_p^2 = 0.09$) and cognitive sequence of instruction ($F(2,115) = 60.65$, $p = 0.01$, $\eta_p^2 = 0.51$). These findings were superseded by the finding of a single statistically significant ($F(2,115) = 38.19$, $p = 0.01$, $\eta_p^2 = 0.40$) interaction involving both preference for grasping experience and cognitive sequence. Based on the guidelines set forth by Cohen (1977), this difference had a large effect size $\eta_p^2 \geq 0.14$, and showed a high level of power. Based on the findings, the null hypothesis was rejected, and it was determined that interactions between cognitive sequence and preference for grasping experience did exist. Results of the omnibus ANOVA are shown in Table 3.

Table 3

ANOVA Table for the Effect of Preference for Grasping Knowledge and Cognitive Sequence on Change in Pre and Posttest Scores on Water Science Unit Assessments

	SS	*df*	*MS*	*F*	*p*	η_p^2	1-β
Grasping	2922.20	1	2922.20	11.07	0.01*	0.09	0.91
Sequence	32014.49	2	16007.24	60.65	0.01*	0.51	1.00
Grasping*Sequence	20160.22	2	10080.11	38.19	0.01*	0.40	1.00
Error	30352.84	115	263.94				
Total	262248.00	121					

Note: Significant alpha level was determined *a priori* at an adjusted level of $p \leq 0.02$ to account for analysis of both units of instruction

The analysis of the soil science unit yielded similar results, which are shown in Table 4. A significant difference ($F(2,115) = 69.17$, $p = 0.01$, $\eta_p^2 = 0.55$) was found related to student preference for grasping information which was superseded by a significant interaction ($F(1,115) = 17.58$, $p = 0.01$, $\eta_p^2 = 0.23$) between sequence of instruction and preference for grasping information.

Table 4

ANOVA Table for the Effect of Preference for Grasping Knowledge and Cognitive Sequence on Change in Pre and Posttest Scores on Soil Science Unit Assessments

	SS	*df*	*MS*	*F*	*p*	η_p^2	1-β
Grasping	93.95	1	93.95	0.41	0.53	0.01	0.10
Sequence	32028.74	2	16014.37	69.17	0.01*	0.55	1.00
Grasping*Sequence	8138.91	2	4069.46	17.58	0.01*	0.23	1.00
Error	26624.92	115	231.52				
Total	310351.00	121					

Note: Significant alpha level was determined *a priori* at an adjusted level of $p \leq 0.02$ to account for analysis of both units of instruction

Following the results from the ANOVA analyses, simple main effects tests were conducted to further investigate the interaction. The results of the simple main effects tests revealed that, for both units of instruction, students had significantly higher scores in the unit sequenced to begin with their preferred method of grasping information. The resulting profile plots for both units are shown in Figure 2.

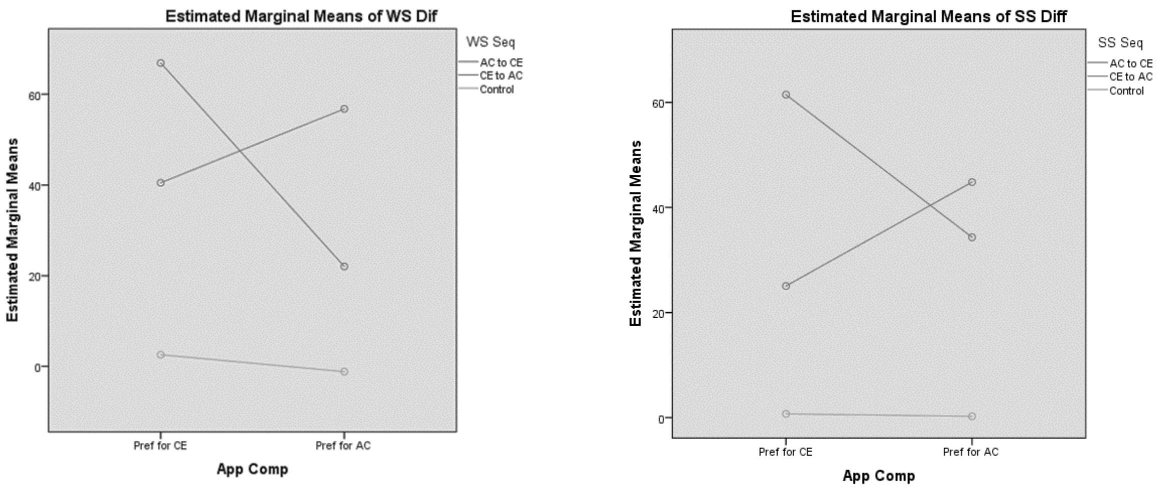

Figure 2. Profile plots for both units of instruction

Conclusions/Implications

This study was an exploratory examination of cognitive sequencing of STEM concepts in agricultural education, in an effort to gain insight into how the cognitive principle of sequencing instruction might play a role in student understanding of STEM concepts. The study was developed using the foundational underpinnings of experiential learning, which is already at the foundation of agricultural education (Baker, 2012; Roberts, 2006). Through this examination, we can begin to frame methods for instruction which might help agricultural educators better guide students through the abstract STEM concepts they are being asked to teach (Myers & Dyer, 2004). The findings of this study lend support to the fact that it is not only what agricultural educators are teaching in regards to STEM concepts in agricultural education, it is how they are teaching it that may make the critical difference for students.

The results of this study highlight the importance of cognitive sequencing as a factor related to change in score from pretest to posttest. By using a crossover design, each student could be evaluated in relation to their preference for grasping experience and their performance on purposively sequenced units. For the $n = 121$ students involved in this study, differences were evident. The results reveal that sequencing of instruction resulted in greater changes in assessment scores as an interaction with preference for grasping experience. Student differences based on cognitive sequence have direct implications for agricultural educators as they work to instruct STEM concepts.

Three main findings emerge from this study: students in this study who preferred to grasp experience through apprehension had higher change scores from pretest to posttest when the units were sequenced to begin with a concrete experience, students who preferred to grasp experience through comprehension had higher change scores when the units were sequenced to begin with abstract conceptualization, and students performed with higher change scores in the unit cognitively sequenced to match their preferred learning style, regardless of unit content.

Many of the concepts in STEM education are abstract in nature (Maltese, et. al., 2014), and the hands-on nature of agricultural education and other CTE courses have been seen as a platform for delivering these concepts (Stone, 2010). For students who prefer to grasp information through apprehension, the presentation of abstract concepts through abstract conceptualization, which is common in traditional education (Reigeluth, 2013), may not provide the stimulus they need to effectively grasp the new information.

The majority of students in this study (*n* = 86) had a preference for grasping experience through apprehension. If the proportion of students who prefer apprehension over comprehension is similar in the total population of agricultural education students to the proportion in this study, there could be a large number of students who would benefit from a sequencing instruction to begin with concrete experiences. Providing students preferring apprehension over comprehension a concrete experience at the beginning of the instruction allows them to have an experience to tie the abstract concepts to (Garlick, 2010; Kolb, 2015). According to Kolb (2015) those who prefer concrete experience (apprehension) have "a concern with the uniqueness and complexity of present reality as opposed to theories and generalizations" (p. 105).

Students with a preference for grasping experience through comprehension were found to have higher changes in scores when new concepts were presented with an abstract conceptualization focus first. What implications does this have for agricultural education? The traditional model of curriculum design, which includes instruction in abstract concepts followed by concrete application of those abstractions is well-suited for students who prefer to grasp experience through comprehension (Reigeluth, 2013). These students are more suited to learning abstract concepts through traditional educational methods.

Students with both types of preferences exist in an agricultural education classroom, so which of the cognitive sequences is better suited for development of curriculum materials? Sequencing instruction based on individual student preferences for grasping information has close ties to the literature related to differentiated instruction. Tomlinson (1999) stated the importance of tailoring educational practices to meet the needs of each student. The findings of this study give an example of just how critical differentiated instruction is when dealing with STEM concepts in agricultural education classes. Students in this study showed drastically higher scores when they were given the opportunity to grasp information in a sequence tailored to their preference. This small change to educational methods may have broad-reaching effects, not only for STEM concepts in agricultural education, but for education as a whole.

It is important to note that, within the confines of ELT, the entire learning cycle must be completed in order for learning to occur. Students who have a preference for apprehension are not likely to learn only through the concrete experience, it must be supplemented by reflective observation, abstract conceptualization, and active experimentation in order for the intent of ELT to be met (Baker, 2012; Kolb, 2015).

Recommendations

These conclusions serve as a starting point for a discussion on how our practices can best meet the needs of our students. Agricultural education is charged with providing context to abstract STEM concepts (Myers & Dyer, 2004). To this point, there has been little research on the best ways to deliver this content effectively (Stone, 2010). Perhaps by returning to our ELT roots (Roberts, 2006; Baker, et. al. 2012) and differentiating our instruction based on individual learning preferences (Tomlinson, 1999) through cognitive sequencing, we can stimulate the change our field needs to meet the challenge.

Because both preferences for grasping information exist in a secondary agricultural education classroom, it is recommended to alternate and combine instruction in STEM concepts from both apprehension and comprehension of the prehension dialectic. Careful attention should be paid during the design of instruction to ensure that students are receiving exposure to the complete learning cycle as defined through ELT. In addition, we recommend continued emphasis on both sequencing instruction and the design of lessons using ELT for preservice and in-service agricultural educators. Pre-service teachers should be made aware of the potential effects of cognitive sequencing on student learning. They should be given the opportunity to develop lessons which are not sequenced in a traditional AC to CE format. Professional development should be created and presented to in-service teachers to highlight the effects of cognitive sequencing based on learning style. In-service should include instruction on how to present new concepts using both an apprehension and comprehension beginning point.

Additional research is needed to completely understand the role sequencing of instruction might play in both STEM education and agricultural education as a whole. Examining the role of the transformation dimension, replicating this study with engineering and mathematics concepts, and examining units of instruction with alternating or combined sequences of instruction are all recommended areas for continued exploration. We also recommend a replication of this study in fields outside of agricultural education, to test the interdisciplinary reach of instruction purposively sequenced based on ELT.

Experiential learning theory is a valuable tool which many believe may be at the very core of agricultural education. Attention to this theory as a systematic method for instruction, rather than a suggested principle could yield the understanding of how to integrate content and

STEM concepts more effectively for all students. This study is the initial examination of a much larger concept. Combining purposively sequenced instruction with the foundations of ELT could bridge the gap between abstract concepts and STEM knowledge, and may allow agricultural educators to effectively integrate STEM concepts for all students.

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Comparative Analysis of Students Taught Science or Agriscience: Results on State Standardized Math Assessment

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The reliance on standardized tests for educational evaluation and policy decisions drives researcher to explore factors associated with student achievement. Students enrolled in agricultural education have shown increased performance and achievement in mathematical concepts. Building on contextualized learning and status attainment theories, this study used descriptive logistical regression to investigate 8th grade students enrolled in a high school level Agriscience Foundations course for science credit were associated with mathematical achievement test scores. This study lent support to the status attainment theory by identifying variables which distinguished hierarchy of enrollment and achievement. The role of agriscience enrollment on mathematical achievement was highlighted. Students enrolled in Agricultural Foundations consistently outperformed students enrolled in basic science and scored equivalently or slightly lower than students in advanced science. School officials should consider the impact of agriscience courses on achievement when considering course offerings. Hierarchical Linear Modeling should be performed to analyze the role of additional levels of nested data on student achievement data.

Throughout their adult lives, students will rely on the conceptual skill set of math, analytical thinking, problem solving, and reasoning they develop in school (Shinn, Briers, Christiansen, Edwards, Harlin, Lawver, Linder, Murphy, & Parr, 2003). While current Science, Technology, Engineering, & Mathematics (STEM) initiatives in education indicate a focus on improving math learning, ninety percent of adults are concerned about the limited math skills of today's students (Shinn et al., 2003). In *The Condition of Education 2016* report published by the United States Department of Education (USDE) (2016), Natioanl Assessment of Educational Progress achievement levels of students were reported and compared to previous levels to track progress. In 2013, 8th grade students scored higher on the mathematics assessment than all of the previous years. However, only 35% of students scored at or above the *Proficient* level and 26% of 8th graders performed below the *Basic* level. These percentages showed no measureable change from 2011. White students scored at least 22 points higher than Black, Hispanic, and American Indians/Alaskan Native students and 12 points lower than Asian/Pacific Islander students. Male student consistently performed one point higher than females. Florida mathematics scores for 8th grade students neither increased nor decreased from 2011 to 2013. According to the Program for International Student Assessment (PISA), American students are scoring below the international average in math (USDE, 2016). In 2012, the United States ranked 36 out of 65 countries in mathematics and scored below the international average. Floridian students' scores dropped and were lower than international and national students.

Despite debate surrounding the validity of standardized tests, the US education system relies on measures of student achievement in order to set educational policy and practices (Israel & Beaulieu, 2004). Reguardless of efforts to increase student achievement through rigorous standards and testing, little if any progress has been measured and American students perform below the international average (Florida Department of Education [FDOE], 2015a; Israel & Beaulieu, 2004; United States Department of Education [USDE], 2016). The Florida Comprehensive Assessment Test (FCAT) began in 1988 to measure student achievement based on new, more rigorous Sunshine State Standards (FDOE, 2015a). In the 2010-2011 school year, the state began transitioning to the FCAT 2 tests to measure the Next Generation Sunshine State Standards (FDOE, 2015a; FDOE, 2015b). In both FCAT and FCAT 2 scores, students are ranked into 5 levels (FDOE, 2009; FDOE, 2015a; FDOE, 2015b; FDOE, 2015d). For the FCAT 2.0 scores, Level 1 indicates "an inadequate level of success with the challenging content of the Next Generation Sunshine State Standards," Level 2 designates "a below satisfactory level of success with the challenging content of the Next Generation Sunshine State Standards," Level 3 defines "a satisfactory level of success with the challenging content of the Next Generation Sunshine State Standards," Level 4 specifies "an above satisfactory level of success with the challenging content of the Next Generation Sunshine State Standards," and Level 5 designates a "mastery of the most challenging content of the Next Generation Sunshine State Standards" (FDOE, 2015b; FDOE, 2015d). A Level 3 score is required to pass (FDOE, 2009; FDOE, 2015b; FDOE, 2015d).

Standardized tests have assumed a prominent role in education for their roles in student tracking, placement, promotion, and graduation (Hamilton, Stecher, & Klein, 2002; NRC, 1999; Theriot & Kotrlik, 2009); accountability and assessment (NRC, 1999; Theriot & Kotrlik, 2009); funding (Hamilton et al., 2002); teacher evaluations (NRC, 1999); evaluation of education systems (NRC, 1999); and creation of educational policies (Israel & Beaulieu, 2004). They have become a "'currency' for school officials" (Israel, Myers, Lamm, & Galindo-Gonzalez, 2012, p. 15). Research must continue to investigate factors influencing student achievement and thus the diverse implications of standardized test scores. Priority five of the National Research Agenda for agricultural education, "Efficient and effective Agricultural Education programs" (Roberts, Harder, & Brashears, 2016, p. 41), specifically research priority question number 4, "how do school-based agricultural education programs contribute to career and technical education (CTE) and broader educational initiatives?" (p. 43), recognizes the need to investigate how agricultural education can impact student achievment. This study investigates this question as it relates to mathematic achievement in the state of Florida. This study analyzed the first school system to offer Agriscience Foundations as a science credit option for 8th grade students; the administration required an evaluation of impact of this decision on student achievement (P. Nobles, personal communication, April 15, 2016). Evaluation could influence desicions on continuation and more broad implementation within the state.

Theoretical Framework & Literature Review

Contextualized learning (Buriak, McNurlen, & Harper, 1996; Dworkin, 1959; Fosnot, 1996) and status attainment (Duncan, Featherman, & Duncan, 1972; Wilson & Portes, 1975) theories directed this study. Contextualized learning is a branch of constructivism which purports through experiences, learners create their own knowledge (Doolittle & Camp, 1999). Providing authentic examples and experiences for learners to construct their own meaning, models, concepts, and strategies is central to the theory (Dworkin, 1959; Fosnot, 1996; Haury & Rillero, 1994) and should be done in multiple diverse settings (Buriak et al., 1996). The use of contextualized education is promoted in STEM education (Ejiwale, 2012). The contextualized learning of mathematics and science provided by agricultural education supports the transfer of these concepts to different situations (Conroy, Trumbull, & Johnson 1999).

The Carl Perkins Act has mandated the integration of core academic content into CTE coursework making CTE a model for teaching academic and transferable skills required for career success (Meeder & Suddreth, 2012). CTE courses have been found to contribute to student success in academic areas (Chiasson & Burnett, 2001; Conroy, Trumbull, & Johnson, 1999; Israel, Myers, Lamm, & Galindo-Gonzalez, 2012; Meeder & Suddreth, 2012; Shinn et al., 2003; Stripling & Roberts, 2012). Agricultural education programs have been shown to integrate mathematics in a contextualized fashion (Stubbs & Myers, 2015). The integration of real-world problems and engagement in meaningful learning has been demonstrated to impact students' math achievement without decreasing agricultural content knowledge (Bozick & Dalton, 2013; Shinn et al., 2003; Stubbs & Myers, 2015). Nolin and Parr (2013) found the number of agricultural courses taken had a significant positive relationship in predicting the passage of the mathematical portion of a state graduation exam. However, other researchers have found that math-enhanced agricultural curriculum did not significantly increase mathematic achievement, yet still did not decrease agricultural knowledge (Bunch, Robinson, Edwards, Antonenko, 2014; Parr, Edwards, Leising, 2006; Parr, Edwards, Leising, 2008; Parr, Edwards, Leising, 2009).

Status attainment theory claims variables including socioeconomic status, inborn ability, and mediating factors, such as ambitions, determine an individual's location in educational hierarchies (Wilson & Portes, 1975). Socioeconomic status, race, ethnicity and other background variables have been shown to strongly impact educational achievement in more than forty years of research (Darling-Hammond, 2000; Haller & Porter, 1973; Israel et al., 2012; Portes & MacLeod, 1996; Wilson & Portes, 1975). Israel et al. (2012) used higher linear modeling to demonstrate the significance of student-level variables to achievement. Although agricultural education has the ability to increase student achievement through contextualized learning of mathematical principles, the role of student-level variables cannot be ignored.

Several variables were found to be significant predictors of the math, reading, and math/reading composite scores for 8th grade students (Israel & Beaulieu, 2004). Being classified as gifted, higher average grade composite, completed Algebra 1, student engagement in class, and hours doing homework had a positive relationship on scores. Conversely, Black and Hispanic ethnic groups, being female, being a disruptive student, and students with attendance issues had a negative relationship on scores. The researchers also identified family, school, and community resources, structure and social capital predictors. "The contextual aspects of school and community structure mediated the influence of family social capital, student ability, and background on student achievement" (Israel & Beaulieu, 2004, p.283).

Although Israel and Beaulieu (2004) have investigated factors impacting student achievement on 8th grade standardized tests and several researchers have examined the impact of agricultural enrollment on student achievement at the high school level (Bunch et al., 2014; Chiasson & Burnett, 2001; Conroy, Trumbull, & Johnson, 1999; Israel, et al., 2012; Nolin & Parr, 2013; Parr et al, 2006; Parr et al, 2007; Parr et al, 2009; Shinn et al., 2003; Stripling & Roberts, 2012), research investigating the impact of agricultural coursework on student achievement at the middle school level has not been found.

Purpose of the Study

The purpose of this study was to determine if 8th grade students enrolled in Agriscience Foundations as a science credit were associated with increased mathematic FCAT scores. The following objectives guided the study:

1. Describe the characteristics of the populations of Agriscience Foundations students, Basic Physical Science Students, and Advanced Physical Science students.

2. Determine if students enrolled in the Agriscience Foundations course as a science credit score higher on FCAT mathematics tests than those students enrolled in basic science and advanced science courses.
3. Ascertain what factors impacted students' achievement on FCAT mathematics tests.
4. Analyze how the course taken for science credit impacted FCAT mathematics achievement scores.

Methodology

A quantitative, descriptive logistical regression research design was used for this study. The categorical data provided by the data set to predict categorical outcomes required logistical regression (Agresti & Finlay, 1997; Field, 2013). Florida 8th grade students were the population of interest. A north-central, county-based district in the state of Florida was used as a convenience sample for this populations because it was the only county school system offering 8th graders the chance to earn science credit to for the Agriscience Foundations course. This convenience sample compromised randomization and provided an undercoverage of the population restricting the generalizability of the results beyond students in the study (Agresti & Finlay, 1997).

The data set included 2013-2014 FCAT data for 1129 8th grade students enrolled in one of the four county middle schools offering Agricultural Foundations for science credit. Middle schools in the county not offering agricultural programs were excluded from the data set. The data set included FCAT achievement levels for previous and most recent FCAT and FCAT2 tests in reading, math, science, and writing; course enrolled for as science credit; science course teacher; reading, writing, math, and science proficiency scores; attendance data; and semester and final grades for the course. Demographic variables included gender, age, ethnicity, and status of free and reduced lunch, homelessness, migrant, exceptionalities, 504 Section, ESE testing accommodations, and student first language other than English.

The dependent variables were FCAT and FCAT2 mathematics achievement. Validity of these tests was provided by rigorous alignment of test items to content standards (Israel et al., 2012). An instructional validity study was performed by the FDOE to show that "any student who is seeking a regular high school diploma has been given the opportunity to learn the content measured by each required assessment" (FDOE, 2011, p. 2). The researcher coded FCAT and FCAT 2 scores into pass/fail categories to be able to perform binary logistical regression. Since a score of 3 or higher was required to be on grade level and pass the exam (FDOE, 2015d), students scoring at level 1 or 2 were put in the fail category and students scoring a 3-5 were assigned to the pass category.

Course taken for science credit during the 8th grade year was the independent variable. Students were enroll by the scool into Agriscience Foundations, a 9th grade level introductory agricultural course; M/J Physical Science, the basic science course; or M/J Physical Science Advanced, a more advanced science course. "Laboratory investigations that include scientific inquiry, research, measurement, problem solving, emerging technologies, tools and equipment, as well as, experimental quality, and safety procedures" were integrated in all three courses (FDOE, 2015c, p. 1; Florida State University [FSU], 2015a, p. 1; FSU 2015b, p. 1). While the content of the basic and advanced levels were the same, the advanced course utilized higher level objectives requiring higher order thinking (P. Nobels, personal communication, April 15, 2016). Studetns explored mathematical applications through the context of agriculture through their requirements to collect, interpret, analyze, and present data, understand measurement error, analyze economic importance of agricultural products, and maintain proper Supervised Agricultural Experience records in the Agriscience Foundations. Competencies in agricultural history and the global impact of agriculture, career opportunities, agriscience safety, principles of leadership, agribusiness, employability, and human relations skills were also developed (FDOE, 2015c). The course integrated Florida Standards for grades 09-10 in reading, writing, and mathematical practices for technical content in addition to the CTE benchmarks.

A set of control variables were established from the data set and literature including: gender, race-ethnicity, total days absent, free and reduced lunch status, student grade, and school (Israel & Beaulieu, 2004; Israel et al., 2012). Course level labels of advanced and basic were given to reflect the varying levels of content and to make a better comparison to the 9th grade level Agriscience Foundations course. Student performance was denoted by final grade in science credit course. Ethnicity and Race were condensed. Asians reflected a small portion of the sample and were condensed with Whites because literature noted these races tend to perform higher on standardized tests than other races. Black and Hispanics accounted for a large percentage of the sample ane were individual categories. Small percentages of Multi-racial and American Indian/Alaskan Native were merged into one category. Socioeconomic status was analyzed by free and reduced lunch status. Student attendance was signified by total days absent. Disruptive behavior was measured by total days out of school suspension and total days in school suspension. Student age was an indicator of students who had been held pack or promoted a grade. Dummy coding was used to analyze the categorical independent variables. The following reference categories were chosen to reflect the largest population of the sample: basic science, final letter grade B, White/Asians, males, and not eligible for free and reduced lunch.

Objectives one and two were examined with descriptive statistics. Missing FCAT score levels were imputed using multiple imputation as recommended by Shafer and Graham (2002) to handle data that is missing at random. Frequencies described the characteristics of the samples of Agriscience Foundations students, Basic Physical Science Students, and Advanced Physical Science students to address objective one. For objective two frequencies were analyzed to determine the distribution of FCAT scores for agriscience, basic science, and advanced science students. Additionally, crosstabs for the control variables of school, race/ethnicity, and course taken for science credit were analyzed.

Objectives three and four were addressed with binary logistical regression to allow the use of continuous and categorical data to predict a categorical dependent variable (Agresti & Finlay, 1997; Field, 2013), in this case, membership in the pass or fail groups of the FCAT and FCAT2 exams. All assumptions were checked and determined to be met (Lomax & Hahs-Vaughn, 2015). To construct models with appropriate goodness of fit scores as determined by the Hosmer and Lemeshow Test, researchers used the hierarchical method of creating models by entering known predictors which impact student achievement scores from the literature into block 1, variables of interest (i.e. course taken for science credit and final grade in science credit course) in block two, and additional student control variables in additional blocks (Field, 2013). The models were adjusted by removing insignificant predicting factors until a model with the best goodness of fit and predictability statistics was reached. Once appropriate models were formed, they were verified with the forced entry.

Since the Cox Snell R^2 never reaches its theoretical maximum of 1, the Nagelkerke R^2 statistic was chosen to represent the amount of variance explained by the model as recommended by Field (2013). Suppressor variables were checked with correlations. Odds ratios were reported instead of the Beta coefficient for easier interpretation (Agresti & Finlay, 1997; Field, 2013). Since the American Psychological Association (2010) recommended the use of standardized reports of effect size , standardized Beta scores were calculated using an Excel® Spreadsheet following the procedure outlined by King (2007) in Appendix A. "Variables having larger standardized beta weights (in absolute value) are considered to be stronger predictors in the equation" (King, 2007, p. 3).

Results

Objective one aimed to describe the characteristics of the populations of Agriscience Foundations, Basic Physical Science, and Advanced Physical Science students. Table 1 shows the distribution of course selection and student attributes. The Basic Physical Science population had the highest percentage of students qualified for free lunch (68.4%). The Advanced Physical Science course was not offered in schools A and B. The Agriscience Foundations population had a larger percentage of females (56.9%), White, Non-Hispanic students (70.2%), and a lower percentage of Black, Non-Hispanic students (8%).

Table 1. Distribution of course selection and student attributes.

Variable	Agriscience Foundations (*n* = 1128)	Basic Physical Sci. (*n* = 5112)	Advanced Physical Sci. (*n* = 528)
Male (%)	43.1	54.8	58.0
Age (%)			
13	13.3	14.3	23.9
14	78.2	61.7	67.0
15	8.0	21.6	9.1
16	0.5	2.3	0.0
Race-ethnicity (%)			
White, Non-Hispanic	70.2	49.9	48.9
Black, Non-Hispanic	8.0	20.7	18.2
Hispanic	17.6	20.5	23.9
Asian, Pacific Islander	1.1	2.2	0.0
Multiracial, Non-Hispanic	2.7	6.3	8.0
American Indian/ Alaskan Native	0.5	0.4	1.1
Receives Testing Accommodations (%)	10.1	17.6	12.5
Total Days Absent μ (sd)	9.1(10.6)	12.4(11.2)	8.3(7.2)
Free and Reduced Lunch Status (%)			
Free Lunch	53.2	68.4	59.1
Reduced Lunch	13.3	8.8	14.8
Not Eligible	33.5	22.8	26.1
School (%)			
School A	37.2	17.0	0.0
School B	11.7	17.7	35.2
School C	22.9	31.0	0.0
School D	28.8	34.3	64.8

Objective 2 intended to determine if students enrolled in Agriscience Foundations scored higher on FCAT mathematics tests than those students enrolled in a basic or advanced science course. Table 2 shows the frequency distributions of FCAT Math score levels for 8th grade students in agriscience, basic science, and advanced science courses. There was a statistically significant association between the Math FCAT score level and course taken for science credit (X^2 = 1131.36, *df* = 8, *p* = <0.01). On the FCAT Math test, students enrolled in the basic science course had between 11.7% - 26.2% percent more students score in the 1and 2 score levels compared to Agriscience Foundations and advanced science classes. There were 7.7% less Agriscience Foundations students scoring at level 4 and 3.8% less students scoring at level 5 compared to advanced science.

There was also a statistically significant association between the Math FCAT2 score level and the course taken for science credit (X^2 = 1591.45, *df* = 8, *p* = <0.01). On the FCAT2 Math test, 27.8% more basic science students scored at level one than in Agriscience Foundations and Advanced Science. There was a larger percentage of basic level students at the level 2. There was an 11.7% difference between students in basic science and agriscience and a 6.9% difference between the students in agriscience and advanced science. Twenty-one percent of advanced science students and 17.2% of agriscience students achieved level 5.

Table 2. Distribution of FCAT Math Scores for 8th Grade Agriscience, Basic Science, and Advanced Science Students.

FCAT Test	Score Level	Agriscience	Basic Science	Advanced Science
FCAT Math A	1	2.6%	28.1%	1.5%
	2	14.0%	25.7%	7.1%
	3	31.8%	27.9%	28.3%
	4	34.3%	13.1%	42.0%
	5	17.2%	5.3%	21.0%
	Total	100.0% (1119)	100.0% (4971)	100.0% (519)
FCAT2 Math B	1	1.1%	28.9%	1.1%
	2	20.7%	31.1%	6.8%
	3	36.7%	30.4%	37.5%
	4	25.0%	7.8%	29.5%
	5	16.5%	1.9%	25.0%
	Total	100.0% (1128)	100.0% (5094)	100.0% (528)

Note. (*n*)
A X^2 = 1131.36, *df* = 8, *p* = <0.01 *N* = 6609
B X^2 = 1591.45, *df* = 8, *p* = <0.01 *N* = 6750

A higher percentage of students enrolled in Agriscience Foundations earned a passing score than those who enrolled in the physical science courses. The Pearson Chi-Square tests indicated a significant associations between the course taken and FCAT score levels. Crosstabs were run to identify significant associations between courses taken, FCAT scores, and the control variables of school and ethnicity. Agriscience students consistently performed better than basic science students across all schools and race/ethnicity groups. Significant associations were found between school and FCAT score level and FCAT2 score level for agriscience, basic science, and advanced science students based on school and ethnicity.

Objective 3 proposed to ascertain factors impacting students' achievement on FCAT mathematics tests. Objective 4 targeted to analyze how the level of the course taken impacted FCAT mathematics achievement scores. The binary logistic regression models for each of the five FCAT tests were analyzed to address these objectives.

The model created to predict student odds of passing or failing the Math FCAT was statistically significant as denoted by the omnibus test (X^2 = 1089.97, *df* = 7, *p* = <0.01). This model was determined to be a good fit by the Hosmer Lemeshow Test (X^2 = 7.58, *df* = 7, *p* = 0.37). The Nagelkerke R square (0.20) implied the logistic combination of all the independent variables in the final model predicted 20% of the variance in the Math FCAT passage rate. The model predicted 64.5% correctly, an 8.5% increase over the intercept only model.

Table 3 displays the results of the model. The model included the three variables: course taken for science credit, ethnicity, and free and reduced lunch status. The odds ratios reported represent the probability of success over the probability of failure on the Math FCAT test when all other factors in the model are controlled. Course taken for science credit played a statistically significant role in determining the odds for membership in the passing group. Students enrolled in the agriscience course had an odds ratio of 5.06 compared to students enrolled in basic science, signifying they were more likely to be members of the passing group, while students enrolled in the advanced science course had an odds ratio of 12.71 compared to students enrolled in basic science representing they were more likely to be members of the passing group.

Table 3. Predictive Ability of the Variables in the Math FCAT Model

Variable in the Model	*B*	*Standardized B*	*Wald*	*df*	*p*	*Odds Ratio*
Course taken for Science Credit$_A$						
Agiscience Foundations	1.62	0.15	353.07	1	<0.01	5.06
Advanced Science Course	2.54	0.06	251.69	1	<0.01	12.71
Race/Ethnicity$_B$						
Black	-0.84	-0.08	129.92	1	<0.01	0.43
Hispanic	-0.17	-0.02	5.83	1	0.02	0.85
Other	-0.32	-0.02	8.451	1	<0.01	0.72
Free and Reduced Lunch Status$_C$						
Reduced	-0.10	-0.01	0.92	1	0.34	0.91
Free	-0.41	-0.05	39.42	1	<0.01	0.66
Constant	1.981		446.96	1	<0.01	7.25

$_A$ Reference category is Basic Science
$_B$ Reference category is White/Asian
$_C$ Reference category is Not Eligible

Race characteristics also played a statistically significant role in determining the members of the Math FCAT passing group. When compared to White/Asian students, student who were Black had a 2.31 odds ratio failing, student who were Hispanic had a 1.1.8 odds ratio of failing and, and student who were in the Other race category had a 1.39 odds ratio of failing. Student who were enrolled in the reduced lunch program did not have statistically significant difference in the odds of passing the test; however, students in the free lunch program had statistically significantly higher odds of being in the failing group by a factor of 1.52. Correlations were checked to identify the possibility of suppressor variables; while there were significant correlations, all coefficients were below *r* = .51 and did not indicate a strong effect size (Ferguson, 2009). The agriscience course had the largest standardized Beta value.

The model created to forecast student odds for the passing the Math FCAT2 had a statistically significant omnibus test (X^2 = 1752.66, *df* = 13, *p* = <0.01). The model was determined to be a good fit by the Hosmer Lemeshow Test (X^2 = 13.57, *df* = 8, *p* = 0.94). The Nagelkerke R square of 0.31 indicating the logistic combination of all the independent variables in the final model predicted 31% of the variance in the Math FCAT2 passage rate. The model predicted 69.3% correctly an 18.8% increase over the intercept only model. Table 4 displays the results of the Math FCAT2 model. The model included the following variables: course taken for science credit, ethnicity, sex, free and reduced lunch status, total days absent, total days out of school suspension, total days in school suspension, student age, and testing accommodations. The odds ratios reported represent the probability of success over the probability of failure on the Math FCAT2 test when all other factors in the model are controlled.

Table 4. Predictive Ability of the Variables in the Math FCAT2 Model.

Variable in the Model	*B*	*Standardized B*	*Wald*	*df*	*p*	*Odds Ratio*
Course taken for Science Credit$_A$						
Agriscience Foundations	1.33	0.12	271.89	1	<0.01	3.80
Advanced Science	2.62	0.09	246.74	1	<0.01	13.70
Race/Ethnicity$_B$						
Black	-0.78	-0.08	94.90	1	<0.01	0.46
Hispanic	-0.15	-0.02	4.14	1	0.04	0.86
Other	-0.15	-0.01	1.57	1	0.21	0.86
Sex$_C$						
Female	0.06	0.01	1.12	1	0.29	1.06
Free and Reduced Lunch Status$_D$						
Reduced	0.02	0.00	0.03	1	0.86	1.02
Free	-0.27	-0.03	15.85	1	<0.01	0.77
Total Days Absent	-0.04	-0.11	147.83	1	<0.01	0.96
Total Days Out of School Suspension	-0.01	-0.01	0.33	1	0.57	0.99
Total Days In School Suspension	-0.27	-0.09	71.43	1	<0.01	0.76
Accommodations	-0.52	-0.05	42.63	1	<0.01	0.60
Student Age	-0.41	-0.06	78.36	1	<0.01	0.66
Constant	7.774		138.94	1	<0.01	2378.60

$_A$ Reference category is Basic Science
$_B$ Reference category is White/Asian
$_C$ Reference category is Male
$_D$ Reference category is Not Eligible

Which course students took for science credit played a statistically significant role in determining the odds of passing the Math FCAT2 test. Students who took the agriscience course had higher odds of passing the test than students enrolled in basic science by a factor of 3.80 Students who took the advanced science course had higher odds of passing the test than students enrolled in basic science by a factor of 13.70. Black and Hispanic students had statistically significant higher odds of failing the test than White/Asian students by a factor of 2.17 and 1.16, respectively. The difference in odds for students in the Other race category was not statistically significant when compared to White/Asian students. Female students did not have a statistically significant difference in odds of passing the test when compared to males.

The odds ratio of passing the test for students who were enrolled in the reduced lunch program was not statistically significant when compared to those students not enrolled in the free and reduced lunch program; however, students in the free lunch program had a statistically significantly higher odds of being in the failing group by a factor of 1.30. For each additional day of school missed, students had a predicted statistically significant increase in odds of failing the test. An increase in total days of out of school suspension did not have a statistically significant association with the odds of membership in the pass group. On the other hand, for each additional day of in school suspension, the predicted odds of failing the Math FCAT2 increased by a factor of 1.32. Students receiving testing accommodations had a statistically significant higher odds of failing by a factor of 1.67. Finally, as student age increased by a year, their predicted odds of failing the test increased by a factor of 1.52. Correlations were checked to identify possible suppressor variables; while there were significant correlations, all coefficients were below $r = 0.51$ and did not indicate a strong effect size (Ferguson, 2009). Being enrolled in Agriscience Foundations had the largest standardized Beta score.

Discussion, Conclusions, and Recommendations

Objective one aimed to describe the characteristics of the of Agriscience Foundations, Basic Physical Science, and Advanced Physical Science students. The group characteristics of the three courses taken for science credit differed based upon demographic and independent variables. Notable differences in the characteristics of the groups include age, race, total days absent, free and reduced lunch, and schools. The basic science course included many more students who were 15-16 years old. Since most students are 14 years old when they enter high school, this may suggest that more students who were retained a grade were in the basic science course. The Agriscience Foundations course had majority of White/Asian students, which was notably higher than basic and advanced science basic. This finding supports research on the diversity of the agriscience classroom and reinforces the need for agriscience programs to serve more diverse students so the population characteristics of the school are mimicked in the agriscience classrooms as recommended by Torres, Kitchel, & Ball (2010). The basic science course had the highest mean score of total days absent. The increase in absences could contribute to the lower achievement scores in this category as suggested by Lamdin (1996). Additionally, the students in the basic science course had the most students qualifying for free lunches indicating this population is from a lower social economic status. These findings support the status attainment theory by illustrating how demographic variables may determine hierarchy in course enrollment (Duncan et al., 1972). Neither School A or C offered an advanced science course. Since students enrolled in Agriscience Foundations courses had better odds of passing the math FCAT tests than students in basic science classes, more students should be enrolled in Agriscience Foundations when advanced science courses are not offered in the school.

Objective two aimed to determine if students enrolled in Agriscience Foundations for science credit score higher on FCAT mathematics tests than those students enrolled in a science course. All of the crosstabs had significant chi-squared statistics indicating a statistically significant association between the FCAT score level and course taken for science credit. A common pattern emerged; a higher distribution of students in basic science scored lower on the FCAT scores and a small distribution of them scored higher levels of FCAT scores. Conversely, students in the agriscience and advanced science courses had a lower distribution of students scoring in the lower levels and a higher distribution of students scoring in the higher levels with the advanced science course having slightly higher performance than the agriscience students. The majority of students were enrolled in basic science; however, both agriscience and advanced science students performed higher on the mathematics tests. School systems should enroll more students in the agriscience and advanced science courses.

Objective three was designed to ascertain what factors impacted students' achievement on FCAT mathematics tests. The Math FCAT model had six statistically significant predictor variables; however, taking agriscience or advanced science were the only practically significant odds ratio according to Ferguson (2009). Further investigation is needed to determine why these two courses werethe most practically significant predictors. Analysis of examples and experiences provided for learners in the different courses should be pursued to determine if contextualized learning contributed to success in these courses as suggested by other researchers (Dworkin, 1959; Fosnot, 1996; Haury & Rillero, 1994). This model to showed statistically significant decreases in the odds of passing the test for each race/ethnicity category compared to White/Asian as well as all students from a lower socioeconomic class as designated by their enrollment in the free and reduced lunch program. These findings support the findings of Israel and Beaulieu (2004); Black and Hispanic students perform lower on student achievement tests in reading and math. This test should be evaluated for racial and ethnic biases. Additionally, teachers and school systems should ensure that teachers are able to effectively deliver math content to a range of diverse learners in their classrooms.

The Math FCAT2 model had nine statistically significant predictors; however, only two factor met the minimal requirements for practical significance (Ferguson, 2009). Student enrollment in agriscience had a moderate to strong effect size on odds of passing the test and students in adevanced science had a strong effect size on the odds according to Ferguson. Both Black and Hispanic students experienced decreased odds of passing the Math FCAT2. These findings support the findings of Israel and Beaulieu (2004) in that Black and Hispanic students perform lower on student achievement tests in reading and math. Based on this finding, efforts should be made to ensure the test does not have any racial or ethnic biases. Additionally, schools and teachers need to focus on overcoming racial and ethnic achievement gaps through effective school structure, culture, and teaching methods. Authentic examples from different ethnic backgrounds should be used in these classes to provide contextualization to all students (Dworkin, 1959; Fosnot, 1996; Haury & Rillero, 1994). Schools, teachers, and test creators need to address gaps based on socioeconomic status as students in the free lunch program also experienced statistically significant lower odds of passing the Math FCAT2 test.

Although there was a statistically significant decrease in the odds of passing for each additional day absent, the effect size of this decrease is minimal. This is not to say that efforts to increasing school attendance would not be beneficial to students and their achievement scores. The total days of in school suspension was utilized as a measure of disruptive behavior. In this model, each additional day of in-school suspension decreased the predicted odds of passing the test. While interpretation of this needs to be taken cautiously because of the different approaches schools take to handling discipline issues, it is safe to say that developing a school culture that expects appropriate behaviors and encourages students to act appropriately would have a positive relationship with student achievement scores. Students in populations which struggle in school were at decreased odds of passing the Math FCAT2. Both students with testing accommodations and students who were older and may have been held back in school had a practical and statistically significant decrease in odds of passing the test. Current testing accommodations should be evaluated to ensure they are sufficiently meeting the needs of these students. Teachers and school should work to address these special populations.

Objective four proposed to analyze how the level of course taken impacted FCAT achievement scores. All of the models indicated students enrolled in Agriscience Foundations had higher predicted odds of passing the FCAT tests compared to students who enrolled in the basic science course when all other variables were controlled. Additionally, when the crosstabs were analyzed, it was evident that agriscience students scored at a higher level across all score levels than the basic science students. This finding supports the findings of Chiasson and Burnett (2001), Conroy, Trumbull, and Johnson (1999), Israel, et al. (2012), Nolin and Parr (2013), Shinn et al. (2003), and Stripling and Roberts (2012), that students in CTE, specifically agricultural education programs, have higher achievement scores in mathematics. The findings suggest Agriscience Foundations does contribute to teaching students the math skills needed to be successful in 8th grade. Schools should consider the impacts of enrollment in Agriscience on student achievement, and offer more middle school students the opportunity to take Agriscience Foundations as an alternative to basic science in 8th grade. These findings can also provide justification for CTE administration to establish middle school agriscience programs. Additional research is needed to determine why students in these courses are better prepared. Is it because of learning the content in the context of agriculture (Dworkin, 1959; Fosnot, 1996; FDOE, 2015c; Haury & Rillero, 1994), the use of different teaching methods, the students' motivation and engagement level (Young, 2013), a hands-on approach to teaching, or some other factors?

Students in the advanced science course had the highest odds of passing all of the FCAT tests in each subject as indicated by the regression models. More opportunities should be provided for students to take advanced science. Agriscience teachers should collaborate with advanced science teachers to determine strategies used in advanced science which could be integrated in agriscience to further increase the success of students. As Patricia Nobles (personal communication, April 15, 2016) indicated, the major difference between basic and advanced level science courses was higher order learning objectives utilized. Researchers should analyze learning objectives in advanced science and agriscience to determine if differences exist within the level of thinking required by the objectives used in each course.

Continued research in this area is recommended. Including additional predictor variables outlined by Israel and Beaulieu (2004) could provide further insight on the objectives of this study. Better measures of student engagement and disruptive behaviors should be developed to include in the models. Additionally, a Hierarchical Linear Model would allow analysis of nested data such as school and teacher variables without violating the assumptions of independence (Field, 2013) and would provide a more thourough explanation of factors affecting achievement. Random sampling of middle schools throughout Florida would be required draw generalizations. The new Florida Assessments Standard tests should be replicated in a similar fashion. Other states should replicate to see if results are similar with their state tests. Since the agriscience course is associated with higher scores and increased odds of passing middle school achievement tests, studies like this study and Nolin and Parr (2013) should be conducted to analyze the relationships of agricultural curricula and achievement scores at the high school level.

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Cooperative Learning Groups Improving Science Integration

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Abstract

The purpose of this case study was to create information about the employment of Cooperative Learning Groups (CLG) intended to improve the science integrating instruction of secondary agricultural educators. The objectives of the study were to determine if CLGs were an effective means for increasing: a) the use of science integrating learning questions and problem statements which require higher levels of cognitive processing in agricultural courses of study; and b) the teaching observation scores of secondary agricultural educators integrating science into a course of study. Overall, the findings revealed that the CLG process lead to an observed increase in the total number of higher order science integrating learning questions and problem statements utilized by the agriculture teachers within the instruction of their respective course of study. An effect size estimate revealed that the increase in the number of science integrating learning questions and problem statements that required higher levels of cognition had a large practical significance. It is recommended that researchers and practitioners consider creating more information about cooperative efforts between agriculture teachers and science teachers as a basis for exploring effective means of integrating science within agricultural courses of study.

Introduction

Historically, secondary agricultural programs of study have been considered to be separate from the academic subjects that tend to be recognized as the core of the U.S. educational system (Gordon, 2008; Thompson, 1996). From a conceptual perspective, secondary agricultural programs of study have traditionally focused on curriculum and instructional practices which were based on the industry specific skills and technologies that would assist students in transitioning into skilled wage employment or entrepreneurship (Gordon, 2008; Stewart, Moore, & Flowers, 2004). However, as the educational reform movement has moved forward and broadened its agenda, its tendrils have extended deeply into the realm of agriculture education (Stearn & Stearns, 2006). One of the main outcomes of that reach has been to provide an impetus for reimaging what secondary agricultural education is and what it might become for future populations of students (DeLuca, Plank, & Estacion, 2006; Warnick & Thompson, 2007).

One of the central themes embedded within the movement to adapt secondary agricultural education to the future needs of students is to utilize agriculture as a context for a broader set of student outcomes (Stearn & Stearns, 2006; Stewart, Moore, & Flowers, 2004). One facet within that broader set of student outcomes is to utilize secondary agricultural programs of study as a space in which science content can be contextualized. This strategy has been explicitly encouraged since the enactment of the 1990 amendments to the Carl Perkins Act which stated that the basic federal grant to individual states for vocational education be spent on programs that "integrate academic and vocational education" (Carl D. Perkins Vocational and Applied Technology Education Act Amendments, 1990, p. 6). The explicit inclusion of science content experiences as an essential component of agricultural programs of study represents an important change in how secondary agricultural education is popularly conceptualized (Gordon, 2008;

Stearn and Stearns, 2006). The legislative outcomes also serve as evidence that the inclusion of science content in secondary agricultural programs of study has gained credibility and prominence (Brister & Swortzel, 2007; Castellano, Stringfield, & Stone, 2003; Rojewski, 2002).

Today, individual secondary agriculture programs may focus on a diverse array of subject areas such as electrical systems, GIS technology, horticulture, and green construction. The variety of possible subject areas within secondary agriculture programs creates a context in which there exists a multitude of opportunities for the integration of agricultural and science content (Balschweid & Thompson, 2002; Hillison, 1996). Research findings indicate that the most effective agricultural and science content integration emerges as an outcome of classroom and laboratory experiences that foster contextualized learning environments (Ricketts, Duncan, & Peake, 2006; Stone, Alfeld, Pearson, Lewis, & Jensen, 2005). Research findings also indicate that the central strength of agricultural and science content integration is grounded in the fact that, by definition, agricultural programs and courses of study offer opportunities to link learned knowledge and skills directly with authentic applications (Castellano, Stringfield, Stone, 2003).

As Myers and Washburn (2008) note, a number of prominent researchers (Balschweid & Thompson, 2002; Balschweid, Thompson, & Cole, 2000; Conroy & Walker, 2000; Enderlin & Osborne, 1992; Mabie & Baker, 1996; Parr, Edwards, & Leising, 2006; Persinger & Gliem, 1987; Roegge & Russell, 1990; Stone, Alfeld, Pearson, Lewis, & Jensen, 2005; Young, Edwards, & Leising, 2009) have begun to establish a solid knowledgebase within the area of agricultural and science content integration. However, Myers and Washburn (2008) also point out that much more research needs to be enacted to form a more comprehensive understanding of agriculture and science content integration. In particular, more research needs to be conducted that assists in defining the following two concepts: 1) how is agricultural and science content integration being operationalized within secondary agricultural programs of study; and 2) how do integrated agricultural and science content learning experiences affect overall student achievement (Edwards, 2004; Myers & Washburn, 2008). The current study will focus on addressing the concept of how agricultural and science content is being integrated and more specifically it will focus on the process integration.

Heretofore, there has been little research completed that addresses agricultural and science content integration as a process (Edwards, 2004; Myers & Washburn, 2008; Spindler, 2013). As Edwards (2004) noted, the research base regarding how teachers think about and conduct curriculum integration in secondary schools is, for the most part, undeveloped. More specifically, very little information exists in the literature regarding how secondary agriculture teachers make sense of agricultural and science content integration, particularly with respect to the creation of learning objectives that will guide the instructional activities utilized to engage students (Scott & Sarkees-Wircenski, 2008; Warnick & Thompson, 2007).

It is clear that the existing research literature does little to assist in understanding the process of agricultural and science content integration based upon the experiences and perspectives of secondary agriculture teachers (Fetcher & Zirkle, 2009). In fact, only one recent study frames agricultural and science content integration as process which may be experienced by agriculture teachers. Further, there is a dearth of research findings that illustrate specific methods, actions,

supports, and resources which facilitate the process of agricultural and science content integration (Edwards, 2004; Stearn & Stearns, 2006; Washburn & Myers; 2010).
Much of the research regarding agricultural and science content integration has focused on perceptions of its merit and worth rather than on questions of how the process is or might be carried out (Ricketts, Duncan, & Peake, 2006; Spindler, 2013; Warnick & Thompson, 2007). Research needs to be enacted that will assist in identifying, developing, and connecting the phenomena that are the building blocks of the mechanism that initiates, drives, and sustains the agricultural and science content integration process (Washburn & Myers, 2010).

Theoretical Framework

Social interdependence arises when individuals share common goals and the outcomes each individual experiences are dependent on the actions of others to which they are connected (Deutsch, 1962; D.W. Johnson & Johnson, 1989). As defined by Deutsch (1962) there are two types of social interdependence: 1) positive social interdependence, exists when there is a positive correlation among individuals' goal attainments and individuals perceive that they can only attain their goals if the other individuals with whom they are cooperatively linked attain their goals; and 2) negative social interdependence, exists when there is a negative correlation among individuals' goal attainments and individuals perceive that they can only attain their goals if the other individuals with whom they are competitively linked fail to attain their goals. A condition of no interdependence exists when there is no correlation among the goal attainments of individuals and individuals perceive that their goal attainment is independent from the actions of other (Deutsch 1949a).

Deutsch constructed social interdependence theory based on two central concepts, the first concept was related to the type of interdependence between people in a specified context and the second concept was related to the type of actions enacted by the people involved (Johnson & Johnson, 2005). Social interdependence theory then is based on the conception that how participants' goals are structured determines the ways they interact and the resulting interaction pattern determines the outcomes of the situation (Deutsch 1949; Johnson & Johnson, 2009). Another outcome of Duetsch's work was the conception of three psychological processes that emerge from interdependence: 1) substitutability; 2) cathexis; and 3) inducibility (Deutsch, 1949). Substitutability is the degree to which the actions of one person substitute for the actions of another person. As a result of substitutability the effective actions of collaborators reduce the drive to complete a task. Cathexis is an investment of psychological energy in objects outside of oneself and it may have either positive or negative valences. Duetsch posited that in cooperative contexts, effective actions are cathected positively and bungling actions are cathected negatively. Inducibility is the openness to being influenced by and to influencing others. Positive interdependence tends to create greater openness to influence and negative interdependence tends to create resistance to influence.

Synthesizing the research surrounding social interdependence that took place over a thirty year period, Johnson & Johnson (2009), were able to modify and extend social interdependence theory in two distinct ways: 1) they were able to identify and validate variables that mediate the effectiveness of cooperation; and 2) by investigating numerous independent variables they were able to expand the scope of the theory. Based upon their research investigating the implementation of cooperation, Johnson and Johnson (2009) have posited that five variables mediate the effectiveness of cooperation: 1) positive interdependence; 2) individual accountability; 3) promotive interaction; 4) appropriate use of interpersonal social skills; and 5) group processing.

The five mediating variables that have been forwarded by Johnson and Johnson (2005, 2009) have been framed as the five essential tenets for cooperation. Cooperation consists of actions that support working or acting together for common purpose or benefit (Harris, 2010). Much of the research on Cooperation has been undertaken in educational and business settings where it has been utilized as an instructional and process facilitation strategy. It has been found that when collaborative processes employ structured cooperative group interactions the productivity of each individual is optimized (Mader & Smith, 2009). Further, research has demonstrated that collaborations that appropriately employ the five tenets of cooperation are more likely to attain preferred outcomes and outputs (Kunchenbrandt, Eyssel, & Seidel, 2013).

Given the robust nature of the evidence supporting cooperation as a as a form of collaboration, it is likely that the five tenets of cooperation could be employed to improve the instructional practices and teaching of secondary agricultural educators. This study aligns with the key outcome of priority area 3 a sufficient scientific and professional workforce of the National Research agenda (Doerfert, 2011). The purpose of this case study was to create information about the employment of Cooperative Learning Groups (CLG) intended to improve the science integrating instruction of secondary agricultural educators. The objectives of the study were to determine if CLGs were an effective means for increasing: a) the use of science integrating learning questions and problem statements which require higher levels of cognitive processing in agricultural courses of study; and b) the teaching observation scores of secondary agricultural educators integrating science into a course of study. The following null hypotheses were used to guide the study:

> H_0: There will be no difference in the number of science integrating learning questions or problem statements which require higher levels of cognitive processing within the agriculture teachers' courses of study before and after the engagement of the cooperative learning group process (H_0number: μpre = μpost).
> H_0: There will be no difference in the teaching observation scores of the agriculture teachers integrating science into their courses of study before and after the engagement of the CLG process (H_0higher: μpre = μpost).

Methods

The twelve individuals that participated in the current case study were state certified agriculture teachers working in urban, suburban, and rural comprehensive schools and area career and technical centers. The criterion sample utilized for the current case study was selected from a sample of forty-two agriculture teachers that participated in a previous survey study regarding science integration within CTE programs. The potential participants for the current study were selected from those agriculture teachers that were found to be integrating science learning objectives, but not engaging with science teachers in their schools.

In order to recruit potential participants to the study, a cover letter describing the study and a link to an informational webpage where the agriculture teachers could indicate their willingness to participate was mailed and emailed to potential participants. The mail and email documents explained the purpose and importance of the study, the value of their participation, and the data collection methods. After receipt of the initial reply email or submission through the research study webpage, working dates and times with the agriculture teachers were arranged using email.

Once working date arrangements were made the researcher assisted each agriculture teacher to develop a Cooperative Learning Group (CLG) consisting of two to three additional individuals at their school to work on improving the integration of science within at least one agriculture course of study. In addition to the agriculture teacher, most of the CLG groups consisted of: a) an administrator that worked with curriculum, instructional improvement, or CTE programming; and 2) one or two science teachers that taught biology, chemistry, or physics. The study occurred over a 7 month period and the CLGs were free to work on the project at their convenience. In return for their cooperation the agriculture teachers and CLG group members each received a $50.00 prepaid VISA gift card. Funding to support the research project was provided through start up funds provided by the Department of Agriculture, Leadership, and Community Education.

The information collected for this study specifically focused on the science integrating learning questions and problem statements utilized by the agriculture teachers in a course of study. As part of the study the CLGs were asked to attempt to increase the relative number of science integrating learning questions and problem statements which require higher levels of cognitive processing within their instruction for at least one course of study. In other words they were asked to utilize questions designed to create more opportunities for students to engage in complex open ended science integrating learning experiences. The CLGs were also asked to focus on developing ideas and strategies for improving the overall quality of science integrating instruction within at least one agricultural course of study.

In order to assist the CLGs in making progress the researcher taught a two hour workshop through WebEx that introduced and demonstrated the use of Bloom’s revised taxonomy (Anderson, Krathwohl, Airasian, Cruiskshank, Mayer, Pintrich, Raths, & Wittrock, 2001) to the CLGs. Bloom’s revised taxonomy is an effective tool for writing, organizing, and analyzing learning objectives, learning questions, and problem statements (Blumberg, 2009). Bloom’s revised taxonomy (Anderson, Krathwohl, et al. 2001) allows researchers and educators to conceptually chunk large amounts of complex information in order to bring more precision to applied practice. One of the critical strengths of the revised taxonomy is that it can be employed as a syntactic logic tool at the macro level for curriculum planning and program assessment and at the micro level for lesson planning and student assessment (Cannon & Feinstein, 2005).

In the revised taxonomy, learning objectives can be described and represented using a two-dimensional taxonomic table (Anderson, Krathwohl, et al. 2001). Table 1 illustrates that the revised taxonomy consists of an intersection of four knowledge dimension categories and six cognitive process dimension categories. The twenty-four discrete cells created by the intersection of the knowledge and cognitive processing dimension categories afford educators the opportunity to more precisely classify learning objectives, learning questions, and problem statements based upon the specific facets of the intersecting dimensions. (Krathwohl, 2002).

Table 1 demonstrates that within Bloom's revised taxonomy (Anderson, Krathwohl, et al. 2001) the four types of knowledge are: a) factual; b) conceptual; c) procedural; and d) metacognitive. Factual knowledge is considered to be knowledge of terminology, facts, and basic elements of more complex knowledge, e.g., people, events, locations, or dates (Anderson, Krathwohl, et al. 2001). Conceptual knowledge reflects a deeper understanding of content and how it is connected to larger systematic perspectives (Blumberg, 2009). Procedural knowledge often involves processes or methods and the criteria utilized to make decisions regarding key steps and procedures (Anderson, Krathwohl, et al. 2001). Metacognitive knowledge involves being self-aware of personal cognitive strengths and challenges. Metacognitive knowledge is also related to

Table 1
A two-dimensional illustration of the relationship between the knowledge and cognitive processing dimensions of Bloom's revised taxonomy

	Cognitive Process Dimension					
Knowledge Dimension	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	A1	A2	A3	A4	A5	A6
Conceptual	B1	B2	B3	B4	B5	B6
Procedural	C1	C2	C3	C4	C5	C6
Metacognitive	D1	D2	D3	D4	D5	D6

Note. Adapted from Krathwohl, 2002. p. 216.

knowledge of general strategies for learning and knowledge about how, when, and why to employ particular learning strategies (Blumberg, 2009). Table 1 also illustrates that within Bloom's revised taxonomy (Anderson, Krathwohl, et al. 2001) the six levels of cognitive processing form a hierarchy based upon differences in complexity and range from least complex to most complex: 1) remember; 2) understand; 3) apply; 4) analyze; 5) evaluate; and 6) create (Anderson, Krathwohl, et al. 2001). For the purposes of this study science integrating learning questions and problem statements that were classified as being in the analyze, evaluate, and create categories of the taxonomic table were considered to require higher levels of cognitive processing.

Any individual science integrating learning question or problem statement will fall under one of the six discrete categories of cognitive processing and at the same time will also be linked to one of the four discrete categories of the knowledge dimension. The object in a learning question or problem statement is used to determine whether the learning objective is supporting factual, conceptual, procedural, or meta-cognitive knowledge acquisition and the verb in a question or problem statement is used to determine which cognitive process dimension is being applied in the learning process: remembering, understanding, applying, analyzing, evaluating, or creating.

As part of the research process the CLGs were asked to work cooperatively to complete goal oriented activities. Table 2 illustrates how the goal oriented activities the CLGs were asked to carryout align with the theoretical framework. The tasks included the CLG participants working together to create a shared understanding of the scope and sequence of at least one agricultural course of study and gauge the relative level of science integration within those same courses of study. The CLG tasks also involved employing Bloom's revised taxonomy to review and revise science integrating learning questions and problem statements utilized in the agricultural courses of study. The review and revision process took advantage of one of the central strengths of the taxonomic table in that it provides a framework for describing learning questions and problem statements by the type of knowledge to be gained and the cognitive process employed to facilitate the actual learning. Employing the taxonomic table as a classification tool provided a map that the CLGs could employ during subsequent tasks. The final layer of CLG tasks included: a) adapting and redesigning science integrating learning questions; and b) planning the implementation of engaging instructional strategies in the agricultural courses of study.

Table 2
Links between the theoretical framework work and CLG activities

Positive Outcome Interdependence	Creating or adapting science integrating learning questions and problem statements to improve alignment to state learning standards
	Increasing the level of cognitive processing elicited by the science integrating learning questions and problem statements
	Improving the alignment of science integrating learning questions and problem statements to instructional strategies
Individual Accountability	Reviewing and classifying science integrating learning questions and problem statements
	Generation and adaption of science integrating learning questions and problem statements
	Assess alignment of science integrating learning questions and problem statements and state standards
Promotive Interactions	Actively participate in group work sessions
	Explaining and elaborating science integrating learning questions and problem statements
	Relationship building through shared understandings and work
Interpersonal Skills	Listening for understanding
	Purposeful checks for understanding
	Asking questions
Group Processing	Work session reflections
	Describing what was helpful
	Making decisions about what actions should continue or change

Data for the study was collected using video recorded observations of the agriculture teachers. Each participant was observed four separate times via video recordings by the researcher. Each participant was observed two times before or very close to the beginning of their CLG process and two times following the completion of their CLG process. Collected data included observed frequency counts of the total number of science integrating learning questions and problem statements which required higher levels of cognition. Collected data also included scores from teaching observations completed by the researcher.

Data analysis included calculating difference scores that resulted from the change in the number of science integrating learning questions and problem statements which required higher levels of cognition before and after the CLG process. Data analysis also included a review of the teaching observation scores. In order to test the null hypotheses matched-sample t tests were utilized and an a priori level of significance of 0.05 was set as the standard for rejecting the null hypotheses (Howell, 2002). Effect size was estimated utilizing Cohen's d; calculation procedures for estimating effect size for matched-sample t tests were carried out according to Howell (2002).

Findings

The 12 agriculture teachers participating in the study taught an average of 146 (SD= 9.2) students per year and taught an average of 5.2 classes (SD=.54) a day. A minority of the teachers were female 5 (41%) and 11 (92%) of the instructors had completed an accredited teacher preparation program. The mean number of hours the CLGs worked on the overall process was 36.31 (SD = 8.16) hours. Table 3 illustrates that before beginning the CLG process the agriculture teachers were observed to have utilized a composite total of 64 science integrating learning questions and problem statements which required higher levels of cognition during their initial three observations. Following the CLG process the agriculture teachers were observed to have utilized a composite total of 180 science integrating learning questions and problem statements which required higher levels of cognition. Table 3 reveals that following the CLG process all of the agriculture teachers were observed to have utilized more higher level science integrating learning questions and problem statements than prior to the CLG process. Additionally, Table 3 illustrates that the observation scores for all but two of the agriculture teachers were higher following the CLG process.

Table 3
Number of course units, number of higher order science integrating questions, and mean teaching observation scores before and after the CLG process (n = 12)

		Pre			Post	
P[1]	# of Units[2]	# higher[3]	# Obs[4]	# of Units	# higher	# Obs
1	7	3	82	7	12	86
2	9	7	85	9	11	89
3	10	6	84	10	16	87
4	4	2	85	5	11	88
5	8	6	92	8	20	93
6	7	8	81	7	13	95
7	8	7	80	8	21	86
8	10	8	94	10	17	92
9	6	5	86	6	16	87
10	5	1	76	5	9	84
11	9	7	72	9	15	80
12	11	4	75	11	19	85

Note: [1]Participant number. [2]total number of units in course of study. [3]total number of science integrating questions and problem statements requiring higher levels of cognition. [4]Mean teaching observation scores.

Table 4 illustrates the results of the matched-sample *t* test which was utilized to test the first null hypothesis: H_0: There will be no difference in the number of science integrating learning questions or problem statements which require higher levels of cognitive processing within the agriculture teachers' courses of study before and after the engagement of the cooperative learning group process (H_0number: μpre = μpost). The results indicate that the number of science integrating learning questions and problem statements (M = 15.00, SD = 3.86) which required higher levels of cognition within the agriculture teachers' instruction following the CLG process was significantly greater (t = -9.79, p = .0001) than the number of science integrating questions and problem statements which required higher levels of cognitive processing (M = 5.33, SD = 2.34) in the agriculture teachers' instruction prior to the CLG process. The difference between the means represents a large practical effect (d = 3.03). In this case, the null hypothesis was rejected

Table 4
Comparison of number of science integrating learning questions and problem statements eliciting higher levels of cognition (n = 12)

Group	*M*	*SD*	*t*	*p*
Pre CLG Process	5.33	2.34	-9.79	.00001*
Post CLG Process	15.00	3.86		

Table 5 illustrates the results of the matched-sample *t* test which was utilized to test the second null hypothesis: H_0: There will be no difference in the teaching observation scores of the agriculture teachers integrating science into their courses of study before and after the engagement of the CLG process (H_0higher: μpre = μpost). The results indicate that the teaching observation scores (M = 87.67, SD = 4.14) recorded after the CLG process were significantly greater (t = 3.91, p = .0024) than the teaching observation scores (M = 82.67, SD = 6.51) recorded prior to the CLG process. The difference between the means represents a large practical effect (d = .92). In this case, the null hypothesis was rejected.

Table 5
Comparison of teaching evaluation scores (n = 12)

Group	*M*	*SD*	*t*	*p*
Pre CLG Process	82.67	6.51	3.91	.0024*
Post CLG Process	87.67	4.14		

Conclusions / Implications

It is clear that, agricultural education must be adapted to account for the sociological and technological advances which continually transform the nature of work and life (Weimer, 2003). As Flecther and Zirkle (2009) highlighted, the new modus operandi for agriculture teachers and other CTE teachers is to prepare students to be college and career ready. This new focus has created a need for agriculture programs to redesign the ways in which instruction is constructed and aligned. One of the most active discourses related to redesigning secondary agricultural education has encompassed the integration of science instructional content within agricultural courses of study (Balschweid & Thompson, 2002; Brister & Swortzel, 2007; Conroy & Walker, 2000; Ricketts, Duncan, & Peake, 2006; Spindler; 2013; Warnick & Thompson, 2007; Washburn &

Myers, 2008). The literature clearly expresses that it is important for agricultural education teachers and researchers to engage in creating instruction designed to assist students in constructing new understandings through the contextualization of science concepts. It is those contextualized understandings that epitomize the outcome potential that agricultural and science content integration may realize within secondary agricultural programs of study.

The purpose of this case study was to create information about the employment of Cooperative Learning Groups (CLG) intended to improve the science integrating instruction of secondary agricultural educators. The objectives of the study were to determine if CLGs were an effective means for increasing: a) the use of science integrating learning questions and problem statements which require higher levels of cognitive processing in agricultural courses of study; and b) the teaching observation scores of secondary agricultural educators integrating science into a course of study. A matched-sample *t* test revealed that the observed increase in the number of science integrating learning questions and problem statements which required higher levels of cognitive processing was statistically significant. In addition, the utilization of Cohen's *d* as a statistic for assessing the changes in the number of higher order science integrating learning questions and problem statements observed in the agricultural teacher's instruction demonstrated that the CLG process lead to a large practical effect. Therefore, it can be concluded that the CLGs were an effective means for increasing the number of science integrating learning questions and problem statements which require higher levels of cognitive processing in the agricultural courses of study. Further, based on the results of the second matched-sample *t* test and calculation of Cohen's *d* statistic it can be concluded that CLGs were able to provide a suitable way to improve the teaching observation scores of the agriculture teachers that were integrating science learning questions and problem statements into their courses of study. These conclusions match previous research that has demonstrated that properly organized and operationalized cooperative groups support higher levels of productivity and the enactment of more effective processes (Johnson & Johnson, 2009).

For the CLGs, utilizing the table specified in Bloom's revised taxonomy was an effective tool for assessing, analyzing, and adapting the science integrating learning questions and statements in the agriculture teachers' courses of study. While there was variation in the extent to which the CLGs changed the number of science integrating learning questions and problem statements, all of the CLGs were able to increase the number of higher order science integrating learning questions and problem statements the agriculture teachers' utilized within the instruction of their respective agricultural course of study.

The substantial change in the number of science integrating learning questions and problem statements requiring higher levels of cognitive processing across the participants is of practical significance. The findings illustrate that while science integration may be occurring in secondary agricultural programs, at this point in time the level of what is being taught as a consequence of that integration is still in question. The findings also indicate that it is likely that secondary agriculture teachers need substantial assistance in order to begin integrating science through open ended strategies. This finding is particularly relevant because what teachers do as instructors will be less important than what they ask their students to cognitively process and do before, during, and after instruction (Haskell, 2001; Mestre, 2005). Further, it is important to consider that by utilizing science integrating learning questions and problem statements in agricultural courses of study that require students to imagine, analyze, and create solutions to novel challenges, instructors can more effectively assist students to construct knowledge and practice skills that facilitate knowledge retention and transfer (Mestre, 2005).

Recommendations

Part of the need for this research is reflected within the increasing calls to more clearly define and assess the critical role agricultural education may have in contributing to the future academic achievement of students in the area of science. The need for this specific research arose in response to the call to more closely examine how agricultural and science content integration was being operationalized within secondary agricultural programs of study (Brister & Swortzel, 2007; Edwards, 2004; Myers & Washburn, 2008; Spindler, 2013). Because the current study is only one step toward creating a body of related literature, it is recommended that more research investigate the process of integrating science within agricultural courses of study. It is also recommended that researchers and practitioners consider creating more information about cooperative efforts between agriculture teachers and science teachers as a basis for exploring effective means of integrating science within agricultural courses of study.

The findings and conclusions of the current study indicate that the learning questions and problem statements agriculture teachers are using to integrate science within their courses of study may be insufficient for the preparation of persons able to utilize scientific methods and processes as tools for reasoning, decision making, and problem solving across domains of knowledge. Therefore, it is recommended that researchers investigate methods for improving the specification, revision, and implementation of science integrating learning questions and problem statements used to engage and guide student learning experiences in secondary agricultural programs of study.

The current case study used social interdependence theory as a basis for investigating the utilization of CLGs as an effective way to facilitate and improve the process of integrating science into agricultural courses of study. Social interdependence theory is well supported by research and practice. The tenets of effective cooperation which have arisen from the social interdependence theory are also well supported by research and practice (Eddy, 2010; Johnson & Johnson, 2009). However, Johnson and Johnson (2009) call for more research to be carried out that investigates how social interdependence theory may be integrated with other psychological theories. It is recommended that researchers also consider investigating the potential connections between social interdependence theory and other prominent theories utilized in agricultural education and research. One example might be the theory of planned behavior which posits that attitudes toward behavior, subjective norms, and perceived behavioral control effect a person's behavioral intentions and behaviors.

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Agriscience education through inquiry-based learning: Investigating factors that influence the science competence of Hispanic middle school students

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Abstract

Inquiry-based teaching methods have been found to enhance students' abilities to understand the process of scientific inquiry. The purpose of this study was to determine if middle school students taught through an inquiry-based teaching approach consisting of scientific skill development, scientific knowledge, and scientific reasoning were more likely to meet their respective science grade level expectation. Participants consisted of predominantly Hispanic sixth and eighth grade students enrolled in school enrichment programs through the MMSAEEC. Inquiry-based instruction was integrated within science classes using lessons in soil pH and water quality. Overall, sixth grade students scored highest on items related to science skill, while the eighth grade students scored highest on the science knowledge portion of the instrument. Regarding the sixth grade students, science reasoning and science skill were found to be significant predictors of grade level expectation, while science skill was significant for the eighth grade data. It is recommended that teachers incorporate inquiry-based learning strategies into their classrooms to encourage students to ask questions and refine their ability to think critically and solve problems. Further research is needed to clarify the role of science comprehension and the associated sub-dimensions with the ability to predict grade level expectation.

Introduction

According to a report published by the National Science Board (NSB) (2015), upwards of 26 million workers, from sub-baccalaureate through doctoral level, are employed in jobs that require significant knowledge in the science, technology, engineering, and math (STEM) fields. This represents nearly one-fifth of all jobs in the United States (NSR, 2015). Additionally, a 17% increase in STEM employment opportunities has been projected by the year 2020 (White House Initiative on Educational Excellence for Hispanics (WHIEE) (n.d.). Currently, there is a shortage of qualified employees for current STEM positions and not enough students are pursuing education in STEM to provide an adequate workforce to meet future growth in the field (WHIEE, n.d.). Even more alarming is the lack of representation of minorities in STEM (National Science and Technology Council, 2013). Clearly, it is imperative to build student interest in STEM fields in a way that will encourage the eventual pursuit of a STEM career.

Research has indicated attitudes and interest of students as young as middle school aged can be positively influenced by the integration of STEM (Wyss, Heulskamp, & Siebert, 2012). This integration has been especially important as a method of developing student engagement in the science fields (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2007). Science, in particular, often disengages students with scientific concepts that fail to connect to their daily lives (Diaz & King, 2007). As an alternative, educational reform has suggested a more hands-on approach to science integration to engage students in active learning, problem solving, and exploration (Satchwell & Loepp, 2002). Career and Technical Education (CTE) programs, such as agricultural education, can enable students to learn science skills by embedding content in authentic contexts (Conroy & Walker, 2000; Pearson, Young, & Richardson, 2013; Roberts & Ball, 2009; Roegge & Russel, 1990; Zirkle, 2004). Additionally, teaching science in context further develops students' critical thinking and problem solving skills (Phipps, Osborne, Dyer, & Ball, 2008; Myers, 2004; Thoron & Myers, 2011; Thoron & Myers, 2012).

Inquiry-based teaching methods have also been found to enhance a student's ability to conduct experiments and help them gain a better understanding of the process of scientific inquiry (NRC, 2007). Inquiry-based instruction is rooted within the constructivism paradigm popularized by educational philosophers such as Piaget, Vygotsky, and Dewey (Doolittle & Camp, 1999). In fact, Dewey (1910/1997) outlined steps of reflective thinking, which align very closely to the scientific methods utilized in modern inquiry-based learning. Effective inquiry-based learning is derived from scientific thinking and realistic problem solving and its flexible approach allows teachers to modify the structure of lessons based on particular educational goals (NRC, 2000). As a student-centered approach to learning, inquiry-based instruction begins with students' current knowledge, then proceeds with instructor support in developing knowledge of scientific inquiry (NRC, 2000). This differs from traditional teaching methods that focus on the teacher as an expert (NRC, 2000; Parr & Edwards, 2004). Problem-solving and higher-order thinking skills are enhanced when students are encouraged to expand their knowledge through active engagement and reflection (NRC, 2000; Von Secker & Lissitz, 1999).

Following the NRC's (2000) publication on the scientific inquiry teaching method, the prominence of inquiry-based science instruction increased in an effort to reform science education in the U.S. (Thoron & Meyers, 2011). Inquiry-based methods align well with CTE and agricultural education courses as these subjects have been shown to be an innovative means for improving core content achievement by allowing students to apply these concepts to real-world situations (Parr, Edwards, & Leising, 2008; Pearson, Young, & Richardson, 2013; Young, Edwards, & Leising, 2008; Thoron & Meyers, 2011). Thoron and Meyers (2011) conducted a quasi-experimental study to determine the effects of an inquiry-based approach versus a subject matter approach on high school students' achievement in agriscience instruction. This study found that students who were taught using the inquiry-based teaching method scored higher on content knowledge assessments than students taught using the subject matter approach (Thoron & Meyers, 2011).

Teachers should purposefully select methodologies when integrating STEM content into the context of agriculture (Baker, Brown, Blackburn, & Robinson, 2014). When successfully implemented in the classroom, inquiry-based teaching can lead to an authentic learning experience that encourages students to think critically (Parr & Edwards, 2004; Thoron, Meyers & Abrams, 2011). However, successful inquiry-based teaching requires adequate professional development and teacher training (Thoron et al., 2011; Thoron and Meyers, 2011). Teacher in-service programs, such as the National Agriscience Teacher Ambassador Academy (NATAA), teach educators to utilize pedagogy that encourages students to engage in scientific thought, conduct detailed observations, and ask open-ended questions (Thoron et al., 2011). Thoron et al. (2011) interviewed NATAA teacher participants after they received inquiry-based instructional training to gain a deeper understanding about their perceptions of implementing these techniques into their classrooms. They found that implementing inquiry-based instruction in the classroom was an individual process for each teacher and that inquiry-based instruction was a more rewarding teaching method, despite increased lesson preparation time (Thoron et al., 2011). Additionally, focus group respondents indicated the use of inquiry-based teaching methods helped the teachers form positive associations with other instructors and administrators. Overall, this method was regarded as an asset to agriscience teachers, especially when combined with adequate preservice training and professional development, that allowed them implement this strategy in their classrooms (Thoron et al., 2011).

The Memorial Middle School Agricultural Extension and Education Center (MMSAEEC) in Las Vegas, NM is an agriscience education program developed by the New Mexico State University (NMSU) Cooperative Extension Service in partnership with the public school system to integrate inquiry-based and experiential learning methods into the classroom (Skelton & Seevers, 2010; Skelton, Seevers, Dormody, & Hodnett, 2012; Skelton, Stair, Dormody, & Vanleeuwen, 2014). The mission of this sixth through eighth grade STEM education program is to prepare students to think critically about complex concepts and become aware of careers in the STEM fields (Skelton & Seevers, 2010; Skelton et al., 2012; Skelton et al., 2014). The program employs the skills of a NMSU faculty member to deliver instruction, conduct classroom based experimental studies, plan field trips, and provide demonstrations (Skelton & Seevers, 2010; Skelton et al., 2012; Skelton et al., 2014). The MMSAEEC seeks to achieve its mission through contextualized instruction and hands-on learning within the subjects of agriculture and natural resources (Skelton & Seevers, 2010; Skelton et al., 2012; Skelton et al., 2014).

Studies by Skelton, Dormody, & Lewis (In Press) and Skelton et al. (2014) have been conducted to measure the science achievement and comprehension of middle school students participating in the MMSAEEC program. Skelton et al. (2014) conducted a quasi-experimental study to determine if there was a difference in student achievement in science, as well as agriculture and natural resources. This study also analyzed differences in student interest in STEM careers between the MMSAEEC program and two comparison middle schools. Student achievement in science, and agriculture and natural resources was determined from New Mexico standardized test scores. A comparison of performance on the science standardized test indicated that the MMSAEEC students' overall test scores were higher than the comparison schools in overall science comprehension, as well as the sub-dimensions of science and people, scientific investigations, and physical science. However, the life science and earth science sub-dimension scores were not significantly different (Skelton et al., 2014). Overall, MMSAEEC students had improved performance and higher scores; however, interest in STEM careers was not significantly different between the groups. In fact, all students indicated a similarly strong interest; however, the MMSAEEC students were twice as likely to be interested in agricultural careers (Skelton et al., 2014).

One important factor of the MMSAEEC program is the demographics of the students involved. Overall, 88% of students in the program are Hispanic, a demographic that is underrepresented in STEM (Lopez et al., 2005). Hispanics represent nearly 20% of the U.S. population, however they represent less than two percent of the total STEM workforce (WHIEE, n.d, n.d.). Although Hispanics in New Mexico have not traditionally been considered a minority within the state, the overall Hispanic community in the U.S. is a minority group that has shown a lack of educational attainment. The drop-out rate for Hispanic students, age 25 years or less, is 27% and is attributed to issues such as language barriers, needing to work to supplement their family's income, and a lack of family support for education (Gasbarra & Johnson, 2008).

There is also a socioeconomic trend within the Hispanic community in which 23% of the population lives below the poverty level, with an average family income of $34,396 (Lopez et al., 2005) However, as the population of Hispanics is projected to increase in the U.S., their buying power and their overall economic contribution is projected to increase (Lopez et al., 2005). It will be important to increase engagement in STEM careers through education that also prepares Hispanic students for employment (Gasbarra & Johnson, 2008; Lopez et al., 2005).

The shortage of Hispanics in STEM and science related fields has been associated with several factors, including (a) the methods that are used to teach science in schools, (b) the lack of qualified instructors teaching these subjects, and (c) under-funded schools that are deficient in proper supplies to effectively teach these subjects (Gasbarra & Johnson, 2008). There is a need for Hispanic students to have access to more hands-on STEM education that can provide better access to education for this community (Gasbarra & Johnson, 2008). In order develop interest in STEM careers, alternative methods of teaching science may be necessary to reach diverse populations and actively engage learners.

Conceptual Framework

Experiential and inquiry-based learning programs employ a process by which knowledge is created through experience (Kolb, 1984). Through this process, experiential learning creates an environment for students to carry out investigations in a real-world context. According to Kolb (1984), effective engagement in curriculum requires: (a) concrete experience; (b) reflective observation; (c) abstract conceptualization; and (d) active experimentation. The conceptual framework for this study is developed from the interaction of these four principles through a model of application involving scientific knowledge, scientific skills, and scientific reasoning developed by Skelton et al. (2012) (see Figure 1). The interconnection of all three concepts forms a broader contextual understanding and improves comprehension in science content (Skelton et al., 2012).

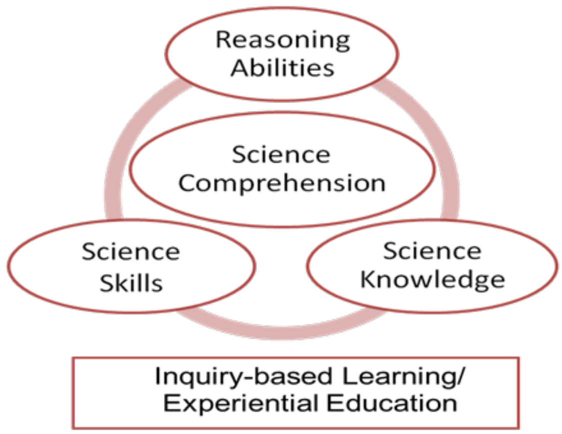

Figure 1. A conceptual model for improving science comprehension (Skelton et al., 2012).

The content of the program is based on the New Mexico public school grade level expectation (GLE), STEM curriculum, as well as the 4-H Science, Engineering, and Technology curriculum (Skelton & Seevers, 2010). The teaching methods used within this program are based on a conceptual model consisting of inquiry-based activities and the experiential learning process (Skelton et al., 2012; Skelton et al., 2014). The combination of inquiry and experiential learning provides an opportunity for higher level thinking skills to be developed and be retained by students (Skelton et al., 2014). The process model begins with science skill and/or knowledge development or acquisition, and proceeds to higher order thinking skills that allow students to demonstrate mastery of the content and then form scientific conclusions (Skelton et al., 2012).

The purpose of this research aligns closely with the AAAE National Research Agenda, specifically Research Priority Area 3: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century as well as Research Area Priority Area 4: Meaningful, Engaged Learning in All Environments (Roberts, Harder, & Brashears, 2016). Deepening our understanding of how core content integration influences the achievement of minority students enrolled in agricultural education programs can assist the profession in meeting the demand for a scientifically prepared workforce that is well represented by all ethnic and racial groups.

Purpose and Objectives

The purpose of this study was to determine if middle school students taught via an inquiry-based teaching approach consisting of scientific skill development, scientific knowledge and scientific reasoning, were more likely to meet their respective science grade level expectation (GLE). The following research objectives guided the statistical analyses of the study:

1. Determine the level of science comprehension (i.e., science knowledge, science skill, and science reasoning) by grade level.

2. Determine whether science comprehension subdimension scores (i.e., science knowledge, science skill, and science reasoning) can predict if students are more likely to meet their respective science GLE.

Methodology

Research Design

This study represents data collected as part of a larger study (Skelton et al., In Press). Participants in this study consisted of six classes of 6th grade students and five classes of 8th grade students enrolled in school enrichment programs through the MMSAEEC. Students in 6th grade received enrichment as part of their earth science curriculum which consisted of soil pH. Students in 8th grade received programming targeted at analyzing water chemistry. These topic areas fit within the New Mexico standardized science curriculum and were identified as ideal areas for inquiry-based teaching. MMSAEEC programs are designed as educational enhancements, similar to 4-H school enrichment programs, and are delivered through the traditional classroom. Broadly, the experiments examined the relationships between plant growth and soil pH (6th grade) and plant growth and water quality (8th grade). Researchers spent the first week teaching basic principles and applications for testing pH of solutions (i.e., litmus paper, pH paper, meters) and water chemistry (i.e., dissolved oxygen, pH, total dissolved solids, nitrate, ammonia-nitrogen, phosphorous, electrical conductivity, and chlorine). During this process, content was introduced, techniques were demonstrated, and students practiced collecting data. Then, using a guided-inquiry approach, students were provided with a problem to investigate and the materials necessary to carry out the investigation. In teams of 3, the students developed hypotheses and devised their own procedures to test their hypotheses. Following their procedures, the students designed conducted their own experiments. Upon completion of the experiments, they were required to explain the problem, their hypothesis, procedures utilized, and present conclusions to their classmates (Skelton et al., In Press).

In order to measure science comprehension, an instrument was developed that reflected the New Mexico agriculture, food, and natural resource content and performance standards. Pre-test and post-test assessments were designed to measure change in scientific knowledge, science skill development, and scientific reasoning ability (see Table 1). Skelton et al. (In Press) offers an in-depth discussion of the pre-test and post-test differences. Overall science comprehension was determined as a result of each program treatment through the aggregation of the sub-dimension scores. For each grade level, a researcher-created instrument, consisting of nine multiple-choice items, was developed with three questions measuring each sub-dimension. A panel of experts established face and content validity of the instruments. The panel make no recommendations, therefore the instrument was utilized as presented.

Table 1

Pretest Scores of Students Enrolled In MMSAEEC (Skelton et al., In Press)

Grade Level	*M*	*SD*
Sixth Grade (*n* = 88)		
Science Knowledge	0.75	0.75
Science Skill	1.82	0.88
Science Reasoning	1.06	0.79
Science Comprehension Total	3.62	1.57
Eighth Grade (*n* = 43)		
Science Knowledge	1.86	0.86
Science Skill	0.98	0.87
Science Reasoning	1.23	0.84
Science Comprehension Total	4.07	1.88

Note. Categories of knowledge, skill, and reasoning comprised of three items each.

Regarding the sixth grade students, 77 (87.50%) were of Hispanic origin and 41 (46.59%) were female. A total of 36 (83.72%) of the eighth grade students were of Hispanic origin and 19 (44.18%) were female. Additionally, the Measure of Academic Proficiency and Progress (MAPP) scores were obtained from Las Vegas City Schools to determine if students were at or below their respective GLE (see Table 2). The MAPP is administered three times per year to track students' academic progression. For this study, the students' mid-year test data was utilized, as it was administered during the same time of year as the study's intervention.

Table 2

Personal Characteristics and Grade Level Expectations of Students Participating in MMSAEEC (Skelton et al., In Press)

Grade Level	*F*	%
Sixth Grade (*n* = 88)		
Hispanic Origin	77	87.50
Gender (Female)	41	46.59
At Grade Level Expectation	36	40.90
Below Grade Level Expectation	52	59.10
Eighth Grade (*n* = 43)		
Hispanic Origin	36	83.72
Gender (Female)	19	44.18
At Grade Level Expectation	29	67.40
Below Grade Level Expectation	14	32.60

Data Analysis

Data associated with objective one were analyzed via descriptive statistics, specifically the mean, standard deviation, and percentage. Logistic regression was utilized to meet the needs of objective two. Logistic regression is appropriate when the outcome variable is categorical in nature (Field, 2009). Specifically related to this study, the outcome variable was whether or not the students met their respective GLE. Due to the exploratory nature of this study, the alpha level utilized to determine statistical significance was set a 0.10. Nagelkerke's R^2 was employed to determine the practical significance of the regression model. The value of Nagelkerke's R^2 ranges between zero and one, making its interpretation similar to the classical R^2 utilized to measure effect size in multiple regression (Field, 2009; Nagelkerke, 1991).

Findings

Objective one of this study sought to determine overall science comprehension of students after participating in an inquiry-based science program. Sixth grade students had an overall science comprehension mean of 6.35 (SD = 1.52) out of a possible nine items (see Table 3). The highest mean was in the area of science skill (M = 2.48; SD = 0.66). The lowest mean was for science reasoning (M = 1.76; SD = 0.71).

Table 3

Performance on the Science Comprehension Examination Post-Test for 6th Grade (n = 88)

Test Category	M	%	SD
Science Knowledge	2.11	70.33	0.82
Science Skill	2.48	82.67	0.66
Science Reasoning	1.76	58.67	0.71
Science Comprehension Total	6.35	70.56	1.52

Note. Categories of knowledge, skill, and reasoning comprised of three items each.

Regarding performance of the eighth grade students, the overall mean of science comprehension was 6.05 (SD = 1.59) out of a possible nine items (see Table 4). The highest mean was in the area of science knowledge (M = 2.37; SD = 0.76) and the lowest was science reasoning (M = 1.74; SD = 0.79).

Table 4

Performance on the Science Comprehension Examination Post-Test for 8th Grade (n = 88)

Test Category	M	%	SD
Science Knowledge	2.37	79.00	0.76
Science Skill	1.93	64.33	0.94
Science Reasoning	1.74	58.00	0.79
Total	6.05	67.22	1.59

Note. Categories of knowledge, skill, and reasoning comprised of three items each.

Objective Two sought to determine if science comprehension sub-scores could predict science GLE. Prior to employing logistic regression, the Hosmer and Lemshow Goodness of Fit (HLGF) Test was calculated to determine how well the model fit the data. Table 5 lists the results of the

HLGF by grade level. Regarding the sixth grade data, the HLGF was determined not to be statistically significant, indicating the model fit the data well (see Table 5). Similarly, the HLGF was calculated prior to analyzing data associated with the eighth grade students. The HLGF for this group was determined to not be statistically significant (see Table 6).

Table 5

Results of the Hosmer and Lemeshow Goodness of Fit Test for 6th Grade

	χ^2	*df*	*p*
Step 1 – 6th Grade	4.54	7	0.72
Step 1 – 8th Grade	6.87	8	0.55

The regression model associated with the sixth grade data predicted 70.5% of the cases correctly versus 59.1% predicted in the initial constant model. Nagelkerke's R^2 was calculated to determine the significance of the overall model. Specifically, Nagelkerke's R^2 was 0.36 for the data associated with the sixth grade students. Science knowledge was determined to not be statistically significant (p = 0.45). Both science skill (Wald = 3.11; p = 0.08) and science reasoning (*Wald* = 10.84; p = 0.00) were determined to be statistically significant at the α = 0.10 level (see Table 6). The science skill and science reasoning odds ratios were 2.38 and 4.17, respectively.

Table 6

Logistic Regression of 6th Grade Test Areas on Grade Level Expectation

Variable	*B*	*SE*	*Wald*	*df*	*p*	*Odds Ratio*
Science Knowledge Score	0.26	0.34	0.58	1	0.45	1.29
Science Skill Score	0.87	0.49	3.11	1	0.08	2.38
Science Reasoning Score	1.43	0.43	10.84	1	0.00	4.17

Note. α = .10

The regression model associated with the eighth grade data predicted 74.4% of the cases correctly versus 67.4% in the initial constant model (see Table 7). Nagelkerke's R^2 was calculated to be 0.25 for the overall model. Science skill was the only sub-score determined to be statistically significant (*Wald* = 6.05; p = 0.01) at the α = 0.10 level. The science skill odds ratio was 3.20.

Table 7

Logistic Regression of 8th Grade Test Areas on Grade Level Expectation

Variable	*B*	*SE*	*Wald*	*df*	*p*	*Odds Ratio*
Science Knowledge Score	-.045	0.53	0.70	1	0.40	0.64

Science Skill Score	1.16	0.47	6.05	1	0.01	3.20
Science Reasoning Score	-.064	0.53	1.46	1	0.23	2.30

Note. α = .10

Discussion and Implications

Objective one sought to determine the level of science comprehension by grade level. Regarding the sixth grade students, there was a 31.5% increase in the number of correct items on the post-test instruments (Skelton et al., In Press). Eight-grade students completing the water chemistry unit demonstrated a 40.79% increase in the items they answered correctly (Skelton et al., In Press). The overall score on the 9-item science comprehension instrument could be considered low average (i.e., roughly 70% correct) for both sixth and eighth grade students. The sixth grade students performed best on items related to science skill, while the eighth grade students scored highest on the science knowledge portion of the instrument (Skelton et al., In Press). Results from this study indicate that the inquiry-based methods used in this program were beneficial to overall science comprehension of both grade levels. This is consistent with several prior studies that have investigated the merits of inquiry-based learning (Parr et al., 2008; Pearson et al., 2013; Young et al., 2008; Thoron & Meyers, 2011).

The purpose of objective two was to determine if the science comprehension sub-dimensions (i.e., science knowledge, science skill, and science reasoning) could predict whether students would meet their respective GLE, as measured by the MAPP test. Regarding the sixth grade students, science skill and science reasoning were found to be statistically significant predictors. Per analysis of the odds ratios of these sub-dimensions, it was determined that the higher students scored, the more likely they were to meet their GLE. Science knowledge was not a significant predictor of GLE of the sixth grade students.

Regarding the eight-grade students, science skill was found to be a statistically significant predictor. Analysis of the odds ratio indicated that as scores in the science skill sub-dimension increased students were more likely to meet their GLE. The sub-dimensions of science knowledge and science reasoning were not significant predictors for this group of students.

In both the 6th grade program and the 8th grade program, over 85% of students were identified as being Hispanic and over 45% of the students were female (Skelton et al., In Press). An increase in science comprehension, especially for students that are typically identified as underrepresented in the science field is an important finding (National Research Council, 2007; Barron, 2003). Active learning has been recognized as being one of the most influential factors to student success, being even more impactful than student background and previous academic performance (Barron & Darling-Hammond, 2008). Identifying specific ways that inquiry-based learning can be used help all learners advance in science fields can not only be beneficial for students, but would assist in the development of professional development, pre-service teacher education, and in-service opportunities.

Recommendations

Active learning and engagement in hands-on learning strategies have been identified as effective methods of science instruction (Rutherford & Ahlgren, 1990; Barron & Darling-Hammond, 2008). Results from this research demonstrate that inquiry based learning strategies benefit students and it is recommended that teachers should incorporate inquiry-based learning strategies as a regular part of their classroom instruction. However, integration can be a challenge, particularly because teachers may not have received formal training in how to incorporate inquiry-based learning within the agriscience classroom (Linn, Slotta & Baumgartner, 2000). Because successful inquiry-based learning requires extensive student support and teacher training, adequate planning is crucial for successful integration (Rosenfeld & Rosenfeld, 1998).

Guskey's Model of Teacher Change (2002) describes successful professional development as being a complex process that requires more than just individual training sessions. This model describes ideal professional development as having four key stages: (a) learning about the professional development topic in depth; (b) putting the professional development to practice; (c) determining how students learn as a result of the change in teaching methods; and (d) addressing any change in behavior that results from implementation. Professional development in inquiry-based learning cannot stop after introducing the concept, but rather, should allow teachers to learn about the topic, implement inquiry-based learning and then analyze how inquiry-based learning can impact their classroom. The MMSAEEC program should be utilized to teach agriculture teachers across New Mexico to better incorporate inquiry-based and experiential learning. Studies that actively analyze inquiry-based learning in programs, such as this one, may be helpful for teachers to learn about inquiry-based teaching strategies and better understand how to incorporate this teaching method into their content.

Because agriscience is often known for the experiential nature of its programs (Achieve, Inc., 2015), actively including hands-on and inquiry-based learning strategies may be an excellent opportunity for agriscience and science teachers to develop partnerships that can benefit both teachers and students. Through active partnerships, teachers can provide opportunities for students to better understand scientific principles within the context of agriculture. Similar partnerships have been discussed related to the integration of mathematics in to agricultural education (Parr et al., 2008; Young et al., 2008). Pearson et al. (2013) partnered science and CTE teachers together to develop a community of practice whereby they developed curriculum maps and ensured each lesson was science enhanced. Utilizing these types of partnerships could create stronger collegial relationships and ensure students receive the most accurate, up-to-date science content delivered in the context of CTE.

Regarding future research, further investigation is warranted into the predictive power of the science comprehension subdimensions. This exploratory study utilized a small sample and liberal alpha value in determining significance; therefore, future studies should utilize large samples of students and utilize a more conservative alpha value to determine statistical significance. It is also recommended that future experimental research should be conducted to determine precisely how inquiry-based learning influences student science comprehension. Within the MMSAEEC, future studies should include a delayed post-test to understand the long-term effects of this educational model. While this study analyzed science knowledge within a small aspect of science education, larger studies that address more aspects of science and CTE would be beneficial to teacher education programs. Additionally, other models of inquiry-based education should be studied to identify which methods are most effectively integrated within agriscience programs.

It is also recommended that in addition to studying the overall benefits of inquiry-based learning on student achievement, specific aspects of science integration should be examined. The ability to generate accurate hypotheses, for example, has been connected to the development of efficient and effective problems solvers (Blackburn & Robinson, 2016; Johnassen, 2000). In MMSAEEC and other similar program models, a better understanding of student achievement in areas such as these could help to increase understanding of student success in STEM programs.

Lastly, specific research should be conducted to more closely examine inquiry-based learning models on students from diverse backgrounds. Programs such as MMSAEEC that work with a large number of students from traditionally underrepresented populations can provide unique opportunities to study both student achievement and student interest in STEM. Longitudinal research, in particular, should be conducted to determine if programs like these do increase the number of diverse students that enter the STEM workforce. In a study conducted by Oakes (1990), three factors were determined to be necessary for underrepresented students to pursue careers in science: (a) students' opportunities to learn science and math; (b) their achievement in science and math; and (c) the students' decisions to pursue careers in these areas. The MMSAEEC model as designed by Skelton et al. (In Press) provides opportunities within each of these three areas, therefore, this program and similar models should be investigated to determine the long term impact of successful student achievement in science and math, student interest in these areas, and their decision to eventually pursue careers in these fields.

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Students' Perceptions of School-Based Agricultural Education Through an Initial Early Field Experience

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Abstract

The purpose of this study was to identify the perception of students enrolled in an initial early field experience (EFE) in relation to the components of the agricultural education model. The students enrolled in the initial field experience are freshmen and sophomore students. The initial field experience course consists of four face-to-face class meetings and a 12-hour initial field experience observation. Students' photographed their perceptions of each component in the agricultural education model (classroom, SAE, FFA). The coding of reflective captions led to themes in three areas of the agricultural education model: (a) classroom themes were active learning, collaboration and facilities, (b) FFA themes were activities and opportunities, and (c) SAE themes were school based projects, awards/degrees, and the smallest circle.
Overall, the EFE students used their photographs and descriptions to describe the learner-centered nature of the program. The EFE students described how the three components of the agricultural education model work together to help school-based agricultural education (SBAE) students gain knowledge and experience. It is recommended that teacher educators incorporate photovoice in EFE programs to facilitate discussion of the initial perceptions of students.

Introduction/Conceptual Framework

Preparing agriculture teachers to lead effective school-based agricultural education (SBAE) programs is the responsibility of university agricultural teacher education faculty (Roberts & Dyer, 2004; Meyers & Dyer, 2004). As part of the teacher education curriculum, early field experience (EFE) is an integral piece of agricultural teacher education programs that are based in the experiential learning process (Retallick & Miller, 2007a; Smalley & Retallick, 2011; 2012). Smalley and Retallick (2012) state, "through EFE, preservice teachers have experiences that resemble and model the experiences they will have as teachers" (p. 100).

Kolb (2015) described experiential learning as a process in which knowledge is created through the combination of grasping and transforming experience. This process moves the learner through a cycle of dialectically opposed adaptive learning modes of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2015). The experiential learning process can be used within SBAE programs. An effective SBAE program is commonly conceptualized using the three intersecting circles of a Venn diagram (Talbert, Vaughn, Croom, & Lee, 2014). Talbert et al. (2014) describe these components as contextual; inquiry-based instruction through classroom and laboratory interaction; leadership engagement through FFA; and planned and supervised, experience-based learning through SAE. The experiential learning process can be incorporated into each individual component of the SBAE model, as well as within the total SBAE program (Baker, Robinson, & Kolb, 2012). However, to use experiential learning effectively within their programs, agriculture teachers need to understand the process of experiential learning (Baker et al., 2012; Roberts, 2006). Miller and Wilson (2010) describe incorporating the experiential learning process within agricultural teacher education programs as a means to help preservice teachers' link theory to practice. A combination of coursework, EFE, and student teaching is used to prepare agriculture teachers for the profession (Rank & Retallick, 2016).

An EFE is a preparation process for any student preparing to enter the agricultural teacher education profession. Oftentimes, EFE provides a preservice teacher with the first opportunity to experience a real classroom from a teacher's perspective, and to immerse themselves into a classroom setting. Recent research has shown that EFE's are a vital part of teacher preparation programs that occurs prior to the student teaching experience (Guyton & Byrd, 2000; Retallick & Miller, 2007a; Smalley & Retallick, 2012). An EFE provides a preservice teacher a beginning in their career development (Knowles & Cole, 1996). This career development assists the preservice teacher in becoming a lifelong learner. The learning processes begins in EFE, and will better prepare a preservice teacher as a problem-solver, critical thinker, and one who is wanting to learn more (Knowles & Cole, 1996).

An EFE encourages a preservice teacher to continue in the educational profession and provides a preservice student a true learning experience, which can take place early in a preservice training (NCATE, 2008). A preservice teacher begins thinking as a teacher during an EFE, as well as experiencing the role of a teacher early in their academic career (NCATE, 2008). According to NCATE (2008), the purpose of an EFE is to apply skills and knowledge in various settings appropriate to the level of a student's program. Guyton and Byrd (2000) defined EFE as the range of school experiences that occur prior to student teaching for those students in preservice teacher education. The greatest attribute an EFE can provide a preservice teacher is the opportunity to observe the activities of a practicing teacher (Smalley & Retallick, 2012; Retallick & Miller, 2007).

Educators (Guyton & Byrd, 2000) have not disputed the importance of EFE. Pierce (1996) suggested EFE should take place regularly and earlier throughout preservice training. Early field experiences have provided significant learning experiences for preservice teachers, suggesting the need for the design of authentic classroom experiences (Aiken & Day, 1999). To ensure the effectiveness, early field experiences need to be aligned with the entire teacher preparation program (Little & Robinson, 1997). Retallick and Miller (2007a) concluded that programs have established requirements and specific expectations for EFE. A minimum number of contact hours are required for EFE, as well as a minimum number of lessons planned and taught. Additionally, EFE offerings are driven by internal and external factors including licensure, as well as state and national accreditation. Smalley and Retallick (2012) suggested exploratory EFE could assist with the retention and recruitment of teachers. A study conducted by Baker, Culbertson, Ramsey, and Robinson (2016) focused on how preservice teachers conceived and made meaning of exploratory observations. They found in the study that preservice teachers review their own perceptions, which can reduce anxiety to remain in agricultural education, enhance awareness of school settings, and advance understanding of students.

Five issues have been identified by Hudson, Bergin, and Chayst (1993) as to the effectiveness and impact of EFE: 1) lack of common goal, 2) lack of control, 3) limited learning due to the lack of experiences the preservice teacher can compare, 4) difference between what is being practiced in the classroom and what is being taught on campus, and 5) limited opportunities. Swortzel (1995) stated agricultural education faculty need to continue to evaluate their programs to see where they are accomplishing their mission in preparing teachers who are prepared to teach.

Learners bring their own unique background and set of experiences, which are used as a framework for understanding (Galbraith, 2004). Prior to enrolling in an agricultural teacher education program, students have diverse previous experiences. Some students may have been FFA members, or conducted an SAE while in a SBAE program and other students may not have any previous SBAE experience. A need exists to identify how preservice students perceive the components of the agricultural education model and how the students existing perceptions are influenced by their initial EFE.

Purpose

The purpose of this study was to identify the perception of students enrolled in an initial early field experience in relation to the components of the agricultural education model. Specific objectives were:

1. Identify themes based on the students' perception of the classroom instruction, FFA, and SAE components of SBAE based on the subject of the picture they chose to represent each component;
2. Identify and describe the meaning students ascribe to each of the components: Classroom, FFA, and SAE.

Methods

A modified photovoice analysis was used as a qualitative research method to investigate the EFE students' perceptions of each component of the SBAE model, while they were engaged in their initial EFE. Photovoice was originally developed as an approach to participatory needs assessment (Wang & Burris, 1997). "Photography provides the medium through which people's visions and voices may surface" (Wang & Burris, 1997, p. 382). Using the photovoice process, participants are able to tell a story from their perspective (Wang & Burris, 1997). "The photovoice process is often valued for its ability to uncover rich descriptive information" (Catalani & Minkler, 2010). Wang and Burris (1997) list the goals of the photovoice method as: "(1) to enable people to record and reflect on their community's strengths and concerns, (2) to promote critical dialogue and knowledge about important issues through large and small group discussions of photographs, and (3) to reach policy makers" (p.369).

The participants in this qualitative study were agricultural teacher education students (n= 10) enrolled in an initial EFE course. This course is the first opportunity for agricultural teacher education students to observe a SBAE classroom as an undergraduate student. The students in the course are typically freshmen and sophomores. Students were informed of the purpose of the study, and were asked to sign an informed consent form. Consent to participate was completely voluntary and students were able to opt out at any time without consequence.

The AgEdS 116 initial EFE course is an academic credit course in agricultural teacher education consisting of four face-to-face class meetings and a 12-hour initial field experience observation. The four face-to-face meetings consisted of two meetings at the beginning of the course designed to facilitate the student's goals and expectations of the initial field experience, as well as provide basic technical information about the course. After the initial two face-to-face meetings, the students completed a background check and 12 hours of observation in a SBAE program. The final two face-to-face meetings were held the prior to finals. The purpose of the final two face-to-face meetings was to facilitate reflection to help students make meaning of their experience.

During the initial face-to-face meeting, students were asked to take three photographs during their 12-hour initial field experience. One photo to represent each of the three components of the school-based agricultural education model. As an assignment in the course, students submitted their photos in a threaded discussion within Blackboard Learn accompanied by a 250-word reflection/description of each photo. The EFE students were given specific instructions to obtain permission from the agriculture teacher they were observing prior to taking any photographs. During the final face-to-face meeting of the course, the student's photos were shown to the members of the course in a debriefing session to facilitate discussion and experience sharing. The students used this opportunity to compare and contrast each student's perception of the three components of the SBAE model.

The three photographs and the accompanying reflections/descriptions were coded using open coding. The intent of the researchers was to remain as open as possible when searching for codes that provide descriptive data of the participants' experiences rather than using previous literature or pre-determined themes (Merriam, 2009). Each researcher coded all photographs and descriptions/reflections separately. Following the initial coding, the researchers met to discuss final themes that emerged from the coding process.

Researcher Bracketing

Bracketing is an essential first step in qualitative research practice, strengthening the validity of the study (Merriam, 2009). Bracketing is an opportunity for the researchers to discuss their personal experiences related to the research topic in order to identify any bias (Merriam 2009). As such, it is important to note that both researchers have taught SBAE in public schools, and are currently higher education teachers. One researcher was directly involved as the EFE coordinator and instructor for the AgEdS 116 course. The other researcher was also directly involved with EFE students as the Iowa State University Agricultural Teacher Education Coordinator. Additionally, credibility was enhanced through peer debriefings and independent coder review throughout the study (Guba & Lincoln, 1989).

Findings

Of the preservice teachers who participated in this initial early field based experience course in the fall of 2016 (n=10), the majority of participants were female and college sophomores. As a result of the qualitative analysis, themes emerged from this initial early field experience in relation to the components of the agricultural education model.

Classroom: Active Learning, Collaborations, and Facilities

Photos and descriptions that students submitted to describe the classroom instruction component of the agricultural education model were focused on three themes: *active learning, collaboration,* and *facilities*. The active learning theme included codes that indicated learning was hands-on or based in experience such as projects, inquiry-based methods, and/or problem solving. The collaboration theme emerged based on statements and photographs that indicated cooperative learning, as well as statements about inclusion of all students regardless of background. The final theme, facilities, emerged from statements and photographs that indicated the arrangement of classrooms and labs.

Active Learning Theme

EFE students described the active learning process taking place in SBAE classrooms, as a hands-on experience with a variety of subjects.

> "*This photo (Figure 1) represents how an ag program can be much more than just the standard desk and lecture setting. It shows how hands on the classroom can be and that the students have a say in what they learn about based on their interests.*" This student further described her photograph by stating, "*The school I did my observation at raises alligators in their greenhouse. This started out as a project from one of their classes and they have continued to raise them and they have even harvested one.*"

Another student described her photograph as "*This showcases agriculture education's mission of providing students with inquiry based instruction and learning through interactive classroom activities.*" Additionally, she commented, "*Once the review was complete, students took a safety test that must be passed with 100% in order to begin welding. Then, students could go into the shop and weld.*"


Figure 1.


Figure 2.

Collaboration Theme

In addition to the active learning that was taking place, collaboration was another common theme that emerged from the photographs and comments of the EFE students. One student commented, "*The teachers strongly encouraged the students to work in teams with many of their projects. This encourages teamwork, communication, and cooperation.*" Another student indicated, "*What stuck out to me the most about the [School] agricultural program was how much he encouraged talking. The whole classroom was based upon getting the students involved with one another.*" This student further explained, "[The teacher] *thought that collaborative communication was one of the most important parts of learning.*"

Some students also described collaboration by discussing the inclusion of students from diverse backgrounds in learning activities. One student stated, "[The teacher] *wanted to ensure that both rural and urban students understood what was going on. It was about teaching agriculture.*" Additionally, this student commented that, "*The classes that she taught were educational but made sure that they reached the students on a personal level too.*"

Facilities Theme

The EFE students described the facilities as part of the classroom instruction component of SBAE. One student stated, “*I thought it was cool that they had a lab in the back of the classroom*” when describing his photograph (Figure 3). Another student commented that in addition to the classroom, “*Many of the classes utilize the greenhouse and shop.*” Students also noticed organization within the facilities. One student observed, “*When I walked into the classroom, I felt a sense of organization.*” This student commented about her photo (Figure 4), “*If you look closely in the photo, you can see that she has the cabinets labeled and everything is put away and organized.*” She also indicated, “*I really want to have a classroom set up like she did, I was very comfortable to be in and I felt like kids liked it because they knew where everything was.*”

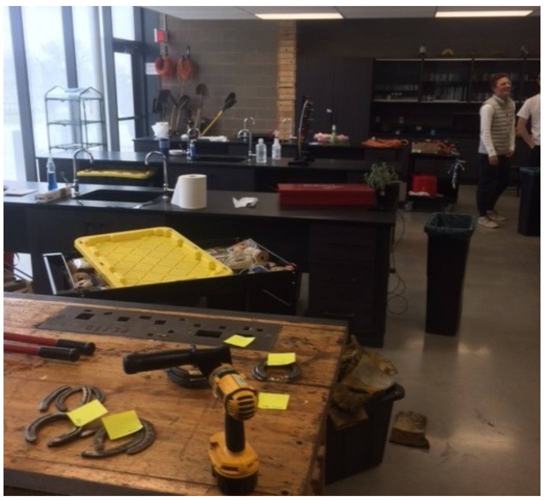
Figure 3.


Figure 4.

FFA: Activities and Opportunities

In the area of FFA, two themes emerged from the photovoice, which included *activities* and *opportunities*. The preservice students identified a variety of activities in FFA through their photos.

Activities Theme

The *activities* identified by the preservice students ranged from career development events (CDE’s), steak dinners, and beef weigh-ins. One preservice teacher described, *“In this picture, they have a sign up for the contest that the students are planning to do for their leadership career development events in the spring... It honestly warms my heart to see that there are so many freshmen who are signed up for conduct of meetings.”*

Another student stated (Figure 5), “*I took a picture of the white board that was at the front of their classroom. I thought this was a good example of how many activities their chapter had going on in the near future*.” Yet another shared, “*This photo represents the Floriculture competition, where center pieces, boutonnieres, bouquets and much more are created by FFA members as they compete to make the best possible pieces. CDE’s are so incredibly important because they give the students more real world experiences.”*

Opportunities Theme

Another theme, which emerged from the area of FFA, was *opportunities*. A preservice student stated, *"FFA to me is making the conscious choice to be better than you were yesterday. This involves making good choices and working hard every day. I think the students who are willing to take advantage of opportunities and put in the effort, are going to see a greater reward for their efforts..."* Another student shared (Figure 6), *"This mural shows the many opportunities that the FFA provides, and the valuable things that can be learning through your years as an FFA member."* Another student shared,

> *"FFA to me is all about personal growth and taking the opportunities that are given to you. I believe that each student who has willingly signed up for a contest is taking the next step in maximizing their opportunities. … A lot of what FFA means to me is seen in the creed. FFA to me is making the conscious choice to be a better you than you were yesterday. This involves making good choices and working hard every day. … I think that the students, who are willing to take charge and put in the effort, are going to see a greater reward for their efforts than those who don't."*

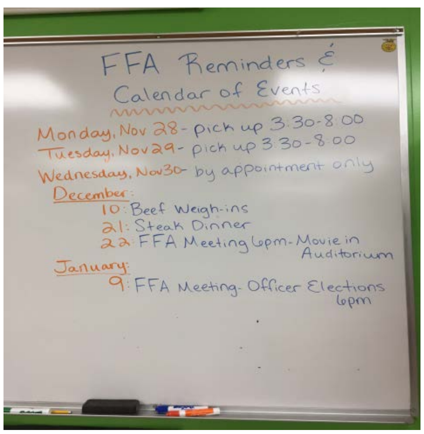

Figure 5.

Figure 6.

SAE: School Based Projects, Awards/Degrees, and Smallest Circle

Three themes emerged from the photographs and descriptions of the SAE component submitted by the EFE students, which included: *school-based projects, awards and degrees*, and *the smallest circle*.

School-based Projects Theme

The school-based project theme emerged from codes, which indicated that high school students were conducting SAEs at school and using school facilities. Awards and degrees was a theme that emerged from codes that addressed recognition through FFA degrees and awards. The third theme, the smallest circle, emerged from codes that indicated that the SAE component of the agricultural education model was less of a focus in the school they observed than the classroom or FFA components.

EFE students described SAE projects that were conducted at school. One student described their photograph (Figure 7) as, "*The picture that I attached was a picture of 3 kids who were working on a horse head made out of horse shoes.*" This student suggested, "*Since none of these kids lived in the country they were not able to have animal SAE or do farm work like a lot* *of kids do. These kids are all putting in the hard work and dedication to this SAE. Even though it might not be a living animal it still takes a lot of work.*"


Figure 7.


Figure 8.

Another student described her photograph (Figure 8) as "*This is the greenhouse at [High School]. Not an exact representation of a Supervised Agricultural Experience, but it was the best representation that I could think of.*" She said that "*Some of the students at [High School] utilize the greenhouse to accomplish their SAE project.*" In addition to the greenhouse, she observed that "*another student had a welding project he was using as his SAE.*"

An aquaculture SAE (Figure 9) was described by another EFE student. This student described her photograph as, "*a photo of the fish tanks in the aquaculture classroom.*" She continued by stating, "[Teacher] *told me kids could use these tanks to do an SAE and raise their own fish for a SAE project if they wanted to in the future.*"


Figure 9.


Figure 10.

Awards and Degrees Theme

The EFE students described recognition through FFA awards and degrees as part of the SAE component. One student described her photograph (Figure 10) as the names of past chapter members who have achieved their [State] or American FFA degree. She commented, "*The wall* *represents every person on record at our school that has received their [State] degree or American degree.*" She adds, "*The wall doesn't just represent a degree, but the SAE and hard work put behind to earn that degree. This is definitely the most meaningful photo to me out of all three for this photo voice.*"

The EFE students believed that SAEs are an important part of SBAE. However, they commented that it was least utilized component of the agricultural education model. One student stated, "*Supervised Agricultural Experience is, in my opinion, probably the smallest circle.*" This student added, "*I'm a firm believer that although it may be the smallest circle in the realistic version of the Ag Ed model, that there is still a lot that can be learned from supervised agricultural experiences.*" Another student commented, "*I feel that SAEs are the smaller portion of the model that people overlook but to me, they are so important because you take the knowledge and skills from the classroom and FFA and get to apply them in real situations.*" Two other students described SAEs as taking a back burner to other components of an SBAE program. One of these students stated, "*Supervised Agricultural Experiences typically kind of takes a back burner in most programs.*" Another student said, "*To me an SAE is one of the most important parts of ag. class, even though it seems to take the back burner in many FFA programs.*"

Although the students described SAE as being less of a focus in the SBAE programs they observed, they insisted that SAE was important and should be promoted. One student commented, "*I think that SAEs need to be pushed more so that students can really understand the importance of them. SAE are just as important as the other two pieces of the model, we just need to inform students better and encourage them to seek one out!*" This student described the importance of SAE as, "*Having an SAE really gives the students the real-world experiences that they need to be successful later in life.*" Another student described the difficulty some SBAE students have with implementing SAE. She commented, "*It can be very difficult for students to be able to work on their supervised agricultural experiences, especially if they have a job and don't have the most amount of time.*" Another student personalized her comment by stating what she would do in the future. She commented, "*As a future teacher, I can encourage SAE interaction by stating the benefits up front in the introductory agriculture class.*" An additional student commented about the importance of the agricultural teacher in promoting SAEs. She stated, "*[Teacher] was very big on making sure every kid had an SAE project to do whether or not it was a large scale project or a small scale project.*"

Discussion, Recommendation & Implications

The focus of the study was to identify the perceptions of preservice students enrolled in an initial early field experience in relation to the components of the agricultural education model. The intent was not to generalize the results to all preservice students, but rather to describe the population of students who took part in this initial EFE. Caution should be taken to not generalize the results to broader populations.

The EFE students in this study valued each of the three components of the agricultural education model. However, these students described the classroom instruction components as the most important part of the model. In their photographs and descriptions of the classroom, the EFE students described learning as an active process facilitated by the agriculture teacher. These EFE students indicated that they observed an environment in the classroom that was learner-centered rather than teacher-centered. One EFE student specifically mentioned that the students were encouraged to talk to each other while working, indicating a possible social-constructivist premise for the agricultural classroom they observed.

Within the FFA component, the EFE students described the range of activities and opportunities for SBAE students. Within the themes of activities and opportunity, the EFE students were cognizant of how FFA provides an opportunity for learning to extend beyond the classroom. Additionally, the EFE students indicated that they were excited by the possibility of extending these opportunities to their own students once they become agriculture teachers.

SAE was described by the EFE students as the smallest component of the model. Although the EFE students described their personal belief that SAE is a valuable learning experience, they described SAE as being less of a focus in the programs they observed. It should be noted that the EFE students may have had limited exposure to SAE in their 12-hour observation. However, the observation that SAE is not implemented to the same extent as the classroom and FFA components is consistent with research conducted by Retallick (2010) and Wilson & Moore (2007) who found that agricultural teachers can talk conceptually about SAE, but have difficulty implementing it in practice.

EFE students described participating in SAEs at school using school facilities. In their description of the photographs, the EFE students discussed the school-based SAEs they observed as projects designed to help students that may not have the resources to develop a traditional SAE. National Council for Agricultural Education ([NCAE], 2015) has described school-based enterprise as a new SAE type. These school-based SAEs could be modified slightly to fit the NCAE description of the school-based enterprise SAE type. One possible modification could be to create a simulated workplace environment (NCAE, 2015) by requiring students to track their time and make weekly reports to the agriculture teacher that could be modeled after reports given by employees to their supervisor. Both of these recommended modifications may already be practiced as a part of the student's record book. However, if these recommendations were specifically required in addition to the record book as part of a school-based SAE, it would enhance the real-world simulation of a workplace environment.

Overall, the EFE students used their photographs and descriptions to describe the learner-centered nature of the total program. The EFE students described how the three components of the agricultural education model work together to help SBAE students gain knowledge and experience that they can use in their future. The EFE student's emphasized active project-based learning was the focus of the classroom component of the SBAE model, and that the projects extended beyond the classroom through FFA and SAE.

Many of the EFE students alluded to their own goals as teachers in their descriptions. The EFE students expressed a desire to emulate the teachers they observed, and use active project-based learning in their future SBAE programs. Thinking of themselves as a teacher is consistent with the purpose of an EFE. One of the primary purposes of EFE is to facilitate the opportunity for preservice teachers to begin thinking as a teacher early in their teacher education program (NCATE, 2008). The EFE student's desire to use active project-based learning and to extend learning beyond the classroom may help them to implement the experiential learning process within each component of the SBAE model, as well as across the entire model.

Agricultural teacher educators should be aware of the observations and reflections of the EFE students. These observations and reflection will better facilitate a cohesive program of continuing experience that supports the development of skills, which will be necessary to build upon and implement the EFE student's goals. For example, agricultural teacher educators should model the experiential learning process by using project-based instruction in other teacher education courses to build on the teaching methods observed by preservice teachers in their EFE. The modified photovoice research method could be adapted to become a teaching method, as well as a research method. Using the photovoice approach as a teaching method can help agricultural teacher educators understand the initial perceptions of EFE students, consistent with the original development of photovoice as an approach to participatory needs assessment (Wang & Burris, 1997). Research should be conducted to identify how the use of the modified photovoice method can enhance learning for preservice teachers, as well as how photovoice can be used to inform practice in teacher education programs.

The findings of this study are limited to the perceptions of the study participants. As such, it is recommended that the modified photovoice methodology be replicated in future initial field experience courses. It is also recommended that the modified photovoice methodology be used to identify the perceptions of student teachers and/or early career agriculture teachers. Additionally, comparisons between the perceptions of students in their initial field experience and the perceptions of student teachers and/or early career agriculture teachers could identify any change in the students' perception of the agricultural education model as the preservice teacher's transition from novice to expert.

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Professional Development Engagement and Career Satisfaction of Agriscience Teachers

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Abstract

Teachers should possess a set of professional commitments, which includes active participation in professional development that leads to student learning. The purpose of this study was to explore the relationship between professional development engagement and career satisfaction. This study used a quantitative descriptive correlational research design. A purposive stratified sample of states and a census of teachers in those states was used. The Tailored-Design Method, using multiple points of contact with various modes was used to collect data with minimal survey error. There was a response rate of 72.5% (n = 892). The mean score for the professional development engagement was 118.3 (SD = 13.4; n = 858) on a 150 point scale. The mean score for career satisfaction was 19.9 (SD = 4.4; n = 878) on a 25 point scale. Professional development engagement and career satisfaction had a moderate correlation (r = 34). These findings showed a high level of participation in professional development, especially workshops and a high level of career satisfaction. Recommendations for practice and future inquiry were provided.

Introduction

The purpose of agriscience course in middle and high school are to prepare individuals for highly skilled, agriculturally related work and to create agriculturally literate citizens who are lifelong leaners (Roberts & Ball, 2009). Highly skilled agriscience teachers are needed for this goal to be realized. The shortage of agriculture teachers has been noted (Foster, Lawver, & Smith, 2014). The literature has also explored various reasons for this phenomena (e.g., Walker, Garton, & Kitchel, 2004). While these issues are critical and should be the focus of investigation, exploring a dichotomy of whether a person leaves the profession or remains may not tell the entire story. According to Bransford, Darling-Hammond, & LePage (2005), one key to improving education globally depends on improving teacher quality. Bransford et al. also purported teachers should have a set of professional commitments as members or a collective profession in addition to having knowledge and skills related to subject matter and learning processes. The focus for agriscience programs should not only be to have enough teachers, but to have enough quality teachers that work to advance the profession and make a difference in their students' lives.

There has been a preponderance of investigation in to the efficacy of agriculture teacher-training programs (e.g., Myers & Dyer, 2004; Swortzel, 1999; Wordlow & Osborne, 2010). While inquiry in this area is important, and an integral part of the American Association for Agricultural Education (AAAE) National Research Agenda (Thoron, Myers, & Barrick, 2016), it is unrealistic to expect teacher-training programs to prepare teachers for the rigor of teaching without supplemental professional development (Lytle, 2000). The AAAE National Research Agenda also recognized the need for inquiry in the area of teacher professional development (Thoron et al., 2016). Grieman (2005) called for further research that explores the impact of professional development on teacher learning.

According to Webster-Wright (2009), continued growth has been an expectation of teachers. According to some researchers (Borko & Putnam, 1995; Desimone, 2009; Gusky, 2000) professional development is a critical part of educational reform. While the importance of professional development has been clear, the ideal way to deliver professional development has been a source of debate. The most common perception of professional development has featured formal conferences, seminars, or workshops (Mizell, 2010).

Darling-Hammond, Wei, Andree, Richardson, and Orphanos (2009) examined the trends of the professional development practice of teachers in the United States. According to Darling-Hammond et al., 92% of U.S. teachers in 2003-2004, and 95% in 1999-2000 participated in professional development events. Darling-Hammond et al. also reported that 83% of teachers are engaged in learning opportunities in the subjects they teach. While these numbers seem promising, the effects of the professional development have been mixed. According to Darling-Hammond et al., professional development is related to student learning gains if it is intensive, ongoing, and connected to practice. According to Desimone (2009), professional development should be focused on the content teachers are teaching, involve active learning, be coherent with previous professional development offerings, have a significant duration, and involve collective participation between teachers. According to Darling-Hammond et al., the professional development that teachers have been receiving has not met these criteria. Further, Darling-Hammond et al., reported teachers are not satisfied with their professional development opportunities.

According to the U. S. Department of Education (2005), sit-and-get or passive, one-shot workshops are no longer adequate for providing meaningful professional development to teachers. Additionally, reports by the U. S. Department of Education (2005) suggested schools have been moving towards more engaging models of professional development that focus on on-going training and emphasize practice, research, and reflection. This new model of professional development has required teachers to be active in reflecting on their practice and applying what they learned in professional development to their practice (Clarke & Hollingsworth, 2002; Desimone, 2009). While professional development reform has created more teacher-centered professional development, little has been done to explore the impact of teacher differences on their professional growth.

While the professional development needs of agriscience teachers has been thoroughly investigated (e.g., Andresen, Seevers, Dormody, & VanLeeuwen, 2007; Christensen, Warnick, Spielmaker, Tarpley, & Straquadine, 2009; Duncan, Ricketts, Peake, & Uessler, 2006; Harris, 2008; Joerger, 2002; Koundinya, & Martin, 2010; Layfield & Dobbins, 2002; McKim, Saucier, & Reynolds, 2011; Myers, Dyer, & Washburn, 2005; Roberts & Dyer, 2004; Saucier & McKim, 2011; Sorensen, Tarpley, & Warnick, 2010), the need to investigate the structure and format of professional development offerings still exist (Thoron et al., 2016). Sorensen and McKim (2014) called for further research to explore how the resources available to teachers can contribute to job satisfaction.

Theoretical and Conceptual Framework

Maslow's (1943) theory of human motivation explains how people strive for esteem and self-actualization once the needs for safety, physiological comfort, and love have been met.

According to Maslow, humans ". . . desire for strength, for achievement, for adequacy, for confidence in the face of the world, and for independence in freedom." After the need for self-esteem has been met, humans strive to find their true purpose in life. This study examines agriscience teachers search for esteem, and ultimately self-actualization, through professional development engagement. This search for esteem and self-actualization manifests itself in career-satisfaction. While other researchers (e.g., Herzberg, 1974) have attempted to codify career satisfaction, Maslow's theory provides the most simple and elegant explanation of this phenomena and thus was used to guide this inquiry.

The purpose of this study was to explore the relationship between professional development engagement and career satisfaction. According to Bransford, Darling-Hammond, and LePage (2005) teachers should have a set of professional commitments that push them to grow and learn throughout their career. This study examined the interplay of job satisfaction and professional commitments, chiefly the professional commitment of professional development engagement. According to Griffin (1983), the purpose of professional development has been to improve teacher practice and beliefs towards an articulated goal. More simply, professional development is the practice of creating meaningful teacher change (Gusky, 2002). This change can create educational reform, be a continuation of the teacher-training process, or to help teachers seek greater fulfillment as professionals (Clarke & Hollingsworth, 2002).

Clarke and Hollingsworth's (2002) interconnected model of professional growth served as the conceptual model for this study (see Figure 1). Clarke and Hollingsworth purported that teachers experience change in four interconnected domains: personal, external, practice, and consequence. These domains are connected through a series of enactment and reflection. Clarke and Hollingsworth explained that the process of teacher learning is not always a linear process, but rather one that moves between the different domains. The critical part of Clarke and Hollingsworth's model is the enactment and reflection that flow between the stages of the model. According to Clarke and Hollingsworth, reflection provides a link between professional experimentation, trying new practices in the classroom, and changing knowledge, attitudes, and beliefs, which prompt individuals to seek external sources of stimulus. These external sources of stimulus constitute a contemporary view of professional development, that is, workshops, training, professional reading, and the like. Clarke, Carlin, and Peter (1992) conducted a case study of a teacher participating in a professional development program. According to Clark et al., the teacher did not enact what was presented in the professional development session until the second session of the in-service training and only after he reflected on the practice. Hollingsworth (1999) used a case study approach to explore how primary teachers experienced mathematics professional development. The results of the analysis of the case studies led to the development of the teacher change model. According to Hollingsworth, teachers enact change from professional development in different ways and use reflection to prompt further exploration of concepts using other resources.

Purpose and Objectives

The purpose of this study was to explore the relationship between professional development engagement and career satisfaction. This study was guided by research priority 5: efficient and effective agricultural education programs. The specific focus in the priority area was improving program development, delivery, and evaluation of professional development programs (Thoron, Myers, & Barrick, 2016). The study was guided by the following objectives:

1- Describe the professional development engagement of agriscience teachers based on personal and professional demographic factors.
2- Describe the career satisfaction of agriscience teachers based on personal and professional demographic factors.
3- Describe the relationship between professional development engagement and career satisfaction for agriscience teachers.

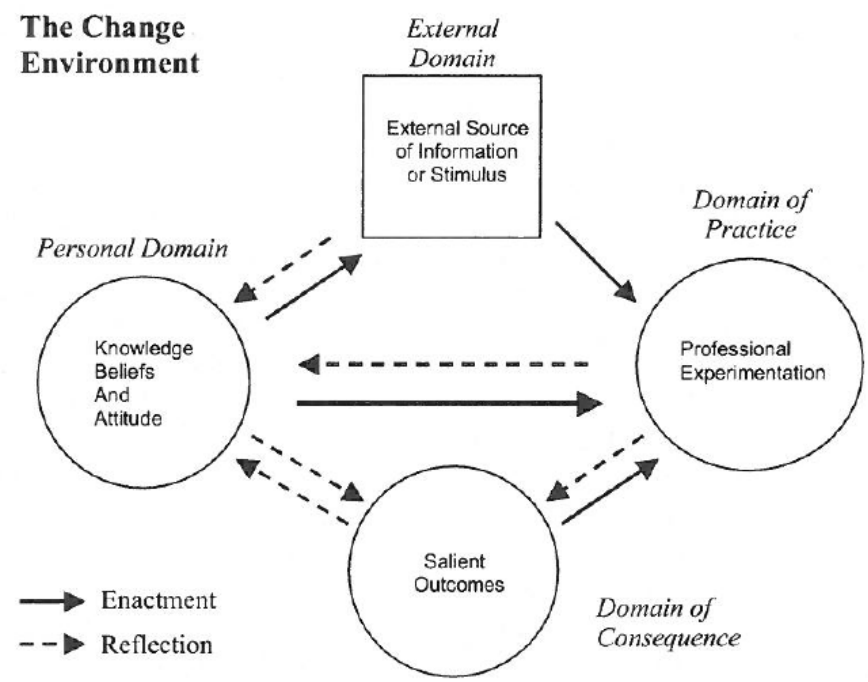

Figure 1. The interconnected model of professional growth (Clarke and Hollingsworth, 2002)

Methods

This study utilized a quantitative, descriptive-correlational design to examine the professional development engagement and career satisfaction of agriscience teachers. The population of interest was middle and high school agriscience teachers in the United States. Four states were selected to participate in the study. The states were purposefully selected to represent geographical diversity. Multiple states were also selected by the researcher to represent variations in professional development opportunities and dynamics in the teacher groups that could exist from state to state and could have an impact on professional development participation. Two states were chosen from the American Association for Agricultural Education's (AAAE) southern region, one from the North Central Region, and one from the Western Region. The states selected to participate in the study were Colorado, Florida, Minnesota, & North Carolina. A census of agriscience teachers was taken within each state. There were 127 teachers in Colorado, 400 teachers in Florida, 243 teachers in Minnesota, and 483 teachers in North Carolina. The sampling frame was obtained from the state agricultural education coordinator in each state.

This study was part of a larger study. The instruments used in this study consisted of two instruments and individual items to collect personal and demographic instrument. The professional development engagement instrument was developed by the researcher. The definition of professional development and core conceptual framework for studying the effects of professional development proposed by Desimone (2009) was used to develop the instrument. Desimone described areas of professional development practice. These areas were adapted for the professional development of agriscience teachers. These areas were (a) workshops related to agricultural education, (b) workshops in the school/district, (c) coaching and/or mentoring, (d) serving in leadership roles, (e) professional reading, (f) formal coursework, (g) informal dialogue, (h) professional learning communities, (i) observing others teach, and (j) feedback from others observing their teaching. Desimone described the levels of professional development as participation, value, and integration in their teaching. Each of the tem areas was explored on the three levels of participation, which provided a 30 item instrument which measured overall professional development engagement. Validity was established by a review of a panel of experts including a full professor in teacher education, an assistant professor in extension education, an associate professor in education, and a PhD candidate in agricultural education. The internal reliability was found to be in the acceptable range with a Chronbach's alpha of 0.91.

Lester (1987) developed the Teacher Job Satisfaction Questionnaire (TJSQ) to measure teacher job satisfaction. The instrument was designed using a random sample of elementary, junior high school, and senior high school teachers. Lester identified nine subscales of teacher job satisfaction. These subscales were: (a) supervision, (b) colleagues, (c) working conditions, (d) pay, (e) responsibility, (f) work itself, (g) advancement, (h) security, and (j) recognition. The instrument had 71 items. A five-point Likert-type scale was used that included strongly disagree, disagree, neither agree or disagree, agree, and strongly agree. Approximately 50% of the items were written using a negative form to prevent response set bias and were recoded for analysis. Internal consistency was calculated using Cronbach's alpha coefficient. Lester (1987) calculated the Cronbach's alpha to be .93. The Cronbach's alpha for each subscale was .92 for supervision, .82 for colleagues, .83 for working conditions, .80 for pay, .73 for responsibility, .82 for work itself, .81 for advancement, .71 for security, and .74 for recognition. The TJSQ was reduced by the researchers to 23 items and included in the pilot instrument. The subscales were not used for this study, and only the overall job-satisfaction score was calculated.

A five-item semantic-differential measure was used in the pilot assessment along with the TJSQ. The five-item scale was designed to measure teacher career satisfaction using fewer items. The Cronbach's alpha for the five-item scale was .97 for the pilot group. The Cronbach's alpha for the 21-item TJSQ was .85 for the pilot group. Content validity was determined for the five-item scale by measuring the correlation with the TJSQ. The 21 item TJSQ and the five item semantic-differential instrument were found to have a strong positive correlation ($r = .68$). Because the researcher-developed semantic differential career satisfaction scale was found to be a valid and reliable instrument, the TJSQ was not included in the instrument.

A mixed-mode e-mail preference survey method delivered using to the Tailored Design Method was utilized for this study (Dillman, Smith, & Christian 2014). A pre-notice letter was mailed as the initial contact. The letter contained a $1.00 incentive for teachers in Florida, Minnesota, and

North Carolina and store coupons, including a certificate for a free hat from Murdock's, were provided to the Colorado teachers. An e-mail invitation for the survey was sent around the time the mail contact was expected to arrive. After three rounds of e-mail contacts, a thank-you/reminder post-card was mailed. The non-respondents were sent a mailed paper questionnaire with a business reply envelope after a fourth e-mail contact was made.

The response rate was 72.5% (n = 892). The response by state was 74.8% (n = 89) for Colorado, 71.4% (n = 277) for Florida, 75.2% (n = 182) for Minnesota, and 71.4% (n = 344) for North Carolina. A total of 97.0% (n = 865) respondents completed the survey using the online instrument, the remaining 3.0% (n = 27) completed the paper copy. A Chi-square test was not found to be significant to compare the distribution of non-respondents and respondents by state (X^2 = 2.92; p = .57. Lindner, Murphy, and Briers (2001) suggested comparing early and late respondents to test for a non-response bias. The early respondents were those who responded to the first two contacts. There were 513 early respondents and 355 late respondents. No significant difference was found for age (X^2 = 38.46; p = .74) or years of teaching experience (X^2 = 32.36; p = .35).

The data were analyzed using SPSS 22.0. Frequencies were calculated for individual items. Means were totaled for each scale. A Pearson's R was used to determine the correlation of the professional development engagement scale and the career satisfaction scale.

Results

The mean score for the total scale was 118.3 (SD = 13.4; n = 858), indicating the teachers' level of professional development was near the agree range (agree = 120). The frequencies for individual items of the professional development engagement scale are displayed in Table 1 and Table 2. The strongly disagree and disagree responses were combined. The strongly agree and agree scores were also combined. Agriscience teacher reported the highest participation in workshops in their school and district and workshops related to agricultural education. The lowest areas of participation were formal courses for credit. The workshops in the school/district had the highest level of disagreement when participants were asked to rank the value of professional development. The type of professional development with the highest value was workshops related to agricultural education, followed by informal dialogue, coaching/mentoring, having others observe their teaching, and serving on leadership roles. The highest level of implementation into practice was workshops related to agricultural education. Other areas that had high levels of implementation were informal dialogue with other teachers and others observing them teach. The lowest level of implementation in their practice was formal courses for credit and professional learning communities.

The mean professional development engagement scores were examined based on professional demographic variables and are displayed in Table 3. The largest variation of mean scores for professional development engagement was between Minnesota teachers (M = 120.2; SD = 13.0) and North Carolina teachers (M = 116.9; SD = 13.6). Teachers who held a master's degree or higher only had a 0.2 higher mean score for professional development engagement than those with four-year degrees.

Table 1. Participation and Value of the Components of Professional Development

	n	Strongly Disagree & Disagree	Neither Disagree nor Agree	Strongly Agree & Agree
Participation				
Workshops (Ag. Ed.)	876	35	53	788
Workshops (School/District)	876	12	40	814
Coaching/Mentoring	873	95	124	654
Leadership Roles	874	114	159	601
Professional Reading	874	137	172	565
Formal course for credit	876	441	206	229
Informal dialogue	874	48	85	741
Professional Learning Community	875	56	59	760
Observing Others	874	131	171	572
Others Observing me	873	135	156	582
Value				
Workshops (Ag. Ed.)	875	11	40	824
Workshops (School/District)	873	169	203	501
Coaching/Mentoring	875	31	114	730
Leadership Roles	875	33	138	704
Professional Reading	876	69	245	562
Formal course for credit	876	97	281	498
Informal dialogue	876	19	72	785
Professional Learning Community	875	95	216	564
Observing Others	875	29	166	680
Others Observing me	872	29	108	735

Note: Items were on a 5-item Likert scale ranging from strongly agree to strongly disagree

The professional development engagement scores were analyzed by personal demographic data and are displayed in Table 4. The professional development engagement scores did not fluctuate beyond one standard deviation for all personal demographic variables. The largest difference in professional development engagement was between white, non-Hispanic individuals (M = 118.0; SD = 13.4) and all others (M = 123.2; SD = 14.3). Individuals with a household income from $120,000-$139,000 had a higher professional development engagement score (M = 120.7; SD = 12.8) than all other income groups. Females had a higher mean professional development engagement score (M = 119.8; SD = 12.9) than males (M = 116.8; SD = 13.8). It is worth noting that the mean scores did not fluctuate more than 5 points on a 150 point scale.

Table 2. Implementation of the Components of Professional Development

	n	Strongly Disagree & Disagree	Neither Disagree nor Agree	Strongly Agree & Agree	Does Not Apply

Implementation					
Workshops (Ag. Ed.)	860	16	37	807	0
Workshops (School/District)	863	82	148	633	0
Coaching/Mentoring	816	19	111	686	0
Leadership Roles	798	20	123	654	1
Professional Reading	815	46	186	582	1
Formal course for credit	687	38	172	472	5
Informal dialogue	841	19	66	756	0
Professional Learning Community	834	70	164	599	1
Observing Others	814	27	105	682	0
Others Observing me	836	22	107	707	0

Note: Items were on a 5-item Likert scale ranging from strongly agree to strongly disagree

Table 3. Mean Scores for the Professional Development Engagement by Professional Demographic Variables

	M	SD
State		
Colorado (*n* = 88)	117.5	12.3
Florida (*n* = 267)	116.9	13.6
Minnesota (*n* = 174)	120.2	13.0
North Carolina (*n* = 329)	118.7	13.7
Agriculture Teacher Prep. Program		
Yes (*n* = 647)	118.5	13.5
No (*n* = 206)	117.5	13.5
Teach subject other than ag.		
Yes (*n* = 351)	117.7	13.7
No (*n* = 504)	118.7	13.2
Teach 9-12 grade students		
Yes (*n* = 759)	118.4	13.4
No (*n* = 93)	117.9	13.5
Teach 6-8 grade students		
Yes (*n* = 303)	119.0	13.6
No (*n* = 547)	117.8	13.4
Highest Level of Education		
Four-year degree (*n* = 484)	118.2	12.6
Master’s or higher (*n* = 367)	118.4	14.6

Note: Professional Development Engagement Scores are on a scale from 30 - 150

Table 4. Mean Scores for the Professional Development Engagement by Personal Demographic Variables

	M	SD
Sex		
Female (*n* = 429)	119.8	12.9
Male (*n* = 429)	116.8	13.8

Marital Status		
Single (*n* = 183)	117.9	11.9
Married (*n* = 604)	118.3	13.9
Widowed/Divorced/Separated (*n* = 63)	119.7	13.8
Children under 18 in household		
None (*n* = 469)	118.9	13.0
1 (*n* = 145)	116.9	15.0
2 (*n* = 155)	117.4	12.4
3 or more (*n* = 81)	119.0	14.9
Household Income		
Less than $40,000 (*n* = 109)	117.3	11.6
$40,000 - $59,999 (*n* = 181)	118.3	12.6
$60,000 - $79,999 (*n* = 170)	118.3	14.4
$80,000 - $99,999 (*n* = 161)	118.8	13.1
$100,000 - $119,999 (*n* = 112)	118.0	13.9
$120,000 - $139,999 (*n* = 46)	120.7	12.8
$140,000 or more (*n* = 51)	117.5	14.9
Ethnicity		
White, non-Hispanic (*n* = 788)	118.0	13.4
All others (*n* = 43)	123.2	14.3

Note: Professional Development Engagement Scores are on a scale from 30 - 150

The overall career satisfaction of agriscience teachers was based on a five-item summated scale with a possible range of scores from 5 to 25 where higher scores represented a higher level of satisfaction. The mean score for agriscience teacher career satisfaction was 19.9 (SD = 4.4; *n* = 878). Thus, the teachers in this study reported that they were satisfied in their careers.

The mean career satisfaction scores were compared, based on professional demographic variables (see Table 5). The mean scores did not fluctuate more than one point between any of the groups. The standard deviations were stable across the characteristics, as well.
The mean career satisfaction scores were analyzed by personal demographic factors and displayed in Table 6. Single individuals had a lower mean career satisfaction (*M* = 18.8; SD = 4.5) than those who were married (*M* = 20.2; SD = 4.3) and widowed/divorced/separated (*M* = 20.1; SD = 4.5). There was some variability in career satisfaction scores between household income categories. The lowest scores were those with a household income of less than $40,000 (*M* = 18.6; SD = 4.8) and those with a household income of $140,000 or more (*M* = 21.6; SD = 4.2). There were negligible differences between the mean scores for males and females, as well as white, non-Hispanic and all other ethnicities.

Table 5. Mean Scores for the Career Satisfaction by Professional Demographic Variables

	M	SD
State		
Colorado (*n* = 89)	19.5	4.3
Florida (*n* = 273)	20.1	4.5
Minnesota (*n* = 179)	20.2	3.9

North Carolina (*n* = 337)	19.8	4.6
Agriculture Teacher Prep. Program		
Yes (*n* = 658)	19.9	4.4
No (*n* = 213)	19.9	4.6
Teach subject other than ag.		
Yes (*n* = 362)	20.2	4.2
No (*n* = 511)	19.8	4.5
Teach 9-12 grade students		
Yes (*n* = 774)	20.0	4.3
No (*n* = 96)	20.0	4.8
Teach 6-8 grade students		
Yes (*n* = 308)	19.8	4.5
No (*n* = 560)	20.0	4.4
Highest Level of Education		
Four-year degree (*n* = 495)	19.8	4.4
Master's or higher (*n* = 374)	20.1	4.5

Note: Career Satisfaction scores are on a scale from 5 - 25

Table 6. Mean Scores for the Career Satisfaction by Personal Demographic Variables

	M	SD
Sex		
Female (*n* = 440)	19.8	4.5
Male (*n* = 438)	20.1	4.3
Marital Status		
Single (*n* = 186)	18.8	4.5
Married (*n* = 617)	20.2	4.3
Widowed/Divorced/Separated (*n* = 65)	20.1	4.5
Children under 18 in household		
None (*n* = 474)	19.8	4.4
1 (*n* = 149)	19.8	4.8
2 (*n* = 162)	20.5	4.2
3 or more (*n* = 83)	20.1	4.1
Household Income		
Less than $40,000 (*n* = 112)	18.6	4.8
$40,000 - $59,999 (*n* = 182)	19.7	4.3
$60,000 - $79,999 (*n* = 175)	19.8	4.5
$80,000 - $99,999 (*n* = 164)	20.3	4.1
$100,000 - $119,999 (*n* = 117)	20.1	4.5
$120,000 - $139,999 (*n* = 46)	20.9	4.0
$140,000 or more (*n* = 51)	21.6	4.2
Ethnicity		
White, non-Hispanic (*n* = 801)	19.9	4.4
All others (*n* = 45)	19.8	4.8

Note: Career Satisfaction scores are on a scale from 5 - 25

Pearson's r correlations were used for comparisons between continuous variables. Professional development engagement and career satisfaction had a moderate correlation (r = 34) using the description of correlation magnitudes established by Miller (1998).

Conclusions, Implications, & Recommendations

The first objective was to describe the professional development engagement of agriscience teachers, based on personal and professional demographic factors. Overall participation in professional development was high, especially in workshops in the school/district, where 92.9% of the respondents indicated they either strongly agree or agree that they participate in this type of professional development. Engagement in workshops related to agricultural education, participating in professional learning communities, and having informal dialogue was also high. Despite the high participation, the value of certain professional development engagement was more varied. Workshops in the school/district had a low value compared to other types of professional development. These results showed the most meaningful types of professional development for agriscience teachers are workshops related to agricultural education. Workshops related to agricultural education should continue to be a central part of the professional development practice of agriscience teachers.

The level of implementation of knowledge learned in professional learning communities was relatively low for the agriscience teachers in this study. While these interventions have been promoted as a way to incorporate Desimone's (2009) core features of professional development and reflective practice, they may not be as meaningful for agriscience teachers. Since agriscience teachers rarely teach with more than 1-2 other agriscience teachers in the same school, participating in professional learning communities may be less impactful for them and removed from the context of their teaching. Perhaps a model of Professional Learning Communities of agriscience teachers could be explored. Principals in school districts that have implemented Professional Learning Communities are encouraged to find innovative ways to allow agriscience teachers to form Professional Learning Communities with other agriscience teachers, rather than other teachers within their school. Further research is warranted in this area.

There was a low level of agreement for the participation, value, and implementation of professional reading. Unlike workshops in the schools, which had a high level of participation and a low level of implementation, these findings showed that teachers are not engaged in professional reading at a high level. Further research is needed in this area. However, the sources of professional reading should be analyzed and improved. According to Little (1987), professional reading can be a part of informal professional development. However, if appropriate and relevant articles are not available, agriscience teachers cannot be expected to engage fully in professional reading. A repository of useful articles related to professional teaching knowledge and technical agricultural content should be developed.

Agriscience teachers value and implement teacher observations. However, they do not participate in observations at a high level. These findings showed teachers value observing others teach and having others observe them teach but they are not engaging in this activity as much as they could. Efforts should be made to increase opportunities for agriscience teachers to observe each other's practice and provide feedback. These observations should be solely for the purpose of professional development and not tied to assessment. Perhaps video recordings posted to an online platform could facilitate this type of professional development. Further research is warranted in this area.

Professional development engagement scores were not subject to large degrees of skewness and kurtosis, nor did they fluctuate beyond one standard deviation for any of the subgroups in the study. The fact that this variable was stable and fairly high showed agriscience teachers are involved in professional development. Desimone (2009) cautioned that participation in professional development does not matter as much as involvement in professional development that leads to student learning. This study found that teachers participate in professional development at a high level, but did not show the impact of their professional development.

The normal distribution of professional development engagement shows that teachers tend to participate in professional development, place value on professional development, and use professional development to inform their practice at varied levels. A system where teachers are actively involved in professional development would have a negatively skewed distribution, with more teachers showing high levels of professional development engagement than those who are below the mean. Such a distribution should be the goal for agriscience teachers nationwide.

The second objective was to describe the career satisfaction of agriscience teachers, based on personal and professional demographic factors. The data showed a slightly negatively skewed distribution in the career satisfaction data, which indicated that agriscience teachers are satisfied in their career. It was also observed that the measure of career satisfaction was stable across demographic characteristics, as the mean scores for the groups did not vary more than one standard deviation. These findings were congruent with Blackburn and Robinson (2008) and Sorensen and McKim (2014), who reported no differences in career satisfaction among demographic groups.

The third objective was to describe the relationship between professional development engagement and career satisfaction for agriscience teachers. A moderate correlation was found between professional development engagement and satisfaction. This finding differs from the findings of Sorensen and McKim (2014) who found a large, positive relationship between the variables of professional commitment and job satisfaction (r = .71). The discrepancy between the variables could be a result of the difference in how the variables are measured. The professional commitment instrument used by Sorensen and McKim was designed to measure teachers overall attitude towards the profession. This study used an instrument that measured participation, value, and implementation in professional development. The difference between overall attitude towards professional commitment and the manifestation of professional commitments should the subject of further investigation.

This study was guided by Maslow’s (1943) theory of human motivation. The findings of this study provides evidence for a link between engagement in professional development and reaching self-actualization in one’s career as measured by career satisfaction. Further research should be conducted to explore the phenomena of teacher motivation and its relationship to Bransford et al.’s (2005) call for quality teachers who are professionally engaged and make a difference in their students’ lives.

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Answering the Unanswered Questions: Linking School-Based Agricultural Education Involvement to Graduation, STEM Achievement, and Income

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Abstract

The progression of research on school-based agricultural education (SBAE) has been limited, in part, due to a lack of nationwide, student data detailing the effectiveness of SBAE. Using an ecological systems perspective, the relationships between SBAE enrollment; graduation rates; postsecondary science, technology, engineering, and mathematics (STEM) achievement; and income were explored using data from a nation-wide, longitudinal study conducted from 2002 to 2012. Results indicate SBAE students were more likely to be male, white, and have a lower socio-economic status than students not enrolled in SBAE. With regard to graduation rates, SBAE enrollment was a statistically significant, positive predictor of high school graduation. In fact, students enrolled in SBAE were 1.16 times more likely to graduate high school than students not enrolled in SBAE. In the analysis of STEM achievement, SBAE enrollment was a statistically significant, negative predictor of postsecondary science, math, and overall STEM GPA. With regard to income, each additional Carnegie unit of SBAE was related to $1,850.67 more annual income for high school graduates and $457.40 more annual income for postsecondary graduates. Findings are discussed in relation to the ecological systems theory, with an emphasis on recommendations for research and practice.

Introduction and Theoretical Framework

As a smaller profession, with limited resources, researchers in school-based agricultural education (SBAE) have a difficult time developing nationwide, longitudinal studies which examine the effectiveness of SBAE. The lack of large-scale research leads to conversations about SBAE being riddled with questions such as “I wish we knew nationally if SBAE impacted STEM achievement” or “Is SBAE better preparing students for career success?” To continue forward, SBAE needs to answer the questions which directly impact the discipline. The goal of the current paper is to begin to answer a few of the critical, unanswered questions. In answering key questions, we welcome the potential cognitive disequilibrium created and embrace the opportunity to gain insight into opportunities to enhance and support SBAE.

The current study seeks to break down prior limits of discourse regarding SBAE by identifying the relationship between SBAE enrollment, graduation rates, STEM achievement, and income using a national sample of secondary school students. Identifying the relationship between SBAE and critical outcomes will provide an opportunity for the discipline to reflect, plan, collaborate, and act in a more purposeful and informed manner. Additionally, the present study will account for three common limitations of current research which decrease our ability to holistically address the impacts of SBAE. Namely, limited generalizability due to non-longitudinal and state-wide studies, failure to account for mediating factors (e.g., sex, race, and socio-economic status), and failure to address STEM concepts other than science and math.

To provide a foundation on which to assess critical questions, we operationalized an ecological systems perspective (Bronfenbrenner, 1993; Lerner, 1995). The Ecological Systems theory posits human development and behavior are influenced by factors within different levels of environmental systems (i.e., individual, microsystem, mesosystem, exosystem, and macrosystem). Theorists with an ecological systems perspective contend a hierarchy of factors influence educational achievement (Bronfenbrenner, 1993). For example, because students (i.e., individual level) are rooted within a school system (i.e., microsystem and mesosystem), the teacher-student interaction, student-peer interaction, and student-academic program interaction can influence achievement. The emphasis of the current study is on the micro- and mesosystems; specifically, the influence of SBAE enrollment on graduation, STEM achievement, and income.

Literature Review

Three important outcomes related to secondary student enrollment in SBAE are considered in the current study: (a) graduation rates, (b) STEM achievement, and (c) income. Within the following review of literature, each of the identified outcomes are explicated by exploring literature throughout education.

High School Graduation

Dropping out of school has been a concern in American society for decades. In 2010, the Alliance for Excellence in Education (2010) reported approximately 1.3 million American children do not graduate each year, with about 7,000 students dropping out every day. Research indicates students most likely to drop out of school are of low academic ability, ethnic minority groups, or families in which parents did not graduate high school (Goldschmidt & Wang, 1999; Rumberger, 1995; Rumberger & Larson, 1998; Swanson & Schneider, 1999). Dropping out has negative effects on both the individual and society. Students who drop out are more likely to experience health problems, engage in criminal activity, earn less money, become dependent on government assistance programs, and not participate in the social or political process (Bridgeland, DiIulio, & Morrison, 2006; Federal Student Aid Information Center, 2011; Hayes, Nelson, Tabin, Pearson, & Worthy, 2002; Martin, Tobin, & Sugai, 2003; Muennig, 2007).

The relationship between SBAE enrollment and graduation rates has received little attention in the literature. However, numerous studies have demonstrated a positive relationship between Career and Technical Education (CTE) and graduation (Plank, 2001; Plank, DeLuca, & Estacion, 2005). Additionally, evidence suggests CTE has a positive impact on the graduation rates of at-risk and special needs students, who enroll in CTE courses at a higher rate (Gray, 2004; Okou, 2004). In SBAE, FFA (i.e., a co-curricular student leadership organization) is an integral component of the curriculum (Croom, 2008). Research suggests additional experiences, like FFA, reduce drop out (Mahoney & Cairns, 1997); more specifically, extracurricular activities yield students 2.3 times more likely to remain in school (Davalos, Chavez, & Guardiola, 1999). Furthermore, Bridgeland et al. (2006) suggest work-related experiences, which are foundations of SBAE, could have improved the graduation chances for 81% of dropouts. SBAE appears to offer graduation-enhancing experiences; unfortunately, no research has explored the relationship between graduation rates and SBAE enrollment on a national scale.

STEM Achievement

A large body of research indicates CTE courses offer opportunities to learn core academic (e.g., science, math) content (Brigman & Campbell, 2003; Dahir & Stone, 2003; Gysbers & Lapan, 2001; Silverberg, Warner, Fong, & Goodwin, 2004). However, research on the efficacy of academic learning within CTE courses has produced mixed results. Some studies suggest CTE students lag behind in mathematics achievement compared to students in other academic tracks (Crain et al., 1999; Plank, 2001) while other studies suggest students perform better in mathematics when it is integrated into CTE coursework (Nolin & Parr, 2013; Stone, Alfred, Pearson, Lewis, & Jensen, 2006). Similar to math, results vary in terms of SBAE enrollment and science achievement (McKim, Balschweid, Velez, & Lambert, 2016). Some studies suggest enhanced science learning among SBAE students (Chiasson & Burnett, 2001; Ricketts, Duncan, & Peake, 2006; Ross, 2001; Theriot & Kotrlik, 2009) while others identify no statistical difference (Connors & Elliot, 1995; Nolin & Parr, 2013) or significantly lower science achievement (Despain, North, Warnick, & Baggaley, 2016; Israel, Myers, Lamm, & Galindo-Gonzalez, 2012). Mixed results intensify the need for national research on the STEM achievement of SBAE enrollees.

Income

Income, the third outcome variable, has been sparsely explored in SBAE. However, in CTE, a 12-year longitudinal study indicated individuals who devoted about one-sixth of their high school enrollment to CTE earned at least 12% more one year after graduation and about 8% more seven years after graduation (Bishop & Mane, 2004). Another study compared CTE and non-CTE students who go directly into the workplace and found CTE students earned higher wages and were more likely to be employed in higher wage segments of the economy (Huang & Gray, 1992).

Existing research illuminates the potential for CTE, and in some cases SBAE, to positively influence graduation rates, STEM achievement, and income. However, for SBAE to advance, three important limitations must be addressed: (a) research specific to SBAE, (b) national research, and (c) attention to mediating factors like sex, race, and socio-economic status (SES). In the current study, we sought to address the identified limitations by exploring the relationship between SBAE involvement, graduation rates, STEM achievement, and income among a national sample of secondary school students when accounting for sex, race, and SES.

Purpose and Objectives

The purpose of the current study was to explore the relationship between SBAE enrollment, graduation rates, STEM achievement, and income among a nationally representative sample of secondary school students. The identified purpose was accomplished by addressing the following research objectives.

1. Describe the sex, race, and socio-economic status (SES) of public school students.
2. Determine the relationship between SBAE enrollment and high school graduation, accounting for sex, race, and SES.

3. Determine the relationship between SBAE enrollment and measureable achievement in STEM, accounting for sex, race, and SES.
4. Determine the relationship between SBAE enrollment and income, accounting for sex, race, and SES.

Methods

Research objectives were accomplished by analyzing data from the National Center for Educational Statistics (National Center for Educational Statistics, 2002), Educational Longitudinal Study (ELS:2002-2012), initially collected from 2002 to 2012. We retained a restricted use data file to allow for the tracking of students through 2012. The final data release, including postsecondary data, occurred in April 2015.

Population and Data Collection

The population for this study included all American high school sophomores in the spring of 2002. A stratified sample was utilized to reduce sampling error and to create subgroups of schools from which schools were independently selected. Initially, schools were stratified by superstrata (i.e., school type or sector and geographic region) and substrata (i.e., urban, suburban, rural) (U.S. Department of Education, 2004). A total of 800 high schools were selected, with 752 schools agreeing to participate (94% participation rate). Once schools agreed to participate, a rigorous recruitment process began with students, teachers, parents, librarians, and school administrators. In total, 15,362 high school sophomores from 50 states and the District of Columbia participated. Additional detailed methodological information can be found in the U.S. Department of Education, National Center for Educational Statistics, Education Longitudinal Study of 2002: Base Year Data File User's Manual (2004). With the exception of the first research objective, analysis was limited to public schools where SBAE was offered. Private schools, charter schools, or religiously affiliated schools were not included in the research frame.

Statistical Analysis

For the first research objective, descriptive statistics were used to describe the population. Objectives two to four were accomplished via logistic and linear regressions, after accounting for the four primary assumptions of regression analyses (Hair, Black, Babin, Anderson, & Tatham, 2006). Research objective one, pertaining to the actual demographics of the sample, was analyzed using unweighted data while research objectives two to four were analyzed with weighted data. Weighting data is typical to compensate for unequal probabilities of sample selection and to adjust for actual participation in the survey (U.S. Department of Education, 2004). The use of weighted data afforded enhanced statistical clarity, enabling generalizations to all high school sophomores enrolled in the United States in 2002.

During statistical analysis, several variables were considered which, while commonly used, bear explanation. Carnegie units were used as a categorical descriptor of SBAE units. Carnegie units are defined as, "A standard of measurement used for secondary education that represents the completion of a course that meets one period per day for one year" (U.S. Department of Education, 2004, p. E-17). Socio-economic status (SES) was a composite variable which included five equally weighted standardized categories: (a) father's/guardian's education, (b) mother's/guardian's education, (c) family income, (d) father's/guardian's occupation and (e) mother's/guardian's occupation. Occupation was standardized using the 1961 Duncan index for determining occupational prestige (U.S. Department of Education, 2004). In research objective one, SES is broken into four quartiles of lowest, mid to low, mid to high, and highest. In accordance with previous research (e.g., Plank et al., 2005) SES, sex, and race were included as control variables for research objectives two through four. Within the analyses, SES was a continuous variable, sex was dichotomous (i.e., 0 = female; 1 = male), and race was categorical.

Findings

In total, students in the sample enrolled in public schools included slightly more females (f = 4,750; 50.13%) than males (f = 4,730; 49.87%). A slight majority of females was also observed within public schools not offering SBAE and for students in public schools where SBAE was offered, but they did not enroll (see Table 1). For students enrolled in SBAE at a public school, the majority were male (f = 550; 60.90%). Additionally, students in SBAE included a comparatively higher proportion of white (f = 610; 70.83%), Hispanic (f = 120; 13.89%), American Indian/Alaska Native (f = 20; 2.33%), and Native Hawaiian/Pacific Islander (f = <10; 0.35%) students. However, a smaller proportion of Black or African American (f = 80; 8.98%) and Asian (f = 30; 3.62%) students enrolled in SBAE coursework. For socio-economic status (SES), students enrolled in SBAE were from a lower SES when compared to their peers.

Table 1

Sex, Socio-Economic Status, and Race of Respondents

	Public Schools, SBAE Offered			
	Students Enrolled in SBAE	Students Not Enrolled in SBAE	Public Schools, *No* SBAE Offered	All Public Schools
Sex				
Male	550 *(60.90%)*	1,480 *(47.09%)*	2,700 *(49.62%)*	4,730 *(49.87%)*
Female	360 *(39.10%)*	1,660 *(52.91%)*	2,740 *(50.38%)*	4,750 *(50.13%)*
Race				
American Indian/Alaska Native	20 *(2.33%)*	40 *(1.37%)*	60 *(1.08%)*	120 *(1.30%)*
Asian	30 *(3.62%)*	280 *(9.49%)*	740 *(14.44%)*	1,050 *(11.75%)*
Black or African American	80 *(8.98%)*	350 *(11.80%)*	820 *(16.08%)*	1,250 *(13.97%)*
Hispanic	120 *(13.89%)*	390 *(13.07%)*	690 *(13.48%)*	1,200 *(13.38%)*
Native Hawaiian/Pacific Islander	<10 *(0.35%)*	10 *(0.27%)*	20 *(0.35%)*	30 *(0.32%)*
White	610 *(70.83%)*	1,920 *(64.00%)*	2,780 *(54.57%)*	5,300 *(59.28%)*

Socio-Economic Status				
Lowest	130 *(14.41%)*	360 *(11.51%)*	490 *(9.06%)*	980 *(10.38%)*
Mid to Low	490 *(54.41%)*	1,340 *(43.20%)*	2,180 *(40.42%)*	4,010 *(42.67%)*
Mid to High	260 *(29.27%)*	1,190 *(38.15%)*	2,240 *(41.63%)*	3,690 *(39.30%)*
Highest	20 *(1.90%)*	220 *(7.14%)*	480 *(8.89%)*	720 *(7.65%)*

Note. All sample sized rounded to the nearest 10, per IES restricted-use guidelines.

Research objective two sought to determine the relationship between SBAE enrollment and high school graduation after accounting for sex, race, and socio-economic status (see Table 2). The logistic regression produced a statistically significant model (x^2 = 37,105.73; *p*-value < .001) that explained 7% of the variance in high school graduation (R^2 = .07). After accounting for sex, race, and SES, enrollment in SBAE was a statistically significant, positive predictor (*B* = .15; *p*-value < .001) of high school graduation. Furthermore, students who enrolled in SBAE were 1.16 times more likely than students who did not enroll in SBAE to graduate from high school (Odds Ratio = 1.16).

Table 2

Relationship between SBAE Enrollment and High School Graduation

	Dependent Variable: High School Graduation			
	B	*SEB*	Odds Ratio	*p*-value
Sex	.54	.01	1.71	<.001
Race	-.01	>.01	0.99	<.001
Socio-Economic Status	.79	.01	2.21	<.001
Enrolled in SBAE	.15	.01	1.16	<.001

Note. R^2 = .07, Chi-Squared = 37,105.73, *p*-value < .001. Enrolled in SBAE was measured as an indicator variable for students who completed SBAE credits.

Research objective three, which sought to determine the relationship between SBAE enrollment and STEM achievement, was analyzed using three linear regressions. First, postsecondary GPA in mathematics courses was analyzed in relation to units of SBAE when controlling for sex, race, and SES (see Table 3). The regression analysis was statistically significant (*F* = 5,990.81; *p*-value <.001) and explained 6% of the variance in postsecondary mathematics GPA (R^2 = .06). After accounting for sex, race, and SES, units in SBAE was a statistically significant, negative predictor (β = -.08; *p* – value < .001) of postsecondary mathematics GPA.

Table 3

Relationship between SBAE Enrollment and GPA in Postsecondary Mathematics Courses

	Dependent Variable: GPA in Postsecondary Mathematics Courses			
	B	*SEB*	β	*p*-value

Sex	.24	.00	.11	<.001
Race	.06	.00	.12	<.001
Socio-Economic Status	.18	.00	.12	<.001
Units in SBAE	-.11	.00	-.08	<.001

Note. R = .23, R^2 = .06, F = 5,990.81, p-value < .001.

In addition to using postsecondary GPA in mathematics, we analyzed the postsecondary GPA of students in science using multiple linear regression (see Table 4). The final model was statistically significant (F = 5,933.00; p-value < .001) and predicted 5% of the variance in postsecondary science GPA. Units in SBAE was a statistically significant, negative predictor (β = -.02; p-value < .001) of postsecondary science GPA.

Table 4

Relationship between SBAE Enrollment and GPA in Postsecondary Science Courses

	Dependent Variable: GPA in Postsecondary Science Courses			
	B	*SEB*	β	*p*-value
Sex	.13	.00	.06	<.001
Race	.05	.01	.11	<.001
Socio-Economic Status	.22	.00	.16	<.001
Units in SBAE	-.03	.00	-.02	<.001

Note. R = .22, R^2 = .05, F = 5,933.00, p-value < .001.

The third analysis for research objective three included GPA in all postsecondary STEM courses (i.e., including technology and engineering) as the dependent variable (see Table 5). The final model was statistically significant (F = 12,144.22; p-value < .001) and predicted 8% of the variance in GPA in all postsecondary STEM courses (R^2 = .08). After accounting for sex, race, and SES, units in SBAE was a statistically significant, negative predictor (β = -.03; p-value < .001) of postsecondary STEM GPA.

Table 5

Relationship between SBAE Enrollment and GPA in Postsecondary STEM Courses

	Dependent Variable: GPA in Postsecondary STEM Courses			
	B	*SEB*	β	*p*-value
Sex	.25	.00	.12	<.001
Race	.07	.00	.16	<.001
Socio-Economic Status	.22	.00	.15	<.001
Units in SBAE	-.03	.00	-.03	<.001

Note. R = .28, R^2 = .08, F = 12,144.22, p-value < .001.

After analyzing the relationships between units in SBAE and GPA in math, science, and STEM coursework using linear regressions, different levels of involvement in SBAE and mean, postsecondary GPA in math, science, and STEM courses were reviewed (see Table 6). Evaluating GPA by levels of SBAE involvement illuminated potential levels of involvement which may have yielded a higher GPA than no involvement in SBAE. Within math, mean GPA with no units of SBAE (*M* = 2.64; *SD* = 1.08) exceeded all levels of SBAE involvement (i.e., the highest GPA for SBAE involvement was for 4.00 to 4.99 Carnegie units; *M* = 2.56; *SD* = 1.06). The same pattern was observed within science, where the GPA in science with no units of SBAE (*M* = 2.57; *SD* = 0.98) exceeded all levels of SBAE involvement (i.e., highest GPA at 4.00 to 4.99 Carnegie units; *M* = 2.54; *SD* = 0.87). Within postsecondary GPA for all STEM courses, students having been enrolled in 4.00 to 4.99 Carnegie units of SBAE (*M* = 2.54; *SD* = 0.98) slightly exceeded the GPA of students not enrolled in SBAE (*M* = 2.50; *SD* = 0.97).

Table 6

Comparison of Units of SBAE and Math, Science, and STEM Post-Secondary GPA

Units of SBAE	Mathematics GPA			Science GPA			STEM GPA		
	f	*M*	*SD*	*f*	*M*	*SD*	*f*	*M*	*SD*
None	371,681	2.64	1.08	410,458	2.57	0.98	516,250	2.50	0.97
0.01 to 0.99	10,014	2.37	1.01	11,403	2.44	1.01	16,949	2.41	0.96
1.00 to 1.99	28,441	2.32	1.18	27,922	2.42	1.08	42,969	2.27	1.12
2.00 to 2.99	11,885	2.37	1.20	15,013	2.42	1.03	21,202	2.17	1.09
3.00 to 3.99	7,243	2.22	1.15	8,886	2.16	1.05	11,992	2.30	0.98
4.00 to 4.99	6,778	2.56	1.06	7,604	2.54	0.87	9,321	2.54	0.98
5.00 or more	1,906	1.75	1.32	2,792	2.49	0.74	3,483	2.30	0.95

Note. Frequencies provided reflect weighted data.

In the fourth research objective, focus transitioned from academics (i.e., graduation and postsecondary GPA) to labor market outcomes, specifically income. First, the relationship between units in SBAE and the 2011 income of high school graduates (see Table 7) and postsecondary graduates (see Table 8) were explored separately due to differences in earning potential among the two groups. For high school graduates who did not pursue postsecondary schooling, the model with sex, race, SES, and units in SBAE was statistically significant (F = 5,767.09; p-value < .001) and predicted 17% of the variance in income (R^2 = .17). When accounting for sex, race, and SES, units in SBAE was a statistically significant, positive predictor (β = .10; p-value < .001) of 2011 income. Using the unstandardized beta (i.e., *B*), a one Carnegie unit increase in SBAE enrollment was related to $1,850.67 more in 2011 income.

Table 7

Relationship between SBAE Enrollment and Income for High School Graduates

	Dependent Variable: Income in 2011			
	B	*SEB*	β	*p*-value

Sex	-14,908.10	11.57	-.38	<.001
Race	935.24	24.80	.11	<.001
Socio-Economic Status	-313.04	95.54	-.01	.001
Units in Agricultural Education	1,850.67	51.53	.10	<.001

Note. R = .41, R^2 = .17, F = 5,767.09, p-value < .001.

Similar to the previous analysis, 2011 income for postsecondary graduates was analyzed in a regression with sex, race, SES, and units in SBAE (see Table 8). The model was statistically significant (F = 11,118.79; p-value < .001) and predicted 6% of the variance in 2011 income for postsecondary graduates (R^2 = .06). After accounting for sex, race, and SES, units in SBAE was a statistically significant, positive predictor (β = .02; p-value < .001) of income among postsecondary graduates. Furthermore, an additional Carnegie unit of SBAE was related to an additional $457.40 in 2011 income.

Table 8

Relationship between SBAE Enrollment and Income for Postsecondary Graduates

	Dependent Variable: Income in 2011			
	B	*SEB*	β	*p*-value
Sex	-8,944.55	54.06	-.19	<.001
Race	570.01	13.11	.05	<.001
Socio-Economic Status	3,740.27	39.75	.11	<.001
Units in Agricultural Education	457.40	30.82	.02	<.001

Note. R = .24, R^2 = .06, F = 11,118.79, p-value < .001.

In addition to exploring the relationship between involvement in SBAE and income using linear regressions, the mean 2011 income for varying levels of enrollment was analyzed (see Table 9). For high school graduates, five of the six levels of SBAE enrollment (i.e., 1.00 to 1.99, 2.00 to 2.99, 3.00 to 3.99, 4.00 to 4.99, and more than 5.00 units of SBAE) exceeded the income of individuals who did not enroll in SBAE (M = 19,307.43; SD = 18,097.71) with the starkest difference illustrating students who enrolled in 4.00 to 4.99 Carnegie units of SBAE (M = 31,248.58; SD = 20,317.49) made $11,951.15 more in 2011 than students who did not enroll in SBAE. For post-secondary graduates, three of the six levels of SBAE enrollment (i.e., 3.00 to 3.99, 4.00 to 4.99, and more than 5.00 units of SBAE) yielded a higher 2011 income than students who did not enroll in SBAE (M = 26,384.15; SD = 23,854.15) with the starkest difference showcasing students who enrolled in more than 5.00 Carnegie units of SBAE (M = 35,031.05; SD = 18,408.24) earned $8,646.06 more than students who did not enroll in SBAE.

Table 9

Comparison of Units of SBAE and Income

		High School Graduate, No Post-Secondary			Post-Secondary Diploma	
Units of SBAE	*f*	*M*	*SD*	*f*	*M*	*SD*

None	87,112	19,307.43	18,097.71	624,326	26,384.99	23,854.15
0.01 to 0.99	6,763	16,875.94	17,472.04	28,958	21,042.59	21,214.93
1.00 to 1.99	15,422	26,434.82	26,101.01	60,289	25,490.53	22,639.83
2.00 to 2.99	9,071	29,066.12	21,093.75	30,467	26,051.52	19,194.21
3.00 to 3.99	2,128	27,206.06	11,557.69	14,516	32,029.89	21,882.01
4.00 to 4.99	1,707	31,248.58	20,317.49	11,112	31,084.94	18,620.81
5.00 or more	1,130	25,750.47	10,504.23	4,294	35,031.05	18,408.24

Note. Frequencies provided reflect weighted data

Conclusions and Discussion

A goal of the current study was to spark informed conversations about the status and future directions of SBAE. Therefore, the conclusions and discussions are purposefully designed to initiate conversations by introducing readers to pivotal questions emerging from the results of the current study. Before moving forward, however, we must address two limitations. First, data collection began in 2002 and concluded in 2012, with final results available in 2015. Given the timeframe and the continual evolution of education, society, and SBAE, the current picture may vary from the findings. Unfortunately, longitudinal research takes time, and given the many years needed to collect data, we will not realize any more nationally representative data of this scale for some time. Second, analyses of the research objectives yielded limited explanatory power (i.e., r^2 values ranged from .05 to .17). Human achievement is the product of complex networks of variables (e.g., location, personality, professional networks) not considered in the current study, which explain the unaccounted variances. When formulating the discussion, identified limitations were taken into consideration with purposeful focus on practically significant results and discussions to illuminate how data collected from 2002 to 2012 inform current and future practices in SBAE.

Question 1: Recruiting Black and Asian Students

Comparing the demographics of respondents enrolled in public high schools illuminates a lower proportion of Black and Asian students in SBAE courses. Previously, limited minority enrollment in SBAE may have been rationalized by pointing to the higher proportion of SBAE programs in rural, largely white communities. However, these data illustrate when Black and Asian students have the option to enroll in SBAE, they do so at a lower rate than their peers. The missing perspectives of Black and Asian students has the potential to weaken SBAE and could be a contributing factor to less diversity within professional agriculture, food, and natural resource (AFNR) sectors. Within SBAE, conversations must begin to answer - *what should we be doing to engage more Black and Asian students?*

As a profession, SBAE must act with purpose and intention to understand the reduced enrollment of Black and Asian students. To provide direction, the decisions of Black and Asian students to enroll, or not enroll in SBAE should be considered from an ecological systems perspective. Specifically, analysis should be done at the microsystem and macrosystem levels. At the microsystem level, efforts should explore the influence of teacher to student, student to peer, and student to SBAE program interactions to identify potential roadblocks to Black and Asian student enrollment. Additionally, efforts should explore the macrosystem level; specifically, research into the intersections of Black and Asian culture, agriculture, and SBAE. Research will be necessary to address these potential influencers on a broader scale. However, we recommend SBAE programs and teacher education programs evaluate the content, culture, and norms of focus and how current programmatic foci influence recruitment of Black and Asian students. As a product of research and programmatic evaluations, we look forward to a collective conversation in SBAE regarding areas for improvement as well as current areas of strength with regard to recruiting Black and Asian students.

Question 2: Evaluating STEM Learning in SBAE

In an effort to understand the relationship between SBAE enrollment and STEM learning, the relationship between units of SBAE and postsecondary math, science, and STEM GPA were analyzed. First, we recognize the limitations of this analysis; specifically, the potential evolution of SBAE since 2002 with regard to STEM education; the potential variations in postsecondary institutions, courses, instructors, and grading processes; and individual student factors which may have influenced our analyses. Acknowledging those limitations, findings from this research provided no evidence SBAE enrollment was related to increased math, science, or STEM GPA at the postsecondary level. In fact, evidence emerged linking increased SBAE coursework to reduced math, science, and postsecondary STEM GPA. Importantly, these findings are not the first to suggest SBAE does not improve measurable STEM achievement (Connors & Elliot, 1995; Despain et al., 2016; Israel et al., 2012; Nolin & Parr, 2013)

Initially, findings may cause concern regarding the impact of SBAE enrollment on STEM learning; however, we believe findings illuminate a chasm between the envisioned role of SBAE in STEM and the way STEM learning is evaluated. Throughout the history of the discipline, SBAE has claimed teaching agriculture, food, and natural resources (AFNR) *contextualized* STEM concepts. However, research into the STEM learning of students in SBAE consistently uses *decontextualized* STEM achievement as the outcome of interest. Within the current study, postsecondary STEM GPA was considered as an indicator of STEM achievement. While dependent on institution, course, and instructor, postsecondary STEM courses rarely contextualize concepts within AFNR; therefore, as others before us, we used a decontextualized outcome to measure a contextualized approach to STEM learning. Within SBAE, conversations must begin to answer – *what must change to better connect the STEM learning approach of SBAE to the way we evaluate STEM knowledge?*

Connecting practice and evaluation is critical for the continued evolution of STEM and AFNR learning. To link practice and evaluation, two approaches should be considered: (a) re-conceptualize the role of SBAE as a method through which students learn *decontextualized* STEM concepts or (b) develop new methods to evaluate *contextualized* STEM knowledge and skills. Recognizing the critical importance of AFNR knowledge and skills as well as the ethos of SBAE (i.e., to build AFNR knowledge) we encourage maintaining the contextualized STEM education approach in combination with the development, and use, of new evaluation methods focused on contextualized STEM knowledge and skills.

Question 3: Positioning AFNR for Future Success

In the current study, three potential outcomes of student enrollment in SBAE (i.e., graduation, STEM achievement, and income) were considered. As discussed, no evidence emerged linking SBAE enrollment and STEM achievement. However, evidence suggested SBAE enrollment was related to increased graduation rates and higher incomes. The positive relationship between SBAE and graduation rates supports existing literature identifying a positive relationship between CTE and graduation (Plank, 2001; Plank et al., 2005). Likewise, the positive relationship between SBAE enrollment and income supports existing research evaluating CTE enrollment and income (Bishop & Mane, 2004; Haung & Gray, 1992).

First, and foremost, findings provide an exciting foundation for marketing current and future SBAE programs. Specifically, marketing information should highlight three findings, (a) students who enrolled in SBAE were 1.16 times more likely to graduate high school than students who did not enroll in SBAE, (b) each additional Carnegie unit (i.e., one course, one period a day, for one year) of SBAE enrollment was related to $1,850.67 more in annual income among high school graduates, and (c) each additional Carnegie unit of SBAE enrollment was related to $457.40 more in annual income among postsecondary graduates. Second, findings, especially when juxtaposed with those of STEM achievement, provide an opportunity to reflect on, and discuss, – *what disciplinary foci best positions SBAE for future relevance and an enhanced impact on students?*

In 1988, the focus of SBAE transitioned from vocational preparation to STEM (i.e., emphasizing science) knowledge building (McKim et al., 2016). This transition was a critical maneuver to ensure the continued relevance of the discipline in light of social pressure on education to focus on core academic subjects. However, the findings from the current study do not appear to support this transition. In fact, graduation rates and income (i.e., two areas positively associated with SBAE enrollment) are more closely aligned outcomes of vocational preparation than STEM achievement (i.e., the one area negatively associated with SBAE enrollment). For the SBAE discipline to increase in relevance and positive student impact, which outcome(s) should the discipline strive for? Should SBAE continue to push STEM learning with the hope of measureable student success? Should SBAE return to its vocational roots, marketing the discipline as a way to enhance graduation rates and the professional earning potential of students? Should SBAE attempt to combine goals, seeking to enhance STEM learning and vocational development? Is there a new outcome (e.g., ecological problem solving, leadership, social equity) which would better propel SBAE in an enhanced direction? Engaging in conversations around potential future directions is a challenging, yet valuable, endeavor.

Answering unanswered questions often provides a foundation to ask more questions. In this study, we sought to pose challenging questions. Engaging in the self-reflection and critical conversations required to answer the questions may at times prove difficult. However, progression as a discipline depends on the collective willingness of SBAE professionals, at all levels, to address these challenging questions with a commitment to better the experience of SBAE students, today and tomorrow.

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Perceptions of African-American Students on Pursuing Agricultural and Natural Resources Careers: Voices from an 1862 Land-grant Institution

Abstract

This phenomenological study examined the lived experiences of nine African-American students pursuing an agricultural and natural resources (ANR) degree at an 1862 land-grant institution. Individual interviews were conducted, and participants were asked about their experiences studying ANR. Six themes were found based on the participants' perceptions. The participants perceived African-American history in regard to slavery and its aftermath affected the number of African-Americans pursuing careers in ANR today. The participants also shared experiences and influences that motivated them to pursue careers in ANR and persist toward their related goals. Learning the motivations of the African-American undergraduate students choosing ANR majors helped expose layers of nuance and complexity comprising the phenomenon. The results revealed areas in which additional research should be conducted to help promote more racial diversity in the ANR sector, including preparation through university degree programs.

Introduction/Review of Literature

During the several decades after the Reconstruction Era in the United States (Browne, 2003), nearly 1 million African-American farmers owned an estimated 15 million acres of land (Grant, Wood, & Wright, 2012). At that time, African-Americans represented more than 13% of all farmers nationwide (Browne, 2003). Beginning in 1920, the number has declined by 98% due to economic struggles, racial discrimination, and land loss (Wood & Gilbert, 2000). Although "African American farmers are historically important contributors to agriculture in the United States" (Balvanz et al., 2011, p. 68), today, African-Americans involved in agriculture represent a very small percentage of the total. Balvanz et al. (2011) suggested several causes:

> African Americans face[d] institutional and social discrimination. The deleterious effects of discriminatory practices continue to be barriers to maintaining the family farm. Discriminatory lending is associated with farmland loss, such that the number of African American farmers in the United States has been falling at a much higher rate than that of White farmers. (p. 68)

Many advocates recognize African-American farmers face specific barriers and started organizations to address their needs, including groups whose purpose is to expose inner-city, African-American youth to the agricultural industry (Grant et al., 2012). Collaborations among 1890 land-grant colleges, The Black Farmers and Agriculturalists Association, and other organizations are pursued to help educate African-Americans about their agricultural history and the importance of keeping agriculture alive in the African-American community (Moon, 2007).

Life for African-Americans After Slavery

The conclusion of the American Civil War marked the end of legal slavery in the United States, and the number of African-American farmers increased, reaching its peak in the early 1900s (Browne, 2003). The promise made to African-Americans at slavery's end was that *40 acres and a mule* were to be given to freed slaves (Gates, 2013). However, when President Andrew Johnson came into office following Abraham Lincoln's assassination in 1865, he terminated most small-farm initiatives for freed slaves, preventing this promise from materializing the way it was intended (Gates, 2013). The alternative result for many was tenant farming or sharecropping (Moon, 2007). The system of sharecropping kept many African-Americans in constant debt to land owners, and their acquired land was often substantially fewer acres as compared to White neighbors (Brown et al., 1994). The earnings of most African-American sharecroppers were inadequate to sustain a comfortable way of life (Hornsby, 2010).

Nonetheless, the peak of land ownership among African-Americans was during the early 1900s (Browne, 2003), and, at that time, land ownership was a symbol of hope for many (Merem, 2006). Across an 80-year span, however, their land ownership dropped from 15 million acres to slightly more than 2 million (Browne, 2003). Many African-American farmers did not receive sufficient information to capitalize on government programs designed to help them (Merem, 2006). According to Merem (2006), lack of knowledge on farm policies and programs created more financial issues. He also found "the current institutional set up overseeing agricultural land use and rural affairs favored big corporate farms over small family farms associated with Black farmers" (Merem, 2006, p. 98). Many African-American farmers also expressed experiencing discrimination from the USDA: "The common complaint was that Black farmers had been purposely driven into bankruptcy through discriminatory procedures of the Farm Service Agency and the local farmer committees that approved USDA entry" (Browne, 2003, p. 145). With most African-American farmers averaging around 65 years of age, today's lack of representation of African-American youth in production agriculture is apparent (USDA, 2007); less than 1% of African-American farmers are under 25 years of age (Merem, 2006).

In 1872, Senator Justin Smith Morrill presented a bill in Congress that would become The Second Morrill Act (Neyland, 1990). This act finally passed in 1890, 28 years after the original Morrill Land-Grant College Act had become law; it allowed for the creation of state colleges for Black students who would study agriculture and mechanic arts (Kerr, 1987). After the end of slavery, however, some resistance existed among freed African-Americans about whether to study agriculture (Moon, 2007). For example, when African-Americans were provided an opportunity to pursue an education and establish institutions, a debate ensued about whether to create a curriculum to continue to develop practical skills and trades or a program of study stressing the liberal arts and humanities (Moon, 2007). This issue continued after enactment of the Second Morrill Act. The idea of attending an institution dedicated to the study of agriculture did not appeal to many African-Americans. The horrors of the past seemed to still linger and "their history of exploitation during slavery and slavery's aftermath had taken the dignity and respect out of agricultural and mechanical occupational pursuits" (Neyland, 1990, p. 21).

Another trend, which occurred during the 1890s, was that many African-Americans moved from the rural countryside to the city (Harris, 1992). This migration influenced more African-Americans to leave agricultural jobs and gravitate toward industrial work (Harris, 1992). "From 1910 to 1920, more than half a million African Americans left the South, with the largest numbers migrating in a three-year span, 1916-19, in what has been called the Great Migration" (Harris, 1992, p. 36). Not only did many African-Americans leave the rural South for a more industrialized North, they also moved to cities in the South (Harris, 1992). During this time, a few influential African-American thought leaders emerged to help the efforts of promoting agriculture among their people (Ownby, 2003). Booker T. Washington was one such individual who led the development of Tuskegee Normal and Industrial School, now Tuskegee University, a historically Black university with strong agricultural roots (Croom, 2007; Croom & Alston, 2009; Ownby, 2003). Contrary to some American-American leaders, Washington "believed all Black southerners needed to know how to work on a farm. He idealized the skills of subsistence farming and urged people to use them to escape poverty" (Ownby, 2003, p. 34).

Shortly after the *Great Migration,* an organization was created to promote agriculture among young Black males: New Farmers of America (NFA) was founded in 1935 (National FFA Organization, 2013). The NFA "was an organization of Negro farm boys studying vocational agriculture in the public schools throughout 18 states in the eastern and southern United States" (Wakefield & Talbert, 2003, p. 95). NFA reached its peak of active membership in 1963 with 58,132 members (National FFA Organization, 2013). The purported *merger* of the NFA with the Future Farmers of America (FFA) occurred in 1965 (Wakefield & Talbert, 2003). NFA was a prosperous organization before the merger (Wakefield & Talbert, 2003), and it contributed more than 50,000 students to the FFA membership roll in 1965. In 2013, however, 579,678 members comprised the National FFA Organization and only 8% were African-American (National FFA Organization, 2013). To evaluate the merger's effects, Wakefield and Talbert (2003) interviewed former NFA members. Their study's participants said involvement in NFA contributed to them developing leadership skills but observed few African-Americans held leadership positions in FFA after the merger. Participants also said they perceived this lack of leadership led to poor morale among Black FFA members following the merger (Wakefield & Talbert, 2003).

African-Americans in Higher Education including Agriculture and Natural Resources

In 2000, African-Americans represented roughly 11% of the total enrollment of higher education institutions in the United States (Burns, 2006). However, "[u]nderrepresented minorities tend to struggle to find instructors, classmates and programs with which they feel a connection" (Anderson II, 2006, p. 11); Vincent, Henry, and Anderson II (2012) concurred. With African-Americans representing 13% of the nation's population, universities have developed recruitment strategies to increase the number of African-Americans in higher education (Burns, 2006) with limited success. From 2002 to 2005, a slight decline occurred in the enrollment of African-American undergraduate students studying for degrees in ANR (Burns, 2006, p. 10).

Dr. Charles Magee, professor and director of biological and agricultural systems engineering at Florida A&M University, expressed the idea that if African-Americans saw more images of themselves on agricultural products they may be more eager to learn about the industry and its career opportunities (Morgan, 2000). "If our children could look at Carver's face on a jar of peanut butter, they would start saying 'I want to be like George and not just be like Mike [i.e., Michael Jordan]'" (Morgan, 2000, p. 24). Morgan (2000) spoke with Dr. Annie King, an associate dean in the College of Agricultural and Environmental Sciences at the University of California-Davis, to explore her thoughts on the lack of African-American representation in agricultural programs. Dr. King shared:

> I was taught by my parents, who had been sharecroppers, that working on the land or with products from the land was an honorable profession. … But many parents and grandparents today tell young men and women about the great hardship associated with slavery or they speak about dirty, hard work with low pay, or even the loss of family-owned farms. (Morgan, 2000, p. 23)

Brown (1993) conducted a study to investigate the core reasons why African-American youth do not seem to show much interest in agriculture. He concluded some of the contributing factors were home life, school-related, and the importance of education in general (Brown, 1993). Brown (1993) found most African-American students avoid agriculture programs because of the misconception only farm and other production-related jobs are available in the industry (Brown, 1993). He concluded many high school participants had little or no knowledge of agriculture or the careers available in the agriculture industry (Brown, 1993). Talbert and Larke (1995) also found African-American students enrolled in secondary agriscience in Texas had less of a rural background and held more negative attitudes about agriculture than White students. Nevertheless, some African-Americans continue to aspire for careers in ANR. Examining the *lived experiences* of African-American students who chose to pursue ANR career preparation by earning university degrees may provide insight about this phenomenon.

Theoretical Lens: Expectancy Value Theory

Expectancy value (E-V) theory can provide a basis for examining what individuals expect regarding success associated with actions and how that would add to their accomplishment behaviors. Persistence, task choice, and performance are influenced by expectancies and values, which are impacted by how individuals perceive their proficiencies and the difficulties associated with various tasks as well as their personal self-schema and goals (Wigfield & Eccles, 2002). The satisfaction a person experiences from performing a task or the personal interest he/she has in a subject area is its *intrinsic value* (Wigfield & Eccles, 2002). When individuals create current and future goals, how well those goals relate to a task is defined as *utility value.* The negative parts of performing a task are considered its *costs* (Wigfield & Eccles, 2002). Participants' views on studying for careers leading to employment in the ANR sectors were interpreted through E-V theory: What made the students decide to pursue careers in an area where they are a minority and, historically, as a race, faced numerous hardships? A phenomenological approach was an appropriate method for studying their views.

Study's Purpose and Research Questions

This study sought to examine the *lived experiences* of African-American students who attended an 1862 land-grant institution during the 2013-2014 academic year. Two research questions guided this study: a) How did the students' experiences influence their choices of college majors and related career objectives? b) What was the *essence* of the students' lived experiences?

Methods and Procedures

Phenomenology emphasizes lived experience and interpretation (Merriam, 2009). The phenomenological approach allows researchers to examine human experiences from the perspective of the study's subjects (Creswell, 1994). "The task of the phenomenologist, then, is to depict the essences or basic structure of experience" (Merriam, 2009, p. 25). In such studies, what emerges is the phenomenon's *consciousness* (Moustakas, 1994), and the primary concern of the researcher is to expose the firsthand experience of an individual from his or her perspectives (Lester, 2005). Moustakas (1994) explained the concept of a phenomenon: "The very appearance of something makes it a phenomenon. The challenge is to explicate the phenomenon in terms of its constituents and possible meanings, thus discerning the features of consciousness and arriving at an understanding of the essences … ” (p. 49). An *essence* is the brief description stemming from the phenomenon’s textural and structural description (Creswell, 2013). It summarizes the individuals’ shared experiences by reducing them to the essentials (Creswell, 2013). Moreover, the transcendental phenomenological approach used in this study included *Epoche,* i.e., the lead researcher “engage[d] in disciplined and systematic efforts to set aside prejudgments regarding the phenomenon being investigated” **(**Moustakas, 1994, p. 22).

Study Population and Participants

The target population of this study was African-American students between the ages of 18 and 25 who attended Oklahoma State University and studied in the College of Agricultural Sciences and Natural Resources (CASNR) during the 2013-2014 academic year. Of the 2,720 students studying in CASNR, 46 were African-American, including graduate and undergraduate students (CASNR, 2014). After soliciting subjects through electronic mail messages and snowball sampling (Creswell, 2013), nine undergraduate African-American students were recruited.

Ricky, an 18-year-old freshman male from a rural area in the South, was majoring in landscape architecture. Although drawn to nature and the outdoors, he had no early exposure to agriculture and no family members or friends involved in the industry. *Taylor,* a 19-year-old freshman female from a metropolitan area in the South, was majoring in animal science with a pre-vet concentration. Being raised around animals, mostly dogs, sparked her love for animals; however, she did not have family members or friends in agriculture. *Kasey*, a 19-year-old sophomore female from a metropolitan area in the South, was majoring in animal science. She grew up a block away from a downtown area, but her grandfather owned a farm she visited.

Kenny, a 21-year-old senior male from a metropolitan suburb in the South, was majoring in agribusiness. His first exposure to agriculture was spending some summers on his grandfather’s small family farm. *Eddie,* a 20-year-old freshman male from a metropolitan area in the South, was majoring in agribusiness. He spent three years in an inner-city high school and his senior year in a suburban high school. Eddie was exposed to agriculture at a young age by his grandmother, who raised livestock. *Cassie*, a 19-year-old freshman female from an urban area in the South, was majoring in animal science with a pre-vet concentration. She was introduced to agriculture in ninth grade when she joined FFA and began agricultural education courses; some of her relatives were involved in agriculture.

Derek, a 20-year-old freshman male from an urban area in the South, was a freshman majoring in animal science. His agricultural involvement began during his sophomore year in high school when his desire to ride horses connected him with a horse rancher. He began learning and working for the rancher, became FFA president, and did horse judging, livestock judging, and parliamentary procedure. *Destiny,* a 19-year-old freshman female from an urban area in the South, was majoring in animal science with a pre-vet concentration. Although having a love for animals and regularly attending rodeos, she did not have family in agriculture. *Robert,* a 20-year-old male from a southeastern state, was a junior majoring in agricultural education. He grew up on his family farm where his adoptive White parents taught him the importance of agriculture.

Data Collection and Analysis

Face-to-face interviews lasting approximately 60 minutes were held with each participant (Creswell, 1994). The interviews included semi-structured, open-ended questions, which allowed the flexibility to follow emerging ideas (Merriam, 2009). The questions – prepared and emergent – explored the study's phenomenon and encouraged the participants to reveal personal experiences and their related meanings (Moustakas, 1994). The interviews were recorded with an *iPhone* using the downloadable, digital recording application *Audio Memos*. Each was transcribed using *Express Scribe*, a transcription software. When the transcripts were created, each participant was given a pseudonym to protect his or her identity. After transcription of the data in Microsoft Word, participants were sent their transcripts via an electronic mail message and given five days to respond with clarifications, i.e., member-checking (Lincoln & Guba, 1985). The changes received were applied to the transcripts.

Data were analyzed by using Moustakas' (1994) modification of the Van Kaam Method through which the lead researcher reviewed each transcript and familiarized herself with the participants and their experiences by creating lists and preliminary groups (Moustakas, 1994). The participants' thoughts and emotions about their experiences were equally highlighted, i.e., *horizonalization* (Moustakas, 1994). Atlas.ti.v. 7 was used to create codes for the significant statements emerging from the transcripts. From the nine participants, 146 significant statements were found under 35 codes, and six themes emerged. Each theme was substantiated through rich descriptions (Lincoln & Guba, 1985); direct quotes from the participants were identified to support the six emergent themes.

Ethical Considerations

Tracy's (2010) *eight big-tent criteria* were followed to ensure the study represented high-quality qualitative research, including worthy topic, rich rigor, sincerity, credibility, resonance, significant contribution, ethical, and meaningful coherence. According to Tracy (2010), studies that explore little-known phenomena are often more interesting. With the small numbers of African-Americans choosing to pursue ANR careers, the phenomenon of African-American students who chose to prepare for such was *worthy of study.*

"A richly rigorous qualitative scholar is also better equipped to make smart choices about samples and contexts that are appropriate or well poised to study specific issues" (Tracy, 2010, p. 841). To ensure *rich rigor*, Tracy (2010) suggested researchers ask themselves four questions:

> Are there enough data to support significant claims? Did the researcher spend enough time to gather interesting and significant data? Is the context or sample appropriate given the goals of the study? Did the researcher use appropriate procedures in terms of field note style, interviewing practices, and analysis procedures? (p. 841)

These questions were asked by the lead researcher during the study.

Maintaining a sense of *sincerity* is critical in qualitative research and can be reached by the investigator being honest, self-reflexive, and transparent (Tracy, 2010). The lead researcher practiced *self-reflexivity* by journaling her feelings and thoughts, which aided in bracketing such and decreased the likelihood of biases influencing her interpretations **(**Moustakas, 1994**)**. When research is trustworthy and reliable, this builds its *credibility* (Tracy, 2010). Tracy (2010) stated credibility "is achieved through thick description, triangulation or crystallization, and multivocality and partiality" (p. 843), which this study included. *Meaningful coherence* is achieved by researchers connecting their theoretical framework and situational goals with data collection and analysis procedures (Tracy, 2010). The researchers' interpretations, as derived from the study's findings, reflect this criterion.

Reflexivity

The lead researcher is an African-American female who grew up in a mostly rural suburb near Memphis, Tennessee. Her father was reared by his grandparents on a small family farm near Jackson, Tennessee, and her mother visited her grandparents' small farm in Medon, Tennessee almost every summer. Roughly 70 acres of land existed between the two farms, which produced cotton, corn, black-eyed peas, and other fruits and vegetables. They also raised hogs and chickens as well as beef and dairy cattle. Her father studied agriculture in high school and was an active member of his FFA chapter. The most exposure the lead researcher had to agriculture while growing up were the stories her parents told about life on the families' acquired lands after slavery. She gained an interest in agriculture in college, after she had her first hands-on farming experiences. She earned a BS degree in agriculture with a concentration in agriscience and a minor in communication arts from Austin Peay State University. During the study, she was pursuing a MS degree in agricultural communications. Noticing she was one of the only, if not the only, African-American in her degree programs at two universities sparked her research interest. This study includes two limitations: a) the results may be transferrable but should not be generalized; and b) the potential for bias existed on the part of the lead researcher but she closely monitored potential biases to reduce the likelihood of such affecting the results.

Findings/Results

Six themes emerged from analysis of the study's data. The themes are presented with supporting quotes derived from the study's participants.

Theme 1: Positive Experiences that Encouraged Participants to Pursue ANR as a Career. Kasey shared her experiences growing up on her family farm in Texas and how it influenced her choice to join the agricultural industry. She said:

> It was actually really fun, because I got to milk a cow for the first time and then I was like, 'I really want to do this when I grow up,' so that's kind of when I was like I want to be a vet, because I was hoping to administer medication to the cows. And we found out that a cow was pregnant, so I got to watch her give birth when the time came. So, I was like this is kind of where I want to be when I get older.

Kenny described his experience at OSU and how an advisor encouraged him to change his major: "… I actually went to the AG business [department], … and just kind of spoke with some of the advisors there, and my advisor now … he actually really is the one who influenced me to go ahead and make the switch."

Ricky discussed the role an African-American in the ANR sector played in his decision to pursue a career in landscape architecture. He said:

> Because I was trying to choose between [becoming] a pharmacist and a landscape architect. I found out that, I guess I could say my idol, Eddie George, he's a famous Ohio State football player and he also became a landscape architect, so I was like, oh that's cool, so I might as well do that.

Cassie stressed the encouragement she received from her high school agriculture teacher and how that influenced her to get involved in agriculture. She explained:

> … my AG advisor, she was very [influential], because she was the one who pushed me to be better than what I was… . with big shows I've gotten second place, I've gotten grand champion at major shows, and so that really helped me out. And then, with just that enjoyment, that love for, my new love for agriculture that I just wanted to continue it on, not stop it in high school. I just wanted to go with it.

Theme 2: The Desire for African-American Students to Create Change Strengthened Their Commitment to Pursue ANR Degrees.

Participants were motivated to pursue agriculturally related degrees because of their perceptions of the lack of African-Americans in the industry. Taylor shared the change she hoped to see in veterinary science: "After going to all the vets in my neighborhood, there's nothing but White vets… . I just feel there's something that we need to change."

Robert described a similar experience in regard to teaching agricultural education. He said:

> … the year I graduated high school we did some research and there was only two African-American agriculture teachers in the entire state of Oklahoma. And I was appalled at the findings … . And that was the first thing that really got me wanting to become an agriculture education teacher teaching high school students.

Participants also shared how they perceived African-Americans could make a difference by pursuing careers in agriculture and its allied fields. Kenny described why:

> … the career opportunities are definitely growing. You're going to need AG, and with the world population booming you know the jobs are going to come so you got to transition Black people in the mindset of you know this is where the world's going … try to find those jobs and try to make a difference in AG because we're definitely capable.

Kenny also described how it would be a positive result for African-Americans to use ANR as a platform to make a difference globally. He said:

> It'd just be cool to see Black people stand up and actually make a difference on a global scale. And AG definitely has the capabilities of impacting the world … actually making the effort to change things and make things better would really, really, be really cool.

Several students also mentioned wanting to join the industry because it was *something different* from what many American-Africans do for careers. Derek shared his view:

> … if I could continue on aiming to be successful and even though … not many African-Americans are involved in this, I figured I wanted to be different… . So, my goal was to make a change and make a difference.

Robert stressed it was time for African-Americans to make an impression in the industry. He said: "Through my eyes it is important that we as African-Americans make our mark… . We need to step up to the plate, so to speak, and take part, make our mark."

Theme 3: Historical Hurts and Lack of Encouragement Contribute to the Low Number of African-Americans in ANR.

All participants were asked: "Why aren't more African-Americans pursuing agricultural careers?" In response, the struggle of *forgetting the past arose.* Destiny expressed the history of slavery in the United States affects African-Americans' decisions to join the industry. She said: "May be like the older generations like their parents or grandparents, maybe they kind of see how if they work on farms it's kind of like the slavery days." Another perspective explained was the view of being a minority in the industry. Destiny indicated many African-Americans may perceive they do not have a place in ANR, where their numbers are small, but if exposed to it early they may not have this perception. She elaborated: "… if they're younger … and don't have to worry about any kind of racism or anything like that. They could just go with it."

A repeated viewpoint was African-Americans are more drawn to the sports and entertainment industries than ANR. Eddie expressed they are drawn to what is seen on television, i.e., Blacks excelling in athletics and in entertainment: "They watch BET a lot, they might watch ESPN … but they don't have lot of … commercials about the actual food that we eat."

Kasey described how people, including African-Americans, emulate what they see:

> … people are inspired by other people … people always want to be rappers and basketball players … they see them every day. But you never really see anyone in the AG industry so you're just like I don't think I can make it, why try … .

The participants also perceived the low number of African-Americans involved in ANR had much to do with lack of encouragement from the industry and the government. Derek said: "I feel people aren't going out to the right people. The AG industry, they're going more out to the White people, and that's not good at all." Robert elaborated further: "… the government needs to put … more emphasis on encouraging minorities in the field of agriculture."

Another factor participants saw as a contributor to the lack of African-Americans is little exposure to or knowledge of what the industry has to offer. Kasey discussed how her experience in agriculture helped her become aware she had an interest in the field. She stated:

> … how would you know that you want that to be your major. See if I never would've had that farm or if I never would've went to the livestock show, I wouldn't be the least interested in cows, or horses, or dogs, or anything [involving agriculture].

Eddie expounded on this point: "There's many [AG] jobs you can do, you can have from AG. It's just learning and then knowing what AG can provide for you." Kenny agreed many African-Americans are not willing to join the industry because they may have misconceptions about its opportunities. He said: "… you're not just going to be on a farm. You know there's other things you can do[, including] food, fiber, energy and all kind[s] of other things."

Theme 4: Giving Back, Promotion, and Early Exposure for African-American Youth can Increase Their Involvement in ANR.

Kenny suggested implementing programs in high schools to expose African-Americans to the importance of ANR. He explained his position:

> You know once you … have access to it you can actually see this is what I can do and this is where I can go with it. So if you were able to put programs in place … for historically Black high schools or whatever and actually had people speak on AG and make them realize that there's not just farming then you could definitely see a change.

Kasey discussed the importance of successful African-Americans in ANR encouraging African-American youth to pursue careers in the sector. She said:

> We have to be outspoken about our success, not like bragging about it, but just showing our younger people that they can do it too… . if we got here you can get here. It may be hard but nothing is easy… . when people succeed in their field other people will follow.

Taylor stated: "I think we just need to have more older people, Black African-Americans, that succeed[ed] and went to college to come out and tell Black kids that all because your Black doesn't mean that you can't succeed into anything." Destiny added:

> … if they see how much the country depends on agriculture and food, … [we] don't really think about where it comes from; we just go to the store and buy it. And so, like if they kind of see the process behind what needs to be done maybe that would get them interested, like maybe they'd want to help, help out the world.

Theme 5: Effects of Positive Experiences While Involved in ANR.

Kenny described enjoying the time he had with classmates and the support he received from them. He said: "I've been learning as I go but I've really enjoyed a lot of it. I'm learning new stuff honestly every day from going to classes and hearing people talk. My classmates have been really supportive." Taylor shared her experience with other students: "But all the students in my animal science class are really, really nice. They're not like the racist type or looking at me in a funny way or anything like that." Ricky also discussed the camaraderie he experienced in his program. He said: "But everybody treats you like a family here at OSU, same with the AG Program, especially with my program, … [landscape] architecture because it's not that many of us." Cassie shared how joining FFA in high school helped her get on the right path:

> … for a while there like I was going on the wrong path, and then FFA said 'hey if you're going to be something you know you're going to have to do it, you're going to have to be something better than what you're doing,' so that helped me out a lot.

Derek described how being involved in agriculture had helped prepare him for life. He said: "AG taught me a lot of life qualities. I had a lot of new connections and everything." Derek also indicated joining the ANR industry could potentially help African-Americans gain more confidence. He further stated: "African-Americans are going to be a lot more noticeable in the agriculture industry and also they also can … feel more greater about themselves than now." Cassie shared Derek's view about being a part of the industry as a minority. She said: "I feel empowered. I don't know if that's right, but I feel empowered."

Cassie also discussed her family's excitement when told she would pursue a degree in agriculture. She said: "My African-American side of the family is not really into AG, and so they were really excited that I was in anything that was kind of scientific." Cassie's grandmother was elated: "My grandmother was really excited that I got involved into agriculture because it's something out of the norm for our family and so she was excited that I branched and did something I really liked."

Theme 6: Negative Perceptions Experienced While Involved in ANR.
The participants also shared some negative perceptions. Destiny discussed the overwhelming experience of joining an unfamiliar program:

> It’s been pretty overwhelming because I’ve never been in the AG field and then all the kids here, like half the kids in my class have grown up on farms so they know what it’s like and they already have experience from childhood.

Derek had negative experiences regarding his African-American friends and family members after becoming involved in agriculture. He stated: “I kind of lost a few friendships from my Black friends because of being involved in the agriculture industry.” Participants also discussed the lack of connection they perceived as a minority in ANR. Ricky shared his experience: “You don’t really have anybody to run to sometimes,” and “[y]ou don’t have anybody to relate to.”

Eddie described the lack of connections he experienced being the only African-American in some of his courses. He stated:

> So it’s just a different feeling. I wouldn’t say like for me being comfortable to where I understand cause a lot of people express something in different ways that I don’t understand. And just being that one person, everybody looks at you differently. They have a higher standard for you… .

Robert addressed the adversity he faced being an African-American in agriculture by sharing how he used the negativity as more motivation to reach his goals. He stated:

> And the fact that I’m African-American, it did make it harder because a lot of people was like you can’t do that because you're African-American. Well the way I see it, that just means I have to work harder to get to where I need to be, to where I want to be.

Taylor also discussed how some White peers viewed her when she entered an agricultural class:

> And there’s a lot of issues, you know, some of my classes I’m the only Black person in there but, you know, there[’s] some people that’s nice but there’s some people that’s just like why is she here and all this other stuff.

Kasey shared her initial shock of attending a similar class: “It’s a little bit of culture shock. I just never been around this environment. I mean I like it, but I don’t really fit in.”

Conclusions, Implications, and Recommendations

Experiences of the nine study participants overlapped and intertwined. The experiences they shared, such as growing up on a farm, being exposed to agriculture by family members, teachers, or other mentors, and realizing not many African-Americans are present in the sector, encouraged them to pursue career preparation in ANR. They also revealed what it meant to be an African-American studying in an ANR undergraduate degree program. Participants shared that, at times, it was challenging facing an industry where not many people with whom they were studying and someday would likely work could relate and connect with them. Several participants expressed feelings of being a minority when entering their classrooms or joining an organization such as FFA, but they were encouraged by the support received from classmates, advisors, and other mentors. In addition, participants voiced their desires to make a difference in the world through agriculture, food, and related fields, which kept them persistent in trying to reach their career goals. Their passions were integrated with the ANR sector and they hoped to share that passion with other African-American youth. The fact the participants had *gone against the grain* and were preparing to join the agricultural industry, although they may have faced many challenges, including feelings of exclusion or judgment, formed the study's *essence*. Their desire to make a difference is what motivated them to remain persistent (Wigfield & Eccles, 2002) along with intentions of encouraging other African-Americans to pursue studies and careers in ANR.

Regarding why so few African-Americans are involved in the industry, most participants revealed views on the lingering effects of slavery, the hardships of ancestors who worked in agriculture, and the promotion of successful African-Americans in the entertainment industry and in athletics. Morgan (2000) also concluded the older generation telling African-American youth about the hardships associated with working in agriculture may negatively affect their pursuit of related careers. In addition, some participants said they did not perceive the industry sufficiently promoted the opportunities available to African-Americans. Seeing African-Americans who chose careers in ANR may encourage more African-American youth to pursue related degrees. Industry and higher education officials, therefore, should publicize and promote the successes of African-Americans working in agriculture and its allied sectors.

The participants' desires to create change was a significant finding. Most wanted to pursue ANR careers because the industry is *different,* along with the idea of making a difference in the world by working in it. Participants expressed they perceived the rewards, i.e., their *expectancy value,* of staying involved in the industry outweighed the negativity experienced. This finding supports the study's theoretical lens, as explained by E-V theory, suggesting choices are influenced by perceptions of expectancies and values, which are determined by how individuals view the difficulties associated with achieving their goals (Wigfield & Eccles 2002).

Future research should examine the lives of African-American students positively affected by participation in ANR education along with older African-Americans who succeeded in the industry to explore how they overcame adversity. Researchers should also conduct a qualitative study, perhaps with focus groups, to explore differences between African-American students who chose to pursue ANR studies versus those who select other majors. Such a study may provide more understanding about why the number of African-Americans in ANR remains low.

Some participants experienced feeling unconnected to their White peers and being the subject of negative perceptions. Wakefield and Talbert (2003) also saw this view when studying the NFA merger with FFA. The lack of leadership roles held by African-Americans after the merger lowered the morale of Black students, which resulted in a loss of connection to agriculture as perceived by their informants (Wakefield & Talbert, 2003). Institutions should ensure faculty and staff members are equipped with the behaviors needed to serve a racially diverse audience. If instructors are well prepared to help students transition into an environment in which they feel alone, sensitive mentors may be able to make their experiences less uncomfortable and more inclusive (Anderson II, 2006). We should continue to explore the views of African-Americans and learn more about what motivates them to participate in ANR. Understanding their experiences may help encourage a new generation of such youth to pursue related careers.

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Evidence for Recruitment Appeals to Students of Color in the National Teach Ag Campaign: An Exploratory Media Content Analysis

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Abstract

Using framing theory as a guide, this study aims to describe the observed trends found in annual reports of the National Teach Ag Campaign through a qualitative content analysis for evidence of recruitment appeals targeting students of color to pursue a career in agricultural education. Using the constant comparative method, the researchers describe depictions of themes found in the annual reports of the National Teach Ag Campaign which demonstrate appeals to students of color as outlined by the Vincent et al. (2012) conceptual model for recruiting students of color into agricultural education, as well as the presence of underrepresented populations as depicted by annual reports of the National Teach Ag Campaign. The results of the data analysis can be broadly categorized into three major categories: (1) Formatting changes, (2) Visual representation of people of color, and (3) Evidence of appeals to inducements and influences proposed by Vincent et al. (2012). Although many of the images depicted in the annual reports do not show wide racial diversity, there is a slight trend towards including persons of more ethnicities in these images in more recent reports. It will be necessary for the marketing team with the campaign to continue to reevaluate what promotional materials they choose to create so as to appeal to different demographics and work toward their goal of recruiting and retaining a diverse, high quality workforce of agriculture teachers.

Introduction

Agricultural education is a profession that faces many challenges, but it has chiefly faced a continual shortage of qualified teachers prepared to run agricultural education programs across the country. This is not a new problem, with there being a reported teacher shortage since almost the inception of formalized, government-funded school-based agricultural education nearly 100 years ago (Camp, Broyles, & Skelton, 2000). Various studies have been performed over the years to identify factors that influence student choice to enter the profession of agricultural education (Calvin & Pense, 2013; Hillison & Hagee, 1982; Juergenson, 1964; Lawver & Torres, 2011) in the hopes of identifying best practices and boosting the supply of agricultural education instructors nationwide. Various recruitment methods have been used to promote the profession to prospective agriculture teachers, and most recently, the National Association of Agricultural Educators (NAAE) established the National Teach Ag Campaign in 2009 to specifically address the shortage of prospective educators entering the profession. The present study aims to describe the observed trends found in annual reports of the National Teach Ag Campaign related to appeals to students of color through a qualitative content analysis using framing theory to guide the study.

Initially, agricultural education was delivered to rural, White, male students, but eventually expanded to be offered to Black male students, followed by female students and students of all ethnicities. The teaching workforce over the years has also been predominantly White males, but has shifted to include more female teachers recently. In the 2011-2012 school year, about 82% of all public school teachers were non-Hispanic White, 7% were non-Hispanic Black, and 8% were Hispanic (Goldring, Gray, & Bitterman, 2013). This contrasts greatly with the 2012 student enrollment demographic percentages at 51% White, 24% Hispanic, and 16% Black, demonstrating a gap between the cultural background or diversity of teachers and the students enrolled in their classes. The agricultural education profession also mirrors the disproportionate demographics of teachers, with the 2010 National Supply and Demand Study finding that approximately 68% of all reporting teachers as White, non-Hispanic, 28% unknown ethnicity, 1.5% African American, and 1.2% Hispanic (Kantrovich, 2010). Of the 742 license-eligible agriculture education program completers in 2015, 92% reported as White, non-Hispanic, 5% as Hispanic/Latino, 2% American Indian/Alaskan, and fewer than 1% as African American/Black, further emphasizing the lack of ethnic diversity in potential agriculture teachers (Foster, Lawver, & Smith, 2014).

Previous literature points to a continued need for an increased emphasis on cultural diversity and gender representation in agricultural education (LaVergne, Jones, Larke, Jr., & Elbert, 2012; LaVergne, Larke, Jr., Elbert, & Jones, 2011; Talbert & Edwin, 2010; Vincent, Kirby, Deeds, & Faulkner, 2014; Warren & Alston, 2007) as well as the need for an increasingly multicultural teaching workforce (Albert Shanker Institute, 2015). At the secondary level, Talbert and Larke (1995) emphasized the importance of utilizing minority agriculture professionals in the classroom and FFA activities as well as depicting minorities in instructional materials, and further recommend that “Efforts should be conducted to recruit more minorities into agriscience teaching” (p. 38), suggesting students would better relate to a role model of the same ethnicity. Vincent, Henry, and Anderson (2012) emphasized that “an understanding of the disparity between the cultural representation among students and teachers in American public schools is significant because the cultural background of individuals in power positions has been demonstrated to matter” (p. 188). Thus, in order to reach the increasingly diverse student population, it is important that the teaching workforce become more diverse.

Currently, limited research specifically within agricultural education has addressed the recruitment of agricultural education teachers in underrepresented populations. In order to address this gap, Vincent et al. (2012) proposed a conceptual model for recruiting students of color into agricultural education, constructed from the results of their study. Ten students of Latino and Black heritage in agricultural education were recruited and participated in a nine-question semi-structured focus group interview regarding the motivating factors behind why they selected agricultural education as their future profession. The results of their interviews contributed to the design of the proposed conceptual model.

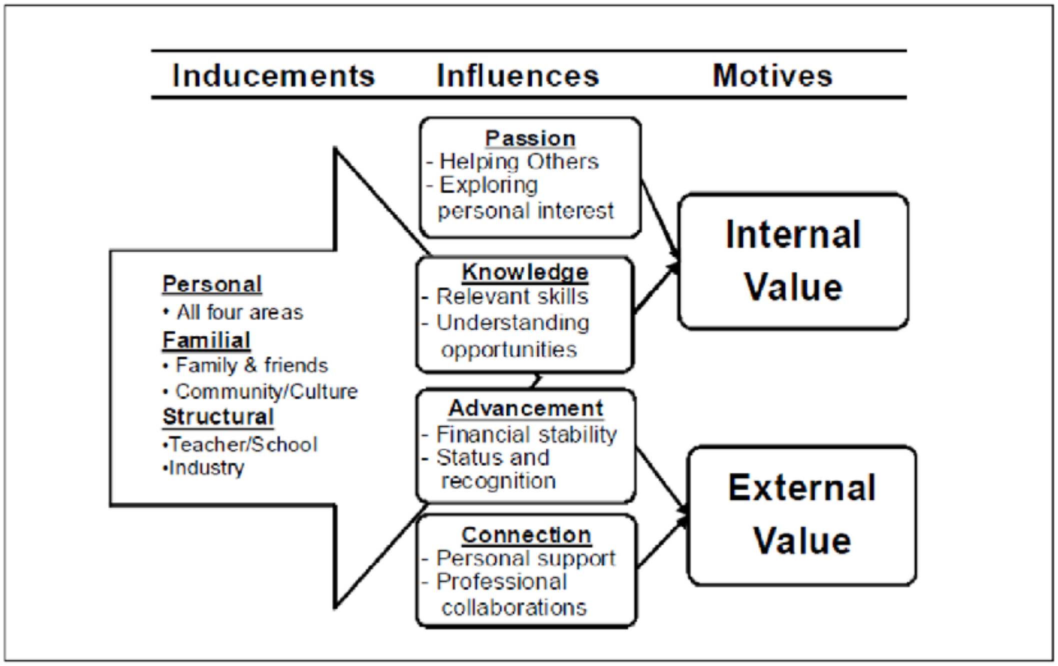

Figure 1. Conceptual model for recruiting students of color into agricultural education (Vincent, Henry, & Anderson, 2012).

In addition to identifying factors influencing the internal and external motivation for students of color to pursue a career in agricultural education, focus group participants also stated that damaging images of agriculture continue to exist in communities of color. According to Vincent et al., “When asked to explain the images of agriculture that the participants had prior to selecting agricultural education, they mentioned phrases such as farming, manual labor, lack of (ethnic or racial) diversity, harvesting crops, and slavery. Participants noted that agricultural education must address these images if the goal is to recruit more students into teaching” (2012, p. 193).

Literature Review

This study is grounded in framing theory. According to Hallahan (2009), “framing is conceptually connected to the underlying psychological processes that people use to examine information, to make judgements, and to draw inferences about the world around them” (p. 206). Thus, framing involves the construction of an individual’s reality, and can be manipulated through imagery, text, word choice, juxtaposition of text and imagery, or what material is selected to be highlighted on display. What an organization chooses to highlight is deemed to be important, whereas what is not chosen to be highlighted may be inferred by recipients as not important. Because people see the world from multiple perspectives, these constructed realities will vary according to how they infer the framed messages. Thus, framing plays a central role in marketing and public relations.

Framing operates through two cognitive mechanisms: 1) contextual cues, and 2) priming (Hallahan, 2009). Contextual cues are those which are prompted by the components of the actual message, whereas priming is a process through which specific previous memories or schemas are triggered to decode a message. Marketing and public relations specialists can take advantage of these mechanisms by actively planning to stimulate or prime the audience through specific context clues in their broadcasted messages. Hallahan (2009) posits that there are seven different factors or "models" which are framed in public relations messages: situations, attributes, choices, actions, issues, responsibility, and news. Marketing efforts of the Teach Ag Campaign can capitalize upon principles of framing theory to help guide their endeavor to recruit and retain high quality, diverse agriculture teachers.

Recruiting people of color into various professions is not a new theme in the United States. In a 1991 literature review of issues related to recruitment and retention of underrepresented racial/ethnic students in higher education sponsored by the National Association of College Admission Counselors, it was found that research related to these issues had occurred as early as 1971. Consequently, this subject has been studied in a variety of contexts. In 1989, the American Association of Colleges for Teacher Education published "Recruiting Minority Teachers: A Practical Guide" which served as a resource for recruiting students in high school, college, and from non-traditional sources. Most recently, the Education Alliance at Brown University published a comprehensive report titled "Minority Teacher Recruitment, Development, and Retention" in which effective recruitment strategies are studied (Torres, Santos, Peck, & Cortes, 2004). Studies have sought to identify factors which influence minorities to enroll in higher education, select teaching as a career, agriculture as a career, and factors which inhibit these decisions. Other research has broken down the minority population into specific demographics to study, such as Native Americans, Latinos, or African Americans/Blacks, as it is dangerous to lump all populations together since the lived experience of each culture is uniquely different from one another.

The agricultural education profession has dedicated research to identifying what motivates students to select agricultural education as a career, difficulties faced by beginning teachers, and retention of agriculture teachers. Diversity is an issue largely studied at the high school level, though there is some recent research which seeks to increase the diversity of ethnicity in post-secondary agricultural education majors. Studies have also sought to identify the impact of diversity training on agriculture teachers' perceptions of diversity within the high school setting.

Oliver and Brown (1988) identified six principles of recruitment of minority students to higher education: (1) Recruitment efforts involve the primary populace of the university, (2) Recruitment efforts should not exclusively or primarily dependent on active minority participation, (3) Recruitment efforts should purposively encourage connections within the social networks of the minority students recruited, (4) There should be a diverse array of activities available within the program, (5) Active service programs should be incorporated into minority recruitment programs, and (6) In order to facilitate success of recruitment efforts, there must also be an actively addressed retention plan.

With the changing demographics of the student population in the United States, it is important to address the demographics of the teacher population. Coupled with the demand for a qualified teaching force in agricultural education, it is necessary to recruit prospective agriculture teachers from a variety of ethnic backgrounds. A primary avenue through which the agricultural education profession actively recruits is the National Teach Ag Campaign. In order to understand if current teacher recruitment efforts address the specific hallmarks of recruiting students of color, it is necessary to evaluate these materials.

To help address the above outlined needs, the purpose of this study is to explore annual reports of the National Teach Ag Campaign for evidence of recruitment efforts targeting students of color to pursue a career in agricultural education. The following objectives guided the study:

1. To describe specific themes found in the annual reports of the National Teach Ag Campaign which demonstrate appeals to students of color as outlined by the Vincent et al. (2012) conceptual model for recruiting students of color into agricultural education.
2. To describe the presence of underrepresented populations as depicted by annual reports of the National Teach Ag Campaign.

Methodology

The materials evaluated were selected through a convenience purposive sample. In order to identify overall recurring themes arising from the National Teach Ag Campaign, the sample was limited to the Annual Reports posted on the National Teach Ag website (www.naae.org/teachag). There were a total of five reports evaluated including the 2010-2011, 2012, 2013, 2014, and 2015 reports. Annual reports ranged in length from 15 pages to 54 pages for a grand total of 145 pages evaluated from the five years of available reports. Copies of the PDF files were downloaded and evaluated on an electronic tablet to allow the researchers to magnify full color photos.

Data were collected via a qualitative media content analysis using the constant comparative method proposed by Glaser (1965) in which the researcher inductively develops theory through comparing observed phenomena to previously observed phenomena. Qualitative media content analysis is a type of content analysis that is a systematic way to study media and propaganda since it evaluates the dynamic between the text/media and potential audiences on the premise that these audiences may interpret the meaning of the images differently (Macnamara, 2005). According to Glaser (1965, p. 439), the constant comparative method consists of four stages:

(1) Comparing incidents applicable to each category,
(2) Integrating categories and their properties,
(3) Delimiting the theory, and
(4) Writing the theory.

In this method, the researcher initially codes observations in the phenomena and then they are to write memos regarding their observations and then pause for reflective thought, taking as much time as needed to carefully consider the findings and how they relate to each other, finding common themes that emerge. Each of the five Teach Ag Campaign Annual Reports were evaluated in this method. Initial rounds of observation noted the total page length, total number of photos, total number of graphics, as well as a description of the content and layout of each page. Subsequent rounds of observation evaluated data for presence of visual aids that included people of color, as well as appeals to the inducements and influences proposed by Vincent et al. (2012), eventually emerging as themes found in the reports.

There are limitations for this study. Qualitative research is inherently biased as the researcher interprets the sample being studied through their own lenses and world view. Macnamara (2005) emphasizes that although qualitative content analyses "can conform to the scientific method and produce reliable findings…[it] is difficult and maybe impossible to do with scientific reliability" (p. 5). The researchers recognize that along with this bias are various power dynamics at play as well. The researchers are of White, non-Hispanic ethnicity and realize that their life experiences differ from others, which might influence how they interpret the information gleaned through this content analysis. Furthermore, this also impacts the replicability of the study, as other researchers performing the same systematic exploration of the content might identify different themes. Additionally, this study assumed that the annual reports evaluated provided a comprehensive overview of all recruitment efforts of the National Teach Ag Campaign, and that the ways in which students of minority backgrounds were recruited were specifically addressed in the reports. The results of the study also assume that through the constant comparative method that the researcher is able to glean accurate overarching themes.

Results

The results of the data analysis can be broadly categorized into three major categories: (1) Formatting changes, (2) Visual representation of minority populations, and (3) Evidence of appeals to inducements and influences proposed by Vincent et al. (2012).

Formatting Changes

The National Teach Ag Campaign was established in 2009 by the National Association of Agricultural Educators (NAAE) to help address the shortage of agriculture teachers in the United States. Initially, it was staffed by only two people: Ellen Thompson, Coordinator, and Julie Fritsch, NAAE Communications/Marketing Coordinator, and was sponsored by three different donors. The first annual report was not completed until the 2010-2011 year. At 54 pages in length it is the longest of the five available annual reports, consisting primarily of descriptions of each of the initiatives, including sample grant applications and award letters, as well as twenty-four pages of news articles from around the country that feature stories about activities associated with the National Teach Ag Campaign.

A campaign mission statement first appeared in the 2013 annual report. The original mission statement reads:

> The National Teach Ag Campaign raises awareness of the need to recruit and retain agriculture teachers, encourages others to consider a career teaching agriculture and

> celebrates the positive contributions that agriculture teachers make in their schools and communities.

The following year the annual report included not only a campaign mission statement but also a campaign goal. The wording of the campaign mission statement was revised to include the word “diverse” in 2014. Additionally, specific key words were printed in all capital letters, seemingly conveying emphasis on those terms. The current mission statement is as follows:

> To raise AWARENESS of the need to RECRUIT and RETAIN high quality and diverse AGRICULTURE TEACHERS, ENCOURAGE others to consider a career teaching agriculture, and CELEBRATE the POSITIVE CONTRIBUTIONS that agriculture teachers make in their schools and communities.

It is interesting that the word “diverse” is not in all caps as other keywords are. However, when looking at the goal of the campaign, which was also established in 2014, the word “diverse” is capitalized:

> To ENSURE an ABUNDANT SUPPLY of HIGH QUALITY and DIVERSE agriculture teachers who will INSPIRE the next generation of LEADERS, PROBLEM SOLVERS, and AGRICULTURALISTS.

Later, the word “ENTREPRENEURS” was added before “and AGRICULTURALISTS.”

In addition to presenting the reports in a more succinct manner, creating and revising a mission statement, and establishing a campaign goal, the Teach Ag Campaign also changed the way in which they summarized data in their annual reports. The first report included sample copies of all documents utilized to promote the campaign, including a copy of a poster that was mailed to agriculture teachers around the country. More recent reports do not have an entire page dedicated to the poster as earlier reports do, but instead show small images of various recruitment materials and resources. The most recent report, 2015, actually changes the format of the whole report from a mailed book-like report to a calendar that can be used for the 2016-2017 year. The top half of the calendar is used to broadcast information about the campaign while the bottom half includes a calendar with important agricultural education-related dates highlighted. Furthermore, beginning with the 2013 report, sponsor advertisements are included. The CHS Foundation has advertised in the campaign each year since 2013, and Growth Energy (American Ethanol) has advertised since 2014. The newest report also includes testimonials from current college students regarding the impact that the Teach Ag Campaign has had.

Visual representation of people of color

While coding observations of the annual reports, the researchers recorded descriptions of included photos, as well as the themes represented by the photos. These visual objects can take on multiple meanings, connotations, and cultural significance depending on the perspective of the viewer (Perloff, 2014). The researchers also documented the total number of photos and graphic icons present in each report. These totals can be seen in Table 1.

Table 1
Quantity and use of visual objects in National Teach Ag Campaign Annual Reports, 2010-2015.

Report Year	Total # Pages	Total # Photos	Total # Graphic Icons	# Images People of Color Present
2010-2011	54	11	20	1 (single image of "Urban Ag Teacher" on Poster)
2012	20	16	104	3 (all urban middle school students)
2013	32	59	104	10 (first educators and preservice teachers depicted)
2014	24	68	73	2 (students in promotional materials & CHS advertisement)
2015	15	66	95	11 (Ambassadors, students, award recipients)
Totals	145	220	396	27

The number of images depicting people who appear to be persons of color were not very frequent, as only twenty-seven images of the two hundred twenty total photographs demonstrated this characteristic (12%). Not only did these images not occur very frequently, but when they did, people of color were often portrayed exclusively as urban middle school students, even appearing on the cover of the 2012 annual report. Students in these images were photographed as members of a class that National Teach Ag Ambassadors were teaching as part of their outreach in Washington D.C. Images such as these appear throughout the report. In the 2013 report, another one of these photos (Figure 3) is presented with the following quote: "Each year, the National Teach Ag Campaign selects the nation's most outstanding agricultural education majors to represent the profession as National Teach Ag Ambassadors" (p. 18). The juxtaposition of this text in combination with the frequency in which this same image is repeated (White female preservice teacher presenting to Black youth) consistently presents the image of White teachers and Black students.

Figure 3. Images of Teach Ag Ambassadors teaching minority youth.

In the 2011 report, the only person of color depicted appears on a promotional poster, as a Black female teacher. She is dressed in a lab coat and surrounded by equipment indicative that she teaches a science-based subject, and behind her is a cityscape skyline. Next to her is a White male teacher, seemingly representing the countryside, as he is surrounded by tools, a barn, and is holding a piglet and welding mask. See Figure 4 for an illustration of this image.

Figure 4. 2011 National Teach Ag Poster.

Despite being depicted as an educator in the very first annual report (2011), people of color do not appear as educators again until the 2013 report. It seems in 2013 there was a greater push for diversity and inclusion, as the National Teach Ag Day was hosted by North Carolina Agricultural and Technical University, an historically black 1890 Land Grant University. During this event, a “Diversity and Inclusion Dialogue” was held, but seems to be the only one of its kind mentioned in any of the annual reports. The photo taken of the participants in this event is the first to appear in this series of annual reports that depicts people of color as teacher educators and preservice educators.

It is curious that out of the entire series of reports, only one student of Asian ancestry is depicted, being present in an advertisement for American Ethanol, one of the sponsors of the Teach Ag Campaign. The populations of color which are most consistently represented in visual imagery selected by the campaign include Black or Latino persons. The vast majority of images depict White preservice teachers, teacher educators, middle or high school students, or stakeholders. Most frequently appearing in these images are college-age White females, who consistently comprise the majority of the National Teach Ag Ambassadors. In 2013, all twelve collegiate National Teach Ag Ambassadors were White females. This is reflective of the profession, as in the 2015 National Supply and Demand Study, it was found that 67% of license-eligible program completers were female (Foster et al., 2015). Thus, not only were people of color underrepresented in the images of preservice teachers, but so were males. The most recent annual report (2015) does depict male students of color as being National Teach Ag Ambassadors.

In addition to photos, the National Teach Ag Campaign uses a variety of graphic icons. Most of these are related to the Teach Ag handprint logo, social media, or agriculture-related objects, but in 2013 an icon which seems to evoke a sense of mentoring, appeared in the reports. It depicts two people facing away from the viewer, with one person’s hand on the others’ shoulder. This icon appears multiple times throughout the Teach Ag literature for the remainder of the reports. The hands of the “mentor” in the image are depicted as flesh tone for a White person each time the icon appears. See Figure 5 for an illustration of this icon.

Figure 5. Teach Ag “Mentor” Icon.

Finally, the annual reports since 2013 feature advertisement from program sponsors CHS Foundation, DuPont Pioneer, and Growth Energy (American Ethanol). CHS Foundation leads their advertisements with the phrase "Investing in the future of rural America" flanked with large color photographs of White FFA members, students, and farmers.

Evidence of appeals to inducements and influences proposed by Vincent et al. (2012)

Four major factors influenced students of color to select agricultural education as a major in the Vincent et al. (2012) study: Passion, knowledge, advancement, and connection. Furthermore, three factors were identified as inducements to select agricultural education or to stray away: Personal, family, and structural factors. When these factors were presented in a positive light, students of color were more likely to select agricultural education as a major, whereas when they were negative, students elected to avoid agricultural education. For example, if a student had an agricultural instructor while in high school that they greatly admired and identified with, they were induced into selecting agricultural education as a major. Likewise, if they had a negative experience with an agricultural instructor, then they were induced to not select agricultural education as a major. Throughout the review of the annual reports in the present study, the researchers sought to identify recruitment efforts which aligned with these proposed influences and inducements.

Each of the annual reports cited Teach Ag representatives attending the national conference of the collegiate student organization, Minorities in Agriculture and Natural Resources and Related Sciences (MANRRS) to present workshops and speeches. In 2013, the National Teach Ag Campaign sent representatives to the Latinos in Agriculture Conference, although this appears to be the only year in which this occurred.

It is difficult to discern particular themes related to Vincent et al.'s (2012) influences in earlier versions of the annual reports. However, in 2015, the report content shifted to include example Tweets, quotes from agriculture teachers, and testimonials from college students involved with the National Teach Ag Campaign. An analysis of these quotes reveals connections to the factors of Passion, Knowledge, and Connection.

Conclusion

The National Teach Ag Campaign is a relatively new initiative in the long history of agricultural education, having only existed for the past five years. In the early stages of inception, the annual reports focused on promoting events which created visibility for the campaign, rather than highlighting the impact that a career in agricultural education has on students. Now that the campaign has increased sponsorship from an initial three donors to a current four donors, more opportunities are available for students to become involved with the campaign at various levels. Since 2012, a panel of twelve National Teach Ag Ambassadors has been selected to represent the campaign in various parts of the country. Most recently, the 2015 cohort of ambassadors was assigned to groups of students who signed up expressing interest in Teach Ag at National FFA Convention. The ambassadors are tasked with mentoring these students throughout the year after

National Convention has ended. Personal support and connections has been highlighted by students of color as a desirable influence on selecting agricultural education as a career.

It is evident that the Teach Ag Campaign has prioritized a commitment to recruiting a more diverse teaching workforce as evidenced by the changes made to their mission statement, goals, and images presented in more recent annual reports. Although many of the images depicted in the annual reports do not show wide racial diversity, there is a slight trend towards including persons of more ethnicities in these images in more recent reports. It has been suggested by previous research (Talbert & Larke, 1995) that students may relate more to teachers of a similar ethnicity, and framing theory posits that the manner in which messages are framed "limits or defines the message's meaning by shaping the inferences that individuals make about the message" (Hallahan, 2009, p.207). By framing visual imagery coupled with reinforcing messages appealing to student passion, opportunity to gain knowledge, opportunity for advancement, and connections to aid in personal and professional support, the Teach Ag Campaign can have a powerful influence over the ways in which students perceive the potential career of teaching agriculture. It will be necessary for the marketing team with the campaign to continue to reevaluate what promotional materials they choose to create so as to appeal to different demographics and work toward their goal of recruiting and retaining a diverse, high quality workforce of agriculture teachers.

Due to the drastic difference between the teachers of minority background working as educators and the amount of students of minority backgrounds, it is imperative to revise current recruitment efforts. Identifying current efforts of the National Teach Ag Campaign can help guide the campaign's impact on future recruitment efforts, and help the campaign meet its goal of ensuring "an abundant supply of high quality and diverse agriculture teachers who will inspire the next generation of leaders, problem solvers, entrepreneurs, and agriculturalists" (National Association of Agricultural Educators, 2015, p. 14).

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State FFA Leaders' Attitudes and Motivation to Provide FFA Membership Access for Homeschool Students

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The purpose of this study was to explore attitudes and motivations of state FFA leaders to provide FFA membership access for homeschool students. Currently, there are two states that explicitly provide FFA membership access to homeschool students as part of a complete Agricultural Education experience (Alaska and North Carolina). Other states have homeschool students that participate in and are eligible for FFA membership through part-time public school enrollment. The National FFA Organization has a strategic goal of expanding access to non-traditional audiences, including homeschool students. Therefore, the attitudes and motivations of state FFA leaders regarding various potential models of providing access to FFA membership for homeschool students can potentially help inform FFA membership policy nationwide. A quantitative electronic questionnaire was framed by Expectancy-Value Theory, developed using original and previously validated items, and administered to all state-level FFA leaders. Results show that models focusing on integration of homeschool students (i.e. part-time public school enrollment, membership in the public school FFA chapter, and completion of an SAE supervised by the local Agricultural Education teacher) garnered the most positive response from state FFA leaders. Implications and recommendations from findings include informing policy and further research involving more stakeholders, especially local FFA advisors.

Introduction

Agricultural Education in the 21st century has shifted its focus from production agriculture to agricultural literacy and increased inclusion of non-traditional audiences in response to demographics trending towards a more diverse and urban population (Conroy & Kelsey, 2000; Henry, Talbert, & Morris, 2014; Newcomb, McCracken, Warmbrod, & Whittington, 2004; Powell, Agnew, & Trexler, 2008). One dimension of Agricultural Education programs that can appeal to non-traditional audiences is learning and developing "soft" skills desired by industry leaders, such as leadership and communication (Crawford, Lang, Fink, Dalton, & Fielitz, 2011; "Job Outlook 2014," 2013; Stephenson, Mayes, Combs, & Webber, 2015). Agricultural Education and the intracurricular component of FFA offers the opportunity for program participants to develop these skills while learning about agriculture, food, and natural resources.

The National FFA Organization has a stated organizational goal of increasing program access to diverse and non-traditional audiences (Crutchfield, 2013). Homeschool students are a potential target audience for increasing enrollment in Agricultural Education and FFA membership. The homeschooling population has grown rapidly, increasing 62% from 2003 to 2012 (Snyder, de Brey, & Dillow, 2016) and the current raw number of homeschool students has been estimated at 1.8 million (Redford, Battle, & Bielick, 2016). Children are equally likely to be homeschooled in elementary, middle, and high school (Isenberg, 2007, 2017). Thus, homeschool students represent a potential source of significant program growth for Agricultural Education and FFA.

Frick and Brennan (1998) are one of few instances in the Agricultural Education field where the possibilities of relationships between Agricultural Education programs and home educators are discussed in order for a homeschool student to access a complete integrated three component Agricultural Education experience, including classroom instruction, FFA, and SAE (Supervised Agricultural Experience). A reason to explore a collaborative relationship between Agricultural Education and the homeschool community is an underlying common philosophy in providing an integrated and holistic education for students. Frick and Brennan's (1998) conclusions suggest part-time public school enrollment as a potential FFA membership eligibility pathway for homeschool students. Indeed, there are documented examples of homeschool students enrolling part-time in a public school with an Agricultural Education program to receive classroom instruction that qualifies them for FFA membership (Johnson, 2012).

In contrast to Frick and Brennan's (1998) philosophical piece in the Agricultural Education Magazine, one research article currently exists in the literature that explores this concept further through data collection and analysis. Walls, Flowers, and Moore (2001) surveyed 187 home educators in North Carolina regarding their level of interest in Agricultural Education programming and found that there was a desire in the majority (77%) of home educators to have agriculture be part of their homeschooling program. This did not matter whether the home educator was in a rural, suburban, or urban area. It should be noted that at some point after this study was published, North Carolina became a state that offers homeschool students the opportunity to have a complete Agricultural Education program experience, currently including the existence of two homeschool FFA chapters (North Carolina FFA Association, 2016) and completion of a state-approved Agricultural Education curriculum, including an SAE component, at home, under the supervision of a certified Agricultural Education teacher. This model of homeschool student participation in classroom instruction in Agricultural Education and completion of an SAE by some means and having FFA membership in a chapter specifically for homeschool students is also currently observed in Alaska (Massey, 2015) and is being discussed as an option in other states (Weik, 2015).

Although the limited amount of prior work provides insight into the desirability of Agricultural Education to home educators as well as current and potential models for program participation, no studies were found that assess the attitudes and motivation of Agricultural Education and FFA state-level leaders with regards to providing access for homeschool students to Agricultural Education programs and FFA membership. Additionally, because there are specific requirements that must be met by students for FFA membership eligibility as defined in state FFA constitutions, it is crucial to explore current and potential ways homeschool students can meet these membership eligibility requirements in order to receive a complete Agricultural Education experience, as well as the acceptability of the different scenarios to state-level FFA leaders.

This study focused on state-level FFA leaders (i.e., state FFA advisors, executive secretaries, executive directors, program specialists, and state supervisors) due to the tradition of structure within Agricultural Education and the established importance of state-level leadership in local Agricultural Education programs within the literature (e.g., Blezek, 1986). State FFA leaders were the target study group due to cases being observed of homeschool students participating in FFA chapters within multiple states (e.g., Johnson, 2012; Massey, 2015) and FFA being a publicly visible portion of homeschool students participating in an Agricultural Education program.

Theoretical Framework

This study was framed by Expectancy-Value Theory (EVT) (Eccles et al., 1983; Eccles & Wigfield, 1995, 2002; Wigfield & Eccles, 2000). The theory assumes that expectancies and task-values are task-specific and directly influence task engagement through motivation (Eccles & Wigfield, 2002). EVT is rooted in a social cognitive perspective (Schunk, Pintrich, & Meece, 2008) where task values and expectancies are assumed to also be influenced by past behavior, personal beliefs, and outside sources such as social interactions. EVT operates under a constructivist paradigm, which assumes a social construction of reality (Lincoln, Lynham, & Guba, 2011) and does not necessarily mean relativism, but rather pluralism (Baxter & Jack, 2008).

Although much of modern EVT application in education research investigates achievement motivations of youth (e.g., Jones, 2011; Martin & Dowson, 2009; Trautwein et al., 2012), college student motivations have also been studied (e.g., Feather, 1988; Flake, Barron, Hulleman, McCoach, & Welsh, 2015; Shepperd & Taylor, 1999), showing that EVT has been applied as a framework in educational settings with adults. Examples of EVT application with adults include measuring the utility value of the mentally ill engaging with activities (Choi, Fiszdon, & Medalia, 2010), and measuring the task engagement of teachers in professional development (Thomson & Kaufmann, 2013). This study will also apply EVT as a framing for an adult population, but in the unique context of state FFA leaders and their task values associated with providing homeschool students with access to FFA membership eligibility.

The task value construct of EVT contains four specific components: attainment value, intrinsic value, utility value, and cost (Eccles & Wigfield, 2002; Schunk et al., 2008). The four components have definitions which have been contextualized for this study (Table 1).

Table 1
Contextualized value components for state FFA leaders

Value Component	Definition	State FFA Leader Perspective
Attainment	Task relevance	Relevance of expanding FFA membership access to include homeschool students
Intrinsic	Subjective interest	Interest in expanding FFA membership access to include homeschool students
Utility	Task usefulness	Improvement of FFA with expanding membership access to include homeschool students
Cost	Potential task negatives	Resource allocation (e.g., time, materials, spots on CDE teams) in expanding FFA membership access to include homeschool students

Attainment value was defined as the relevance of a task (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008), and was operationalized in this study as the relevance state FFA leaders place on expanding FFA membership access to include homeschool students. Intrinsic value was defined as the subjective interest in a task (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008), and was operationalized in this study as the interest state FFA leaders have in expanding FFA membership access to include homeschool students. Utility value was defined as the usefulness of a task for future goals (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008). In the context of this study, it was operationalized as the usefulness of homeschool students being FFA members as perceived by state FFA leaders. The final piece of task value is cost, which is perceived downsides to task engagement (Eccles et al., 1983; Eccles & Wigfield, 2002; Schunk et al., 2008). It was operationalized in this study as the potential costs as perceived by the state FFA leader with regards to an Agricultural Education program and FFA chapter if FFA membership eligibility access is provided to homeschool students.

Due to the target study population being state FFA leaders, expectancies regarding the specific task of expanding FFA membership access for homeschool students was not a measured variable. It was assumed that state FFA leaders are all by definition the state-level “gatekeepers” regarding membership in FFA. Accordingly, they are intimately involved with FFA statewide and would be assumed to have a high expectancy with regards to effectively influencing state-level FFA membership policy.

Purpose

The purpose of this study was to describe state FFA leaders’ attitudes and motivation to provide FFA membership access for homeschool students. There were two research questions for the study: (1) What are the attitudes of state FFA leaders regarding potential models of homeschool student participation in the three integrated components of Agricultural Education and do these attitudes differ by National FFA defined region? (2) What are the motivational attitudes of state FFA leaders with regards to providing homeschool students with access to participate in the three integrated components of Agricultural Education and do these attitudes differ by National FFA defined region?

Methods & Procedures

The study was designed as an exploratory census of state FFA leaders. The study questionnaire was developed from items adapted from previously validated instruments (Gray, 1998; Hendrix, 2003; McGraw, 1989) and original items written by the researchers measuring context-specific task-values (Table 2).

Table 2
Example task-value items operationalized to measure state FFA leaders’ motivation to provide access to FFA membership for homeschool students

Task-value construct	Example items

Attainment value	• It is important to include all members of the community in an FFA chapter, including homeschool students. • It is important that all students interested in Agricultural Education have access to classroom instruction, FFA, and SAE at a local public school.
Intrinsic value	• I am passionate about reaching all students that are interested in FFA, including homeschool students. • I am passionate about growing FFA chapters by reaching underserved populations, including homeschool students.
Utility value	• Homeschool students being in FFA would be a valuable resource for FFA chapters. • Homeschool students being in FFA would make FFA chapters more competitive.
Cost	• Homeschool students being in FFA would take away resources from public school students. • Homeschool students being in FFA would undermine the unity of an FFA chapter.

In addition to the items making up the task-value construct regarding providing access to FFA membership eligibility for homeschool students, items were created that measured attitudes of state FFA leaders regarding observed and potential models of classroom instruction, FFA membership, and SAE completion for homeschool students. Face validity was established by a panel of experts in the field of Agricultural Education and Agricultural Communication. Internal reliability for the task-value construct within the instrument was measured through a pilot test with a sample of 20 former state FFA leaders and current teacher educators. Cronbach's alpha was assessed and all levels were acceptable for task-value constructs except for the marginal level of rigor for attainment value (Attainment = .54; Intrinsic = .72; Utility = .96; Cost = .92). Interpretations associated with the attainment value construct were completed with caution.

State FFA leaders were identified with the assistance of the National FFA Organization, who provided the researchers with the contact information for the top FFA contact person in each state. Territory FFA leaders (Guam, Puerto Rico, and the Virgin Islands) were not included in this study due to the complexities of current homeschool law within U.S. territories. A targeted census was attempted for all 50 state FFA leaders with 42 complete and 5 partial responses being collected. Multiple points of contact were used to maximize response rate. The study was introduced and described to many state FFA leaders at the annual NASAE (National Association of Supervisors of Agricultural Education) meeting prior to executive committee meetings. The electronic questionnaire was then distributed through Qualtrics© about a week later. Reminder emails were sent about a week after the initial distribution, followed by targeted weekly email reminders continuing for about six weeks. As an additional point of contact, non-respondents were also contacted after four weeks by the Local Program Success team at the National FFA Organization.

Data were analyzed using SPSS (v.23) and included descriptive statistics, such as means for items and grand means for the task-value constructs, due to the exploratory nature of the study. In order to maintain respondent confidentiality, data were aggregated to the regional level (Table 3) using current FFA regions as defined in the National FFA Organization Bylaws: Eastern, Central, Southern, and Western (National FFA Organization, 2015). Identical regions are used by both National FFA and the National Association of Supervisors of Agricultural Education (NASAE) and therefore represent a component of structural hierarchy for both School-based Agricultural Education as a whole and FFA.

Table 3
National FFA Organization Regions

Region	States			
Eastern	Connecticut	Delaware	Illinois	Indiana
	Kentucky	Maine	Maryland	Massachusetts
	Michigan	New Hampshire	New Jersey	New York
	Ohio	Pennsylvania	Rhode Island	Vermont
	Virginia	West Virginia		
Western	Alaska	Arizona	California	Hawaii
	Idaho	Nevada	New Mexico	Oregon
	Texas	Utah	Washington	
Southern	Alabama	Arkansas	Florida	Georgia
	Louisiana	Mississippi	North Carolina	South Carolina
	Tennessee			
Central	Colorado	Iowa	Kansas	Minnesota
	Montana	Missouri	Nebraska	North Dakota
	Oklahoma	South Dakota	Wisconsin	Wyoming

Results

Questionnaire items regarding state FFA leaders' attitudes towards observed and potential models of classroom instruction (Tables 4 & 5), FFA membership (Table 6), and SAE completion (Table 7) for homeschool students were measured using a 6-point Likert-type scale (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree). The range for items was 1 to 6, with the mathematical "middle" point being 3.5, that is, any mean above a 3.5 is on average more on the "agree" side of the scale and any mean below a 3.5 is on average more on the "disagree" side of the scale, with a value of 3.5 falling exactly between "agree" and "disagree" on the scale.

Table 4
State FFA leaders' attitudes towards models of instruction for homeschool students

Items	Eastern Region	Western Region	Southern Region	Central Region	Overall
Homeschool students should be permitted to meet classroom instruction	(n = 14)	(n = 10)	(n = 8)	(n = 12)	(N = 43)

eligibility requirements for FFA membership by…					
Completing an online Agricultural Education course.	3.79 *SD* = 1.93	2.70 *SD* = 2.36	3.13 *SD* = 2.10	2.67 *SD* = 1.72	3.16 *SD* = 2.00
Attending Agricultural Education courses at their local public school.	5.43 *SD* = .76	5.80 *SD* = .63	5.63 *SD* = .52	5.75 *SD* = .45	5.63 *SD* = .62
Completing a state-approved Agricultural Education curriculum taught by the homeschool parent.	4.36 *SD* = 1.78	2.20 *SD* = 1.87	3.13 *SD* = 1.64	2.17 *SD* = 1.53	3.09 *SD* = 1.91
Completing any Agricultural Education curriculum chosen by a homeschool parent.	2.71 *SD* = 1.64	1.80 *SD* = 1.48	2.25 *SD* = 1.75	1.58 *SD* = 1.00	2.14 *SD* = 1.51

Note. Numbers presented are means on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

State FFA leaders from all regions most strongly agreed with the model of homeschool students meeting FFA membership eligibility requirements for classroom instruction through part-time public school enrollment. A notable result is that state FFA leaders from the Eastern Region on average answered between "Slightly Agree" and "Moderately Agree" for homeschool students meeting classroom instruction requirements for FFA membership through completing a state-approved curriculum taught by the homeschool parent.

Table 5
State FFA leaders' attitudes towards homeschool parents teaching a state-approved Agricultural Education curriculum resulting in homeschool student FFA membership eligibility

Items	Eastern Region	Western Region	Southern Region	Central Region	Overall
Homeschool parents should be permitted to provide state-approved Agricultural Education curriculum to their children that results in their student being eligible for FFA membership if…	(*n* = 14)	(*n* = 10)	(*n* = 8)	(*n* = 12)	(*N* = 43)
They have no qualifications/all parents should be able to teach state-approved Agricultural Education curricula.	2.29 *SD* = 1.49	2.20 *SD* = 1.99	1.63 *SD* = 1.41	1.17 *SD* = .58	1.86 *SD* = 1.47
They are certified/licensed to teach in ANY K-12 area.	3.07 *SD* = 1.69	2.70 *SD* = 2.16	3.00 *SD* = 1.60	1.92 *SD* = 1.00	2.70 *SD* = 1.66
They are certified/licensed to teach Agricultural Education.	5.00 *SD* = 1.62	3.50 *SD* = 2.27	5.25 *SD* = .89	4.17 *SD* = 1.85	4.56 *SD* = 1.76

They have a post-secondary degree in an agriculture-related field.	4.64 *SD* = 1.60	3.40 *SD* = 2.17	4.00 *SD* = 1.93	2.50 *SD* = 1.73	3.72 *SD* = 1.94
They have at least 6,000 hours of work experience in a field involving agriculture, food, or natural resources.	3.93 *SD* = 1.73	3.10 *SD* = 2.03	3.75 *SD* = 1.98	2.25 *SD* = 1.36	3.30 *SD* = 1.82
They were a former FFA member.	2.86 *SD* = 1.41	2.30 *SD* = 1.95	3.13 *SD* = 1.81	1.67 *SD* = .99	2.49 *SD* = 1.58

Note. Numbers presented are means on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

Results from this question stem show that state FFA leaders from the Eastern, Southern, and Central regions on average agreed that homeschool parents that are licensed to teach Agricultural Education should have their instruction count for the purposes of FFA membership eligibility. A notable result is that state FFA leaders from the Eastern region leaders on average answered between "Slightly Agree" and "Moderately Agree" to the item regarding a scenario where the homeschool parent teaching a state-approved Agricultural Education curriculum has a post-secondary degree in an agriculture-related field.

Table 6

State FFA leaders' attitudes towards models of FFA membership for homeschool students

Items	Eastern Region	Western Region	Southern Region	Central Region	Overall
Homeschool students who meet current FFA membership requirements should be permitted to…	(n = 14)	(n = 10)	(n = 8)	(n = 12)	(N = 43)
Participate in FFA events independently without chapter affiliation	2.00 *SD* = 1.41	1.50 *SD* = 1.58	1.88 *SD* = 1.36	1.08 *SD* = .29	1.63 *SD* = 1.27
Join a homeschool FFA chapter advised by a homeschool parent and participate in FFA events	3.21 *SD* = 1.76	1.80 *SD* = 1.62	2.38 *SD* = 1.30	1.50 *SD* = .91	2.30 *SD* = 1.58
Join a homeschool FFA chapter advised by a certified Agricultural Education teacher and participate in FFA events	4.43 *SD* = 1.60	3.10 *SD* = 1.91	4.25 *SD* = 2.19	2.17 *SD* = 1.19	3.53 *SD* = 1.88
Join the FFA chapter of their local school and participate in FFA events	4.86 *SD* = 1.41	5.22[a] *SD* = 1.72	4.88 *SD* = 1.81	4.33 *SD* = 2.02	4.76[b] *SD* = 1.71

Note. Numbers presented are means on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

[a]n = 9.

[b]$N = 42$.

Results from this question stem show that state FFA leaders from all regions on average agreed that homeschool students who meet FFA membership requirements should be permitted to join the FFA chapter of their local school. State FFA leaders from the Eastern and Southern regions on average answered between “Slightly Agree” and “Moderately Agree” regarding the model of having homeschool students be permitted to join a homeschool FFA chapter that is advised by a certified Agricultural Education teacher.

Table 7

State FFA leaders’ attitudes towards models of SAE completion for homeschool students

Items	Eastern Region ($n = 14$)	Western Region ($n = 9$)	Southern Region ($n = 8$)	Central Region ($n = 12$)	Overall ($N = 42$)
All students participating in FFA should be required to complete an SAE	5.36 *SD* = 1.15	6.00 *SD* = 0	5.88 *SD* = .35	5.83 *SD* = .39	5.71 *SD* = .74
An SAE should be considered instruction that qualifies a student for FFA membership	3.86 *SD* = 1.41	3.11 *SD* = 1.97	3.88 *SD* = 2.03	3.42 *SD* = 1.68	3.64 *SD* = 1.67
An SAE should only be supervised by a certified Agricultural Education teacher	4.21 *SD* = 1.19	4.89 *SD* = 1.45	4.25 *SD* = 1.75	4.67 *SD* = 1.44	4.45 *SD* = 1.40
An SAE by a homeschool student should be permitted to be supervised by a homeschool parent partnering with a local Agricultural Education teacher	4.71 *SD* = 1.38	2.89 *SD* = 1.36	4.25 *SD* = 1.17	3.58 *SD* = 1.44	3.95 *SD* = 1.50
An SAE by a homeschool student should be permitted to be supervised by a homeschool parent as long as they follow the approved requirements for SAEs	3.21 *SD* = 1.42	2.33 *SD* = 1.32	3.50 *SD* = 1.69	2.17 *SD* = 1.59	2.83 *SD* = 1.55

Note. Numbers presented are means on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree).

State FFA leaders from all regions an average moderately to strongly agree that all students participating in FFA should be required to complete an SAE. State FFA leaders from the Eastern and Southern regions answered on average between “Slightly Agree” and “Moderately Agree” on the item regarding an SAE being completed by a homeschool student and supervised by a homeschool parent but one partnering with a local Agricultural Education teacher.

Questionnaire items regarding state FFA leaders' task-value motivation (Table 8) to provide FFA membership access to homeschool students were measured using a 6-point Likert-type scale (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree) for all four underlying constructs. The attainment value construct consisted of five items, the intrinsic value construct consisted of four items, the utility value construct consisted of eight items, and the perceived costs construct consisted of eight items.

Table 8
State FFA leaders' motivation towards providing FFA membership access for homeschool students

	Eastern Region	Western Region	Southern Region	Central Region	Overall
	(*n* = 14)	(*n* = 9)	(*n* = 8)	(*n* = 12)	(*N* = 42)
Attainment value	5.34 *SD* = .43	5.13 *SD* = .74	5.13 *SD* = .85	4.97 *SD* = .43	5.17 *SD* = .59
Intrinsic value	5.29 *SD* = .81	5.31 *SD* = .69	5.28 *SD* = .77	4.44 *SD* = .97	5.09 *SD* = .87
Utility value	3.70 *SD* = 1.26	3.04 SD = 1.59	4.05 *SD* = .67	3.13 *SD* = 1.30	3.44 *SD* = 1.29
Perceived costs[a]	2.97 *SD* = 1.04	3.10 *SD* = .92	3.50 *SD* = .85	3.26 *SD* = .71	3.17 *SD* = .90

Note. Numbers presented are grand means of all construct items on a scale from 1 to 6 (Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, Strongly Agree). [a]Items were reverse coded negatively worded items, higher number means lower importance on perceived costs.

State FFA leaders from all regions on average have a higher attainment and intrinsic value than utility value. Costs were perceived to be present on average by state FFA leaders in all regions but the Southern region.

Implications

Study results showed that state FFA leaders across the country on average have moderate task-value motivation regarding FFA membership access to homeschool students. The four dimensions of that specific task-value motivation provide additional insight and implications for future research. Attainment and intrinsic value showed the highest mean responses for all regions of state FFA leaders, while lower means were seen in utility value. This implies that although state FFA leaders may see the relevance of and have an interest in providing FFA membership access to homeschool students, they may not see as much usefulness in that task. Higher attainment and intrinsic values could be due to the raw numbers of homeschoolers being perceived as potential enrollment growth. However, lower utility values may imply that state FFA leaders do not know if increasing access would help homeschool families in their state accomplish their educational goals for their children or help state FFA leaders accomplish their goals for FFA. Future research should explore state FFA advisors' relationships with the homeschool community and awareness of potential local barriers to potential increases in programs access for homeschool students, such as whether local FFA advisors are willing to work with homeschool students. Another dimension of the measured task-value motivation constructs is costs, which on average state FFA advisors in three out of four regions at least slightly perceived being a potential barrier to increasing access for homeschool students. From an administrative and supervisory standpoint, trepidation could be expected at the potential of resources being stretched further due to increases in Agricultural Education program enrollment and FFA membership after providing access to homeschool students. If a state FFA advisor does not have any experience with providing access to homeschool students, this concern about perceived and potential costs may be even greater.

State FFA leaders from all regions agreed that all students participating in FFA should be required to complete an SAE. This is consistent with the majority of state FFA constitutions that have language in their membership requirements that active members must be completing an SAE (Kararo & Knobloch, 2016) despite research showing that SAE is an underutilized component of the Agricultural Education model and less than two-thirds of students are actually meeting this requirement (Lewis, Rayfield, & Moore, 2012; Talbert & Balschweid, 2004). Future research should investigate expectancies and motivations of state FFA leaders with regards to state FFA constitution membership policies and whether policy enforcement is perceived to lie with state-level or local-level FFA leaders.

State FFA leaders in all regions did not agree to the potential of homeschool students being permitted to complete online Agricultural Education coursework in order to meet eligibility requirements for FFA membership. Although previously suggested as a possibility for meeting classroom instruction requirements (Weik, 2015), this result shows that state FFA advisors may have concerns regarding online coursework, even within the region that contains the major source of online Agricultural Education curriculum, the Nelson Academy of Agricultural Sciences Online (2017) in Montana. Future research should investigate the sources of these concerns, which could include the policy logistics of reciprocal teacher certification across state lines.

An additional option presented as a potential way for homeschool students to be permitted to meet eligibility requirements for FFA membership was by completing a state-approved Agricultural Education curriculum taught by the homeschool parent. Only state FFA leaders from the Eastern region agreed that this was an acceptable option. These data suggest that the North Carolina model or a modification of that model may not be perceived by state FFA leaders as qualifying homeschool students for FFA membership. Moreover, state FFA leaders from the Eastern region agreed that if a homeschool parent has a post-secondary degree in an agriculture-related field, they should be permitted to teach a state-approved Agricultural Education curriculum resulting in FFA membership eligibility. Future research should further investigate details regarding homeschool parents teaching a state-approved curriculum and why state FFA leaders do not perceive certain alternative certification pathways in Agricultural Education (e.g., work experience in an agriculture-related field) as an acceptable possibility.

With regards to FFA membership models, state FFA leaders appeared to be in favor of integrating homeschool students into existing FFA chapters than creating separate homeschool FFA chapters. However, state FFA leaders in the Eastern and Southern regions did agree that homeschool FFA chapters were a viable model. Integration of homeschool students into existing public school FFA chapters already takes place in states such as Indiana and Minnesota (Johnson, 2012) and these results imply that there may be a willingness to expand that practice to other states.

While results show that all students meeting the SAE requirement for FFA membership eligibility is a priority for state FFA leaders, differences exist in attitudes about how homeschool students could complete a SAE as part of a complete Agricultural Education program experience. State FFA leaders from all regions agreed that an SAE should only be supervised by a certified Agricultural Education teacher, but Eastern and Southern region leaders agreed with an SAE model for homeschool students where the homeschool parent acts as the SAE supervisor and partners with a local Agricultural Education teacher. Future research should investigate the attitudes of local Agricultural Education teachers regarding this potential model for SAE completion, because if state-level policy allows for it, this would delegate some responsibility to the homeschool parent and potentially ease the burden of additional students in the local Agricultural Education program.

Overall, results showed the most acceptable model of Agricultural Education program participation and FFA membership for homeschool students to state FFA leaders in all regions is part-time public school enrollment, membership in the school FFA chapter, and completion of an SAE that is directly supervised by the local Agricultural Education teacher. This aligns with participation models currently observed in states (e.g., Indiana & Minnesota) where part-time public school enrollment is legal and there is no existing separate option for homeschool Agricultural Education programs and FFA chapters as exist in Alaska and North Carolina (Johnson, 2012; Massey, 2015; North Carolina FFA Association, 2016). A main implication of these findings is that the model observed in North Carolina and Alaska may not be perceived as the ideal model for homeschool student access in other states by state FFA leaders. Future research should investigate attitudes and motivations of local FFA advisors to provide access to FFA membership eligibility for homeschool students. Although the results imply that there may be a value placed on providing access to FFA membership for homeschool students, more stakeholders must be involved in any change process. State FFA leaders are the “gatekeepers” with regards to state-level administration, but local FFA advisors are the ones in direct interaction with homeschool students in the existing models of Agricultural Education program participation and FFA membership. Before any potential changes resulting can take place, a key stakeholder group, local Agricultural Education teachers and FFA advisors, should be involved and asked their opinions. This will give the Agricultural Education community a better insight as to the best course of action moving forward with pursuing the National FFA Organization goal of expanding access to Agricultural Education programs and FFA membership eligibility.

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Evaluation of Protective Factors' Contribution to First Generation Postsecondary Agriculture Students Successful Transitions

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For generations, researchers have examined attributes that contribute to the resilience of low socioeconomic youth. Attributes that help one become resilient are known as protective factors. The purpose of this descriptive study was to explore the protective factor(s) that contributed to the successful transition of first-generation, low socioeconomic status (SES) College of Agriculture students' at a public land-grant university. The population consisted of postsecondary agriculture students who identify themselves as a first generation, low socio economic student. The First Scholars program assisted the researchers with a convenient sample of participants during the 2015 – 2016 academic year. From the results, the agriculture students enrolled in the First Generations Program contributed their success to their ability to achieve goals; ability to plan for their future; and their focus on education, all of which represent what is called protective factors. Recommendations were made on how to further enhance the success of the agriculture students and toward the recruitment of agriculture students who display a higher resiliency to potentially be successful at the post-secondary level.

Introduction

In the 1960s, President Lyndon B. Johnson declared war on poverty. In order to show the severity of this issue, President Johnson scheduled a trip to a rural [STATE] Appalachian town where poverty was at an all time high to showcase the circumstances in which rural Americans lived (Bello, 2014). According to the United States Census Bureau (2013), in 1960, 70.12% of this Appalachian region of [STATE] is still below the poverty level while only 22.4% of Americans lived in poverty (National Poverty Center, 2014).

On January 8, 1964, President Johnson addressed the nation, "Very often a lack of jobs and money is not the cause of poverty, but the symptom. The cause may lie deeper in our failure to give our fellow citizens a fair chance to develop their own capacities, in a lack of education and training, in a lack of medical care and housing, in a lack of decent communities in which to live and bring up their children" (Johnson, 1964, para. 25). Based upon these beliefs, the "war on poverty" was centered on four parts of legislation: The Economic Opportunity Act, The Elementary and Secondary Education Act, The Food Stamp Act of 1964, The Social Security Amendments of 1965.

Due to President Johnson's efforts towards the "war on poverty", the United States' poverty rate began to steadily decrease in the 1960's. In 1973, the poverty rate had decreased to 11.1%. However, by the 1980's the poverty rate had began to rise again and by 1983 it had reached 15.2% or 35.3 million individuals (National Poverty Center, 2014). After decades of minimal fluctuation, in 2012, the poverty rate percentage had decreased to 15.0% or 46.5 million individuals. Kentucky's poverty rate was slower to decrease, compared to the national average, with a rate of 17.9% (United States Census Bureau, 2013). Even though the poverty rate had declined since 1983, the number of individuals living in poverty in 2012 has increased due to the United States’ increased population.

The current widening economic gap among social classes is gaining national attention. The gap has been associated with the dwindling representation of low socioeconomic status (SES) students in post-secondary education and the high dropout rates in secondary education (Thomas & Stockton, 2003). Research in SES has been combined with several factors to examine student achievement. Many of these factors are external, including parental involvement (Ma, 2009), parental occupation (Leppel, Williams, & Waldauer, 2001), parental encouragement (Sewell & Shah, 1968), parental education level (Dubow, Boxer, & Huesmann, 2009), family support, (Seccombe, 2012), and peer associations (Stewart, 2008). Other factors have been internal, including student resilience (Werner, 1990) and career goals (Calcagno, Bailey, Jenkins, Kienzl, & Leinbach, 2008).

Furthermore, research has explored the intersection SES and demographic characteristics have on student achievement. Demographic factors included race (Thomas & Stockton, 2003), ethnicity (McWhirter, 1997; Trusty, Robinson, Plata, & Ng, 2000), age (Reason, 2009), and gender (Astin, 1993). Dubow, Boxer, and Huesmann, (2009) found the most influential combination of factors when determining a student’s enrollment at a higher education institution is socioeconomic status and parents’ education level.

Parental social class is a significant contributing factor to whether or not the child will go to college. Children with parents of high SES have greater access to higher education (Persell, 2010). Social class can determine what type of school the child will be able to attend, which relates to the quality of teachers, curriculum and teaching practices the school embraces (Persell, 2010). To widen the economic gap even further, research posits that counselors poorly perceive and expect less from low SES students (Auwarter & Aruguete, 2008). In 2008, Auwarter and Arguete reported high school counselors view low SES students as having a less promising future than students from middle and high-income families

Seccombe (2012) identified poverty as having a negative impact on the home environment. Low-income parents tend to interact with their children less frequently than high-income parents because of the emotional distress over income. Seccombe reported this lack of parental encouragement influences children’s goals and whether they see value in education. If a student does not see meaning and value in continuing their education then they will not enroll in college (2012).

Agricultural Education has explored a variety of methods for retaining and assisting students with success, but limited in looking at the factors that contribute success and failures. In fact, in 2007 Wingenbach, White, Degenhart, Pannkuk, and Kujawski examined the knowledge and comfort levels for agricultural science teachers and recommended that additional research explore the factors that affect the lack of success and the discomfort levels the teachers were having. An exploratory case study was conducted at Texas Tech among nine first generation college of agriculture students. From their discussions it was determined that the students yielded parental/family, their teacher, and their own self-motivation as the keys to their success in college (Irlbeck, Adams, Akers, Burris, & Jones, 2014). When quantifiably measuring successful transitions, Garton, Ball, and Dyer (2002) looked at the on-campus factors that contributed to the successful transition of freshman to their sophomore year. Within the study, the authors discovered that the best predictor was the students GPA and ACT scores. Both the 2002 and 2014 study provide wonderful direction that assist educators in assisting successful transition, a need still exist to describe the protective factors that motivate the students to overcome the major hurdles that college can provide, thus developing a resilient young adult.

Theoretical/Conceptual Framework

Researchers consider first-generation, low socioeconomic status students that enroll and successfully transition into a higher educational institutions as *resilient* (Dubow, Boxer, & Huesmann, 2009). The focus of resilience theory reflects how people adapt to situations and overcome adversity (Bradley & Corwyn, 2005). Werner (1995) divided the resilience theory into three aspects: “good developmental outcomes despite high-risk status, sustained competence under stress, and recovery from trauma” (p. 81). An example of a “good developmental outcomes despite high-risk status” is a first-generation, low socioeconomic status student. If a person experiences this type of difficult situation and succeeds despite the odds against them, then they are considered resilient (Bradley & Corwyn, 2005). However, Werner (1995) found people do not overcome difficult situations by themselves. A person must have at least one protective factor present to assist in overcoming the adverse situation. Protective factors are attributes within the individual and/or environmental influences that enhance “developmentally appropriate outcomes” (Werner, 2000, p. 116). An example of protective factors includes: hobbies/talents, faith, mentors, supportive family members, etc. (Werner, 2000). Resilience theory and Emmy Werner’s protective factors provided the theoretical framework for this research study.

Every individual has a number of protective factors that allow them to successfully transition in a variety of settings (i.e. work, school, new friends, etc.), unfortunately in some situations a limitation of protective factors may lead to failure in the task. Perna and Titus (2005) found the most influential factor in determining college enrollment is parents’ education level. However, the most influential combination of factors in determining college enrollment is parents’ education level and socioeconomic status (Dubow, Boxer, & Huesmann, 2009).

After a first-generation, low-income student has entered college, they often face difficulties with academic, cultural, and/or social transitions (Moschetti, 2012). The parents of these students do not have the knowledge to help their student adjust to a college environment because they have never experienced college first-hand (Pike & Kuh, 2005). Due to the realization that college support can be limited, the First Scholars Program requires each student to develop an Individual Strategic Plan (ISP). The ISP serves as the primary tool to access student characteristics. The ISP is tailored to each student based on goals. The ISP requires the students to select activities and experiences that will assist in achieving their goals (Moschetti, 2012). Ishiyama (2007) found when first-generation students are paired with faculty or peers the retention rate increases in the first-generation population of students.

The exploration of resiliency theory is limited in the agricultural education profession. As recent as 2012, Thieman, Henry, and Kitchel discovered the limitation and provided the agricultural education profession with a research synthesis on resiliency. Thieman, Marx and

Kitchel (2014) later explored resiliency further by examining the protective factors that assisted pre-service teachers in their final year of teacher training at the University of Missouri. In the 2014 study, the researchers determined that the students' experiences and belief that they were doing a good job contributed to successful resilience. At the same time, they discovered that the uncertainty of employment could counter resiliency.

Purpose and Research Objectives

The purpose of this study was to describe the protective factor(s) that contributed to the first-generation, low socioeconomic status students' enrollment at The University of [STATE]. Tailoring a study to meet the needs of agriculture students enrolled in the First Scholar's program could provide more insight to problems faced; thus allowing for more diversified tools and programs to be developed to meet the needs to their students.

The following research objectives were developed to be the focus of this study:
1. Describe selected characteristics of the first generation, low socioeconomic status agriculture students. Specifically: gender, race/ethnicity, home residence, grade level, and GPA.
2. Describe the protective factors present among the first generation, low socioeconomic status students.
3. Describe the protective factors present among the first generation, low socioeconomic status students by grade classification

Methodology

This study was descriptive by design. Descriptive research is used when a researcher wants to examine existing conditions (Fraenkel & Wallen, 2006). In this study, the researcher examined which protective factor(s) assisted first-generation, low socioeconomic status students enrolling in a higher educational institution.

When conducting a descriptive study, internal and external validity must be addressed. Internal validity ensures the data collected and analyzed are accurate (Michael, 2000). In order to protect internal validity, the researcher must minimize measurement error by ensuring the instrument is valid and reliable (Michael, 2000). External validity is the degree "to which the results of a study can be generalized to the world at large" (Bickman & Rog, 2008, p. 67). Random sampling technique and maintaining a low dropout rate of participants improves external validity (Michael, 2000).

In this study, the population consisted of first-generation, post-secondary agriculture students enrolled in the First Scholars Program during the 2015 – 2016 academic year (N = 51). At the university in which this study was conducted, 18% of students are considered first-generation. The purpose requires the identification of a low-socioeconomic status population; thus the researcher identified the low SES population by the Free Application for Federal Student Aid [FAFSA]. In the researchers attempt to gain census data, multiple methods of contact were implemented; which led to a tested population of 37 (N = 37). The First Scholars Program was selected as they are the only organization on the campus that has a focus group of first generation, low SES students, which provide a convenient sample of agriculture students to utilize.

The instrument used for this study was developed by the researcher and guided by Werner's (2000) protective factors. The questionnaire was referred to as, "Against the Odds: Protective Factors Questionnaire". There were two sections to the instrument: part I consisted of the protective factors and part II consisted of participant characteristics. The criterion of the 23-protective factors in part I of the questionnaire were set by the work from Werner (2000). The researcher contacted the founder of the developed protective factors.(Werner & Smith, 1992) for permission to modify and use within the questionnaire.. The questionnaire was written so the participants were to determine how influential each approved protective factor was on their success as a student within the college. The second section of the questionnaire sought out the participants' characteristics demographically.

When conducting a descriptive study, internal and external validity must be addressed. Internal validity ensures the data collected and analyzed are accurate (Michael, 2000). In order to protect internal validity, the researcher sought to minimize measurement error by ensuring the instrument was valid and reliable (Michael, 2000). Part II of the questionnaire also allowed the participants to describe which factor(s) they felt were the least and most important to their success within the agriculture college.

A panel of experts (n = 3) reviewed the questionnaire for face validity and a panel of students (n = 8) from similar backgrounds examined the questionnaire for content validity. Modifications were made following the panel members and students review to assist with the understanding of the questionnaire's purpose. Reliability is the extent an instrument produces accurate results (Phelan & Wren, 2006). The reliability of the questionnaire was established using a field test. Cronbach's alpha reliability coefficient for the scale was 0.81 (Santos, 1999). According to Santos (1999), a Cronbach alpha score of 0.70 or higher should be considered acceptable (Santos, 1999).

After the questionnaires were distributed and collected, the researcher and the First Scholars coordinator contacted all non-responsive participants by email in order to solve for non-responsive error. "Non-response error occurs when a significant number of people in the survey sample do not respond to the questionnaire" (Salant & Dillman, 1994, p. 20). Salant and Dillman (1994) consider a response rate under 60-70 percent as an indicator of non-response error. The researcher was able to secure a 72% response rate.

The Statistical Package for the Social Sciences® [SPSS] 22.0 for Windows was utilized for data analysis. All statistical analyses are subject to assumption; therefore, the statistical analysis was guided by the scale of measurement (nominal, ordinal, interval, and ratio) of the data. To help understand the data, findings were reported through the use of frequency counts, percentages, and measures of central tendencies

Results

Research Objective 1: Describe selected characteristics of the first generation, low socioeconomic status students.

Based upon the characteristic information, the majority of the First Scholar participants can be described as female (f = 21; 56.8%) who identify themselves as White (f = 27; 73.0%). The majority of First Scholar participants (f = 20; 54.1%) considered their home residence to be in a suburban setting. Of the participants, the majority were sophomores (f = 13; 35.1%), followed by juniors (f = 12; 32.4%) and seniors (f = 12; 32.4%). The majority of the participants (f = 10; 27.0%) maintained a cumulative Grade Point Average (GPA) range of 3.26-3.50. See Table 1 for a thorough analysis of the First Generation Participants.

Table1. *Characteristics of First Generation Participants* (*n* = 37)

Characteristics	*f*	%
Gender		
Male	21	56.8
Female	16	43.2
Ethnicity		
White	27	73.0
Other	5	13.5
African American	3	8.1
Hispanic/Latino	2	5.4
Home Residence		
Suburban	20	54.1
Rural	14	37.8
Urban	3	8.1
College Classification		
Sophomore	13	35.1
Junior	12	32.4
Senior	12	32.4
Grade Point Average		
3.75-4.0	9	24.3
3.51-3.74	7	18.9
3.26-3.50	8	21.6
3.01-3.25	7	18.9
2.00-3.00	4	10.8
< 2.00	0	0

Research Objective 2: Describe the protective factors present among the first generation, low socioeconomic status students.

In research objective two, measures of central tendencies were used to describe each protective factors perceived contribution to the transitional success from the First Scholars participants (see Table 2). The First Scholar participants scored the protective factor of achieving goals (*M* = 4.73; SD – 0.89) followed by the ability to plan for one's future (*M* = 4.38; SD = 1.01). The ability to focus on one's education had a mean score of 4.32 (SD = 1.12), followed by being independent (*M* = 4.24; SD = 1.17) and then responsibilities (*M* = 4.14; SD = 0.95) to be a self-starter (*M* = 4.03; 1.56) and intelligence (*M* = 4.00; SD = 0.78). The entirety of the protective factor influence on the participants' successful contribution can be reviewed in Table 2.

Table 2
Protective Factors Influence on Successful College Transitions (*n* = 37)

Protective Factors	*M*	*SD*	Range
Achieve goals	4.73	0.89	3.00-5.00
Ability to plan for future	4.38	1.01	2.00-5.00
Focus on education	4.32	1.12	2.00-5.00
Being independent	4.24	1.17	1.00-5.00
Responsibilities	4.14	0.95	1.00-5.00
Ability to be a self-starter	4.03	1.56	1.00-5.00
Intelligence	4.00	0.78	2.00-5.00
Upbringing	3.92	1.04	1.00-5.00
Personality	3.81	1.54	1.00-5.00
Positive self-concept	3.70	1.27	1.00-5.00
School experiences	3.65	1.24	1.00-5.00
Close friends	3.51	1.66	1.00-5.00
Structure and rules	3.43	1.02	1.00-5.00
Teacher(s)	3.22	1.07	1.00-5.00
Physically distance self	3.11	0.46	1.00-5.00
Faith	3.11	0.98	1.00-5.00
Parents’ education	3.11	1.09	1.00-5.00
Caregiver relationship	3.05	1.77	1.00-5.00
High School Activities	2.97	1.34	1.00-5.00
Grandparents	2.76	1.13	1.00-5.00
Siblings	2.68	1.26	1.00-5.00
Hobbies/Special talents	2.65	0.97	1.00-5.00
High school mentor(s)	2.54	2.12	1.00-5.00

Scale based on: 1 = No Influence, 2 = Slightly Influential, 3 = Moderately Influential, 4 = Influential, and 5 = Extremely Influential

Research Objective 3: Describe the protective factors present among the first generation, low socioeconomic status students by grade classification

Table 3 displays the influence of each protective factor identified by grade classification of the First Scholar participants. Of the twenty-three protective factors, the senior participants rated 17 of the protective factors to be more influential in their successful college transition versus juniors who rated four of the protective factors to be more influential than their colleagues and sophomores accredited only two of the protective factors to be higher than their colleagues (Focus on Education; Parent’s Education).

Table 3

Protective Factor Differences by Grade

	Sophomore			Junior			Senior		
Protective Factor	*n*	M	*SD*	*n*	M	*SD*	*n*	M	*SD*
High School Activities	13	3.00	1.41	12	2.58	1.38	12	3.33	1.23
Personality	13	3.54	1.33	12	3.92	.79	12	4.00	1.13
Ability to be a self-starter	13	3.92	1.19	12	4.00	1.04	12	4.17	1.19
Intelligence	13	3.62	.87	12	4.17	.83	12	4.25	.75
Physically distance self	13	2.62	1.19	12	3.25	1.48	12	3.50	1.44
Focus on education	13	4.38	.65	12	4.25	.87	12	4.33	.65
Achieve goals	13	4.54	.78	12	4.83	.39	12	4.83	.39
Hobbies/Special talents	13	2.38	1.33	12	2.67	1.07	12	2.92	1.31
Positive self-concept	13	3.62	1.12	12	3.42	1.00	12	4.08	.79
Ability to plan for future	13	4.23	.83	12	4.50	.90	12	4.42	1.00
Faith	13	2.92	1.93	12	3.08	1.62	12	3.33	1.61
Upbringing	13	3.77	1.30	12	3.92	1.38	12	4.08	.90
Parents' education	13	3.46	1.39	12	2.75	1.48	12	3.08	1.44
Caregiver relationship	13	2.77	1.69	12	2.92	1.68	12	3.50	1.17
Grandparents	13	2.69	1.25	12	2.17	1.28	12	3.42	1.24
Siblings	13	2.54	1.61	12	3.00	1.48	12	2.50	1.38
Being independent	13	3.92	1.19	12	4.67	.65	12	4.17	.83
Structure and rules	13	3.46	1.51	12	3.25	1.66	12	3.58	1.31
Responsibilities	13	4.15	.80	12	4.17	1.19	12	4.08	1.16
Close friends	13	3.08	1.50	12	3.25	1.54	12	4.25	.87
Teacher(s)	13	3.00	1.41	12	2.67	1.54	12	4.00	1.04
School experiences	13	3.62	1.12	12	3.42	1.38	12	3.92	1.24
High school mentor(s)	13	2.62	1.26	12	1.92	1.08	12	3.08	1.44

Scale based on: 1 = No Influence, 2 = Slightly Influential, 3 = Moderately Influential, 4 = Influential, and 5 = Extremely Influential

Conclusions, Recommendations, and Implications

This study consisted of a population of postsecondary students who are part of a College of Agriculture. The students best identify themselves as first generation and of low socio economic status. Due to the risk factors already labeled upon each of these students, research cautions that each student be identified as “at risk” (Pizzolato, 2003). The findings provided preliminary information regarding the protective factors that exist among many of the successfully transitioned student participants.

Over ¾ of the agriculture student participants scored the protective factor of *achieving goals* as extremely influential, overall results indicate a mean of 4.73 and a standard deviation of 0.89. The finding reflects that of Engle, Bermeo, and O’Brien’s 2006 study when they found that first generation students that enroll in collegiate first-generation programs stay focused on achieving career goals. As a result, it posits that Individualized Strategic Plans may serve as useful tools in the helping similar students to develop a personal vision that assist with the focus of staying successful at the postsecondary level. As such, academic advisors could benefit from receiving training in documenting the goals and aspirations of their students, primarily students who are considered first generation and of low socio-economic status.

Of the participants, nearly two-thirds found the protective factor, *the ability to plan for one’s future*, extremely influential, while total results show a mean of 4.38 and a standard deviation of 1.01. Researchers found students that regularly set goals for career preparation stay focused on studies more than their counterparts (Massey, 2015). Since the students find value in goal setting, it may be recommended the University of [STATE]’s First Scholars program help the students stay focused on their career aspirations by performing goal-setting workshops and providing academic advisors. High school educators may also assist with this recommendation by teaching students the value of setting goals and how to follow through with their goals. If high school educators offer goal setting workshops to their students, then the students may be more prepared when they reach the collegiate level. The implication of this recommendation is having more well-prepared, first-generation students entering into college. This will also help programs such as the First Scholars because the students will already be familiar will how to set and manage their goals.

Approximately 70.2% of the participants found the protective factor, intelligence, to be extremely influential or moderately influential in their decision to attend the University of [STATE], while the whole sample generated a mean of 4.00 and a standard deviation of 0.78. Researchers have found students with a higher intelligence level hold themselves to higher standards and expectations when it comes to evaluating college and career success. These students also tend to have the higher grade point averages in school as well (Nickerson, Diener, & Scharwz, 2010). Since the majority of First Scholars participants value education, it is recommended to have educational opportunities (tutoring, support services, etc.) readily available to them. If the participants have access to these services, then they may be able to focus and maintain their studies more easily. The implications of this recommendation are these students focusing on their grade point averages and remaining competitive with their counterparts in the academic realm.

Over half of the participants found the protective factor, *being independent*, extremely influential, though the complete results show a mean of 4.24 and a standard deviation of 1.17. It is recommended that programs that work with low income, first generation agriculture students continue to offer current programs that build independence skills and formulate new ways to teach these skills. Students that identify as being independent may benefit from these programs because they offer mentoring, tutoring, and workshops that allow them to continue developing skills such as independence that will help them in the future. Students should be included in the development of new curriculum to ensure the program meets their diverse needs.

The vast majority of the participants responded to the protective factor of having responsibilities within the family household as influential to their successful transition in college, overall results indicate a mean of 4.14 and a standard deviation of 0.95. Bowen (2015) found students' responsibilities such as household chores can lead to educational success. It is recommended for the University of [STATE] to consider evaluating potential students on admission and scholarship applications based on this attribute. The implication of this recommendation would be narrowing the gap between the low-socioeconomic status students and their high-socioeconomic status counterparts. Often low SES students do not have the same opportunities as the other students due to income. Nevertheless a discussion regarding household responsibilities for admission and scholarship committees may have merit for future students. However, additional research to see if similar findings exist would be beneficial to the discussion regarding the role household responsibilities have on the success of students with similar backgrounds.

Results from the thirty-seven First Scholar participants created a mean of 3.22 and a standard deviation of 1.07, while twenty-six individuals ranked teachers as being influential in their decision to attend college. Schexnider (2013) found teachers have more of an impact on students than other factors. It is recommended that First Scholars choose a Faculty / Staff mentor earlier than junior year. By serving as a mentor earlier on in the program, it may ease the transition on to campus for students. If these educators continue serving as a mentor to these students, then these students will continue to be motivated and inspired to further their education after high school. This may also help increase the percentage of first-generation students receiving a college degree.

When examining the protective factor faith, approximately half of the students found it to have no influence or slightly influential; however, the other half of the students found faith as extremely or moderately influential in their decision to attend the University of [STATE]. Researchers have found this to be consistent when determining if faith contributes to college choice (Kinzie et al., 2004). This finding could have been for several reasons. Since the university is not a religious based university, but instead provide a variety of faith-based organizations for students to explore could be a positive recruiting factor for some participants. Whether these students are interested in faith or religion, by exposing them to the different religions may allow them to build more tolerance to their peers.

Out of the twenty-three protective factors, the only factor that was found to be significant was teacher(s). The seniors scored this protective factor the highest. Based upon these findings, it can be concluded these first generation, low SES agriculture students found their former teacher(s) to be instrumental in the success they are having at the postsecondary level. Researchers have concluded the impact teachers have on students throughout their school years is considered influential (Schexnider, 2013). Due to this finding, it is recommended teachers continue serving as mentors for students in and out of the classroom, even following their graduation from the secondary level. In addition, a qualitative analysis of the relationship the students have with the teacher would assist in understanding the impact the teacher had on the students' resiliency.

It is also concluded, that the other twenty-two factors were not significant for several reasons. These reasons include, but are not limited to, the students' diverse backgrounds and circumstances they have faced throughout their lifetime (Lotkowski, Robbins, & Noeth, 2004). It is evident from the findings in objective one that the students did not grow up with the same background. It is recommended further research be conducted using a larger sample size to examine the protective factors further. If a larger sample size was used in a future study, then a researcher could group students by characteristics and examine if any protective factors were recurring. The implications to this recommendation would allow researchers and educators to better understand their students' backgrounds and what motivates them to excel. If educators had this information, they would be able to help more low socioeconomic status students achieve their goals.

Lastly, a recommendation is made to the First Scholars program (who provided the convenient sample of student participants) to diversify opportunities for the agriculture students and allow for individualized program plans. If all first generation programs offer the same opportunities and require the same criteria for their program, then they may not be able to service as many students as possible. Although all the students in this study were considered low socioeconomic status, they did have the same experiences or the same background. By offering different opportunities for these individuals, the implications would allow more students to benefit academically and socially. The students would be able to experience the opportunities the programs have to offer. High school educators would also benefit from these diverse programs because when they are mentoring low SES students, they would have a support system to recommend their students seek after high school.

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Exploring How Pedagogical Strategies Change Student Perceptions of Writing Apprehension

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Abstract

Writing skills are imperative for students in any career; however, many students have acknowledged avoiding courses that emphasize writing. These same students fail to learn proper mechanics during their post-secondary education. Writing intensive courses have served as a place where students have the opportunity to improve confidence, minimize avoidance-like attitudes, and improve writing techniques. Prior literature has found a relationship between self-efficacy and writing apprehension; additionally, research has suggested how pedagogical strategies can be used to improve self-efficacy. This study sought to explore how the implementation of pedagogical activities changes self-efficacy and the student's level of writing apprehension. A qualitative research design allowed for a thick description of the students' perceptions and reactions to pedagogical activities. The findings suggested pedagogical practices and the role of the instructor played important roles to improve student confidence in writing. Specifically, practicing writing, opportunities to edit and reflect, following a guide, and writing about what matters may be used in courses to improve confidence and writing skills. Additionally, the instructor should provide constructive criticism and serve as a coach during the learning process. In order to improve writing curriculum and student confidence toward writing, instructors should incorporate these recommendations into their curriculum. The researchers also suggest conducting additional research to determine the role of writing apprehension within the college classroom.

Introduction and Literature Review

Although written communication skills have been found to be imperative in any field a college graduate choses, many college students avoid courses that focus on writing skills, and thus fail to learn proper mechanics during their post-secondary education (Belkin, 2015; Leef, 2013). Popular press authors have indicated employers are frustrated with their recent graduates' lack of writing skills (Anderson, 2014; Selingo, 2012), and some have suggested college-level instructors must make student learning of writing skills a higher priority (Leef, 2013). Similarly, research in the realm of agricultural education and communications has discussed the need for agricultural education and communications graduates to have well-developed writing skills (Ahrens, Meyers, Irlbeck, Burris, & Roach, 2016; Davis & Jayaratne, 2015; Irlbeck & Akers, 2009; Morgan, 2010). Graduates within the agricultural sciences must be able to clearly, correctly, and articulately express themselves as they enter graduate school and the professional workplace setting (Lindner, Murphy, Wingenbach, & Kelsey, 2004).

Historically, agricultural communications programs, instructors, and faculty have emphasized writing skills (Ahrens et al., 2016). Additionally, with a growing need for sophisticated written communications skills, instructors across the agricultural sciences have incorporated writing intensive assignments (Trojan, Meyers, & Hudson, 2016). Although instructors stress the need for students to improve writing skills, students have shown writing apprehension, or avoidance-like attitudes toward writing, causing them to not take writing courses seriously (Ahrens et al., 2016; Daly & Miller, 1975). In fact, writing apprehension is one of the main factors that affect a student's motivation and confidence when writing. High writing apprehension also leads students to avoid the learning process (Daly & Miller, 1975; Daly, 1978).

Writing apprehension, a term coined by Daly and Miller (1975), describes the interaction between attitudes toward writing and an individual's motivations, confidence, and skills to complete a written task. Writing apprehension occurs when an individual tends to avoid situations they perceive to demand writing and some form of evaluation (Daly, 1978). Daly (1978) explained that although students need some apprehension to be careful and attentive writers, high and low levels of writing apprehension have been found to be a barrier in the development of a student's written communication skills (Faris, Golen, & Lynch, 1999). Apprehension is scored on a continuum from 26 to 130 with a mean of 75. Individuals with a score between 60 and 90 do not show a significantly unusual level of writing apprehension and tend to have the best motivation while writing. However, those with high writing apprehension tend to write with poor mechanics (grammar, spelling, and punctuation) and tone. Although those with low writing apprehension tend to not fear the writing process, these individuals may exhibit a lack of motivation to complete writing assignments and may be unmotivated to check their work for grammar, spelling, and punctuation errors (Daly, 1978). Although students may fear a writing task, the importance of learning these imperative writing skills is crucial to students' career success (Leggette & Homeyer, 2015). In order to continue to improve writing curriculum in agricultural education and communications, faculty and instructors must understand the students' fears and attitudes toward writing (Leggette & Jarvis, 2015) and identify techniques to help students overcome these fears.

Writing intensive courses have served as places where students are able to improve their confidence and writing techniques (Leggette, McKim, & Dunsford, 2013; Trojan et al., 2016). These courses are dependent upon teachers who develop effective pedagogical strategies and coach or train students to develop writing skills (Leggette, 2015; Trojan et al., 2016). According to Hudd, Sardi, and Lopriore (2013), writing instructors perform two roles in the writing intensive course: 1) to act as coaches who help students to guide discovery, creativity, and critical thinking, and 2) to act as teachers who help students understand the proper writing components and standards of grammar, spelling, and punctuation. However, the teaching of writing is time consuming and many students fail at writing because the instructors do not provide enough time or effort to coach students through the learning process (Bean, 2011; Leggette, 2015). Instructors must be able to "help their students during the development stages of the writing process" (Leggette, 2015 p. 104) by providing a varied amount of "assignments, resources, reaction, and instruction" (p. 107).

Theoretical Framework

The concept of self-efficacy, a component of social cognitive theory, was used as a framework to explain how pedagogical strategies and the role of the instructor contributed to a change in writing apprehension throughout the duration of a one-semester writing intensive course. According to Bandura (2012), social cognitive theory explains how "human functioning is a product of the interplay of intrapersonal influences, the behavior individuals engage in, and the environmental forces that impinge upon them" (p. 11). This theory has been used to describe how an instructor should begin to understand the motivation of the student by exploring the student’s interpersonal experiences, behavior, and environment. Bandura (1995) noted a major component of social cognitive theory was self-efficacy, or internal disposition. This concept explained how “beliefs people hold about their abilities and about the outcome of their efforts powerfully influence the ways in which they will behave” (Pajares & Johnson, 1994, p. 313). The premise of social cognitive theory reflects how someone’s behavior, or motivation toward an action, was shaped by their beliefs in their capabilities (Bandura, 1986; Pajares & Johnson, 1994). Writing apprehension has also been used to judge a person’s competence as he thinks about or performs a writing task and to identify a person’s general self-esteem level when performing a writing task (Daly & Wilson, 1983; Fischer & Meyers, 2017). Further, Pajares and Johnson (1994) found writing apprehension had a strong relationship with self-efficacy. Because self-efficacy is used to describe an individual’s beliefs about their capabilities, the more a student fears or has apprehension toward writing, the more likely the student will not have confidence in his or her capabilities as a writer (Fischer & Meyers, 2017*;* Pajares & Johnson, 1994; Trojan et al., 2016).

Prior research has suggested students’ writing apprehension level can be influenced by increasing self-efficacy (Fischer & Meyers, 2017; Martinez, Kock, & Cass, 2011; Matoti & Shumba, 2011; Pajares, 2003). Further, teaching strategies and the role of the instructor have been proven to affect students’ ability to be effective writers (Leggette, 2015). Because writing self-efficacy beliefs and writing performances are related, the researchers sought to identify how an individual’s level of self-efficacy may be influenced by the four factors of self-efficacy that influence confidence through teaching strategies and instructor characteristics in a writing intensive course: performance accomplishments, verbal persuasion, vicarious experience, and psychological states (Bandura, 1977).

Performance accomplishments refer to the personal mastery of a specific task (Bandura, 1977). Similar to other skills, learning to write properly requires repeated practice for a long duration of time (Trojan et al., 2016; Kellogg & Raulerson, 2007; Leggette et al., 2013). Courses involving a writing intensive component allow students to complete multiple assignments and the opportunity to improve their writing skills (Fischer & Meyers, 2017; Trojan et al., 2016). Within these courses, students may immerse themselves in a writing-rich environment (Leggette & Homeyer, 2015). These courses provide opportunities for both small in-class writing assignments as well as larger out-of-class assignments to be evaluated (Leggette & Homeyer, 2015). In addition to providing opportunities to practice writing, these courses also provide places where teachers can push effective writing strategies to higher quality levels. Therefore, continuous practice and multiple assignments may allow individuals to increase their self-efficacy with the completion of these successful tasks and assignments.

While repeatedly gaining success with a task may help to increase self-efficacy, verbal persuasion is another factor that helps students gain confidence in their writing abilities. Verbal persuasion refers to feedback that proves to individuals they had the knowledge and abilities to achieve a task at hand (Bandura, 1977). When an instructor uses verbal persuasion, it gives the students the information they need to improve on a task such as written or verbal feedback on an assignment (Margolis & McCabe, 2006). Instructors should provide students with positive feedback on their writing performance several times during the course as it is pivotal in helping improve students’ writing competency (Kellogg & Raulerson, 2007: Leggette et al., 2013;

Pajares & Johnson, 1994). Continuous feedback throughout the semester gives the students the opportunity to "learn from their mistakes and improve on the next assignment" (Leggete & Homeyer, 2015, p. 119). Although instructor feedback is pivotal to success, "feedback may be given by the students themselves if the right conditions exist" (Leggette et al., 2013, p. 2). Further, instructors have used writing intensive assignments to help train students to become better writers (Fischer & Meyers, 2017). Because writing is "more than rules," and is a complex procedure, writing must be evaluated through continuous assessment and critical feedback (Legette et al., 2013, p. 2). As Pajares (2003) stated, "positive persuasions may work to encourage and empower; negative persuasions can work to defeat and weaken self-beliefs" (p. 140). By providing positive feedback and support, students may feel the motivation to complete a task at hand (Crumbo, 1999) while also learning and improving their techniques (Leggette et al., 2013).

Vicarious experiences can be used to increase self-efficacy to show a successful model of completing a task. Bandura (1977) explained, "seeing others perform threatening activities without adverse consequences can generate expectations in observers that they too will improve if they intensify and persist in their efforts" (p. 197). Writing intensive courses have served as a place where students may observe others performing tasks (Pajares, 2003) such as peer review sessions and examples. As a student views others completing a task, the student will make social comparisons, which "can be powerful influences on developing self-perceptions of competence" (Pajares, 2003, p. 140). One method teachers have used to teach writing is to provide clearly articulated examples of written tasks (Leggette & Homeyer, 2015). However, examples can hinder students' creative thinking. To overcome lack of creativity, teachers can provide guidance by assigning readings of well-written documents, providing rubrics that address project requirements, and encouraging outlines that help students structure their assignments (Leggette & Homeyer, 2015). Additionally, repetitious project building tasks where students develop a larger project throughout the semester by combining different writing assignments may allow students to develop "their own thoughts and ideas while reflecting on their own thinking" (Leggette & Homeyer, 2015, p. 119).

Efficacy beliefs have been connected to physiological states such as anxiety and stress (Pajares, 2003). In order to decrease anxiety, students must be given the chance to increase self-belief in themselves (Kellogg & Raulerson, 2007). Writing is an emotional and psychological process just as much as a cognitive activity (McLeod, 1987). Self-confidence may be increased through Mascle's (2013) self-reflection. In Mascle's (2013) model, conversations and self-reflections were used to help students believe they have the power and capability to be a successful. In these self-reflections, students must be given adequate time to allow for both "mental and emotional engagement in the recent experience (Kolb, 1984; Proudman, 1992). During this time, students must be encouraged to make holistic pictures or generalizations about their learning that can then be applied to their lives (Meyers & Arnold, 2015) and future writing endeavors. Leggette et al. (2013) also found that self-reflection and evaluation is a "valuable learning tool that could enhance student's performance, attitudes, and self-efficacy" (p. 3). Because self-reflection pertaining to assignments allow students to self-identify and recognize what needs to be improved, students who then assess their own work may be better able to identify and correct mistakes before submitting assignments (Leggette et al., 2013). Additionally, self-reflection forces students to understand what attributes are necessary for higher quality writing materials (Andrade, 2008; Leggette et al., 2013).

Purpose & Research Questions

Both academics and employers have suggested college students need to improve their writing skills. As agricultural educators, faculty and instructors must find ways to develop a sufficient scientific and professional workforce that addresses the challenges of the 21st century (Roberts, Harder, & Brashears, 2016) and sophisticated writing skills in students are necessary to do so. Prior research has suggested writing apprehension is a major factor contributing to student avoidance to learn writing skills (Daly & Wilson, 1983). However, writing apprehension may be diminished and skills may be improved by increasing the students' self-efficacy (Pajares & Johnson, 1994). Further, in one writing intensive course, Fischer and Meyers (2017) found many students lessoned their writing apprehension. Based upon the need to improve self-efficacy to change writing apprehension, the purpose of this study was to explore how the factors of self-efficacy influence student perceptions of writing apprehension in a writing intensive course at Texas Tech University. The following research questions were used to achieve the purpose:

> RQ1: What pedagogical strategies helped students gain confidence and motivation toward writing?
>
> RQ2: What was the role of the instructor in helping to change students' perceptions and attitude toward writing?

Methods

Qualitative methodology has often been used to understand complex phenomenon such as attitudes and behaviors toward completing tasks, because this approach allows researchers to derive thick descriptions of a scenario or situation (Erlandson, Harris, Skipper, & Allen, 1993). In this study, the researchers examined student self-reflections to understand the participants' experiences in a writing intensive course and to understand how specific course activities impacted students' perceptions of writing apprehension. A case study of students enrolled in a required writing course at Texas Tech for the College of Agricultural Sciences and Natural Resources allowed the researchers to investigate a "phenomenon within its real-life context" (Merriam, 1998, p. 21). The population for this study was students enrolled in the scientific writing course, and a sample of 92 students enrolled in the Spring 2015 semester was selected for this study. This population was selected because students enrolled in previous semesters had expressed fear and avoidance-like attitudes to completing written assignments, and this particular sample was chosen as the researcher had access to students in several majors within the College of Agricultural Sciences and Natural Resources with varying levels of writing apprehension. Student majors were animal science, crop and soil science, horticulture or turf grass science, agricultural education, and agricultural and applied economics. The majority of students were freshmen or sophomores.

To determine writing apprehension scores, students were asked to take Daly and Miller's (1975) writing apprehension test at the beginning (week 1) and end of the semester (week 15) to determine their writing apprehension scores. Student WA scores were disseminated to students after the completion of both the pre-test and post-test. Fischer and Meyers (2017) found a significant difference between pre-test and post-test scores and students demonstrated an improvement in writing apprehension throughout the semester.

At three points during the semester, students completed self-reflections about their experiences in the course. In each of the reflections, students commented on instructional techniques, writing projects, and changes in writing apprehension. Merriam (1998) discussed documents as the "umbrella term to refer to a wide range of written, visual, and physical material relevant to the study at hand" (p. 112). The documents were gathered and analyzed in order to understand how different factors of self-efficacy affected student perceptions of writing. Table 2 provides the prompts students answered in their reflections.

Table 2
Writing Reflection Prompts

Writing Reflection	Date of Reflection	Number of Reflections	Prompt
Reflection 1	Week 5	81	Describe how your confidence toward writing has changed throughout the semester, so far.
Reflection 2	Week 10	76	Describe how your motivation toward writing has changed throughout the semester. What factors have helped to change your writing apprehension?
Reflection 3	Week 16	78	Describe how course assignments, in-class activities, feedback on grading, self-reflection assignments, or other aspects of the course have changed your confidence and/or motivation toward writing.

Note: Number of reflections differs due to student attendance during that particular class day.

Because self-reflections were assigned as course assignments, the students received a grade if they responded and were required to provide their name. After a grade was assigned, pseudonyms were used prior to data analysis to protect the student's identity and minimize researcher bias because the main researcher was the instructor of the course. These pseudonyms are used in the manuscript to verify that the quotations are from many students.

To demonstrate trustworthiness of the data collection, the researchers used data triangulation via the collection of three self-reflections to improve the credibility of the study (Guion, Diehl, & McDonald, 2011). Additionally, this research was part of a larger study that also included interviews, observations, questionnaires, and other self-reflections, which provided validity checks across the data sources (Lincoln & Guba, 1990). The self-reflections were analyzed independently and are the only data sources reported in the manuscript. Peer debriefing was used to develop quality reflection questions (Erlandson et al., 1993). Although students were not given a page limit or minimum length, they were asked to write in complete sentences and paragraphs to develop thick descriptions to demonstrate transferability, or the degree in which the findings can be translated to another setting, situation, or participants (Erlandson et al., 1993).

The student reflections were analyzed using thematic analysis via open and axial coding for specific themes (Glaser & Strauss, 1967). The lead researcher, a doctoral student in agricultural communications who was also the course instructor, analyzed the data after final grades were assigned. Throughout the study, the researcher documented a "running account of the process of inquiry" in an audit trail (Erlandson et al., 1993, p. 34). The audit trail detailed theme formation, document organization, and researcher notes. An additional researcher approved the questions for self-reflection and confirmed the themes that emerged from the data analysis process (Erlandson et al., 1993). Texas Tech University Institutional Review Board approved the procedures for this study before data collection.

Findings

RQ1: What pedagogical practices helped students gain confidence and motivation toward writing?

Thematic analysis of student self-reflections revealed the following pedagogical strategies changed students' writing apprehension throughout the semester: *good practice makes perfect, opportunities to edit, opportunities to reflect, following a guide,* and *write about what matters.*

Good practice makes perfect. The students discussed how multiple writing tasks and assignments during the semester helped them become more comfortable or confident with the writing techniques. Michaela explained how writing more often makes her more at ease with the process. She said, "I think I am more comfortable writing because we have been writing so often for this class" (Michaela, Reflection 1). Vivian discussed how she has been able to improve her writing skills through practice. She said, "I definitely feel a lot more confident. I think this class has given me a lot of opportunity to practice" (Vivian, Reflection 2). Seth discussed, "With multiple writing assignments, I have had more opportunities to improve my writing" (Seth, Reflection 2). Casey revealed that completing several writing assignments helped him improve his writing skills:

> Having multiple writing assignments and continuously having feedback returned back with it. I can better myself. The first one I was really nervous about when we turned and talked about our writing apprehension, but as things go on it continuously gets better. I think I can do this I can do better. I can ace this. I know how to do it. It is almost a muscle memory similarly to a sport. Like in basketball you shoot muscle memory for free throws and it's I feel it is just as long as you can keep doing it over and over again it will work out. (Casey, Reflection 2)

In the third reflection, it became more apparent that students felt multiple writing assignments helped them perfect their writing. Cory discussed how it helped him practice his writing when he said, "[Feedback] impacted it greatly through practice makes perfect. Though I still have more improvement, repetition and getting feedback had a huge effect on my skills and techniques" (Cory, Reflection 3). Vivian also stated, "I think my attitude toward writing changed throughout the course. Practice does make me feel more confident about writing" (Vivian, Reflection 3).

Students also discussed how in-class activities helped to engage their interest and give them experience before completing larger assignments. Cory explained, "I'm a big fan of class activities because it actually helps engage my interest even further" (Cory, Reflection 1). Jared discussed how the in-class activities help to give him more experience when he said, "The activities are helpful because it gives me more experiences to write" (Jared, Reflection 1).

Although the majority of the students stated how continuous practice helped them to improve their writing, some students explained how it made them more fearful of writing. "I am a little more afraid to write because I am noticing a lot more errors than previously found. I'm taking two writing intensive courses, so all the assignments are piling up on me" (Omar, Reflection 2).

Opportunities to Edit. The theme of peer editing emerged in the final reflection. The students expressed how editing peer assignments helped them to understand the mistakes of others, which helped them to recognize their own mistakes. David explained, "The peer reviews gave me an opportunity to edit others work which allowed me to eventually begin correcting my mistakes" (David, Reflection 3). Houston explained how peer edits helped him to realize his mistakes before turning in his papers when he said, "My favorite part of this course was peer editing. This helped me know what I need to work on to get a better grade next time" (Houston, Reflection 3). However, as stated by Austin, the peer review experience depends upon the quality of the peer reviewer, "Sometimes peers do not give enough feedback on your work" (Austin, Reflection 2).

Opportunities to Reflect. At various points during the semester, students were asked to spend one minute reflecting upon their grade and feedback on some of their returned assignments. Terri explained how she thought the one-minute papers were the perfect time for her to reflect on what she was learning. "The reflections [one-minute papers] allow me to reflect on what I am learning and to ensure I understand it" (Terri, Reflection 2). Shelby discussed how it made her think about her assignments in detail when she said, "I think the reflections help a lot because it lets me sit and think about the grade I got and why" (Selby, Reflection 1). One student, Mariela, stated it prompted more writing, "I feel that I may enjoy writing a lot more than I did before. I actually started a journal just to write" (Mariela, Reflection 1). In the third reflection, Michaela showed more confidence, "I think by doing reflections on my writing, I have got more comfortable having my writing reviewed and edited" (Michaela, Reflection 3). One student explained how she did not find value in reflecting, "I don't think I put to much thought into the reflections. So, I don't think that they raised or lowered my score by any means. I just wrote something down" (Amy, Reflection 2).

Following a Guide. Writing examples helped them to understand what is expected of them when completing assignments. Cory explained how examples help him improve his writing. "It [examples] has helped me a bunch because I have been able to use them to better my writing" (Cory, Reflection 2). Savannah reflected, "The examples are the best assistance in creating a good paper" (Savannah, Reflection 2). London discussed how examples have helped him to check if his assignments were correct. "I believe my writing apprehension has gone down a little due to the detailed rubrics and examples, which made it easier to check if I am formatting and writing the correct way" (London, Reflection 1). Carly explained how writing was made easier: "Writing is still not my favorite thing in the world. It has been made easier because we have guidelines and examples. If I could always have those writing would not be that bad" (Carly, Reflection 1).

In the third reflection, the idea of organization techniques, or laying out assignments in an organizational manner, was expressed as a tool that helped students understand how to complete an assignment in separate steps. For example, students were provided an outline of the information that should be included in a cover letter. Brandyn explained, "The organizational techniques helped me organize my papers to keep my writing and formatting in order" (Brandyn, Reflection 3). Dylan reflected about how it helped him write in a more methodical fashion when he said, “Instead of looking at it as a whole paper, I break it down into sections” (Dylan, Reflection 3). Vivian expressed how organizing the material into steps helps to make a project less stressful when she said, “The step-by-step building the big project. I really like having my project into broken into smaller pieces to work on and then they all come together at the end. It is really helpful and less stressful” (Vivian, Reflection 3). Further, Alexis said, “Smaller assignments leading to bigger ones helped to curb my anxiety toward a project” (Alexis, Reflection 3).

Write About What Matters. Students explained how their interest in the subject matter or the topic at hand increased their motivation and decreased their fear toward completing the writing task. “My motivation toward writing has increased due to the research paper because it is something I am passionate about. Allow us to write more about what we are passionate about” (Tate, Reflection 2). Richard explained that picking their topics was interesting. “I like writing about things I am interested in that is more motivation than an English class writing about Romeo and Juliet” (Richard, Reflection 2). In Richard’s second reflection he said, “I enjoy writing for a purpose not just, writing to write” (Richard, Reflection 1). Similarly, Kelsey explained, “Allowing me to write about my own topic will be a huge help when it comes down to writing my paper” (Kelsey, Reflection 2).

Students expressed how business-writing assignments helped to prepare them for their careers. Nick explained how the assignments were useful to preparing him for the workplace:

> Assignments that were gone over in the class helped me to realize my writing lows and correct them for future endeavors. I will use what I learned in course assignments to better my writing in the workplace. Clearly, professionalism is an essential there [in the workplace] and this class helped me in that aspect. (Nick, Reflection 3).

Kelsey stated how writing projects that are similar to what she will use in her career helped her to become less apprehensive. She said, “my writing apprehension has changed somewhat because it has become easier for me to write professionally for future references and employers” (Kelsey, Reflection 1).

RQ2: What was the role of the instructor in helping to change student’s attitude toward writing?

Analysis of the reflections revealed that the instructor played a role in helping the students diminish their writing apprehension throughout the semester. The following instructor practices helped to change self-efficacy and writing apprehension: *nothing but the truth and instructor as a coach.*

Nothing but the Truth. Throughout the semester, the majority of students reflected about how feedback made an impact on their writing apprehension. Students discussed how constructive criticism of positive and negative aspects of their writing helped them to improve. Further, students indicated that feedback helped to increase their confidence in writing. Macee said, “She said, “I was fairly confident about my writing before and have gained more confidence after seeing feedback. I am pleased with the feedback I have had on my work” (Macee, Reflection 2). Savannah suggested feedback improved her assignments, “Feedback has helped me because it helps me know what I need to change and gives me confidence in my writing” (Savannah, Reflection 1). Taylor simply explained, “I feel as though the feedback in this class has been the biggest factor in improving my writing apprehension” (Taylor, Reflection 1). Carly stated, “Because I was super self conscious of my writing, I always put it off because I didn’t want others to read it or be judged by it. But now, I do the writing assignments right away because I like the feedback” (Carly, Reflection 3).

Students discussed how constructive feedback was necessary to understand the material. Cassidy said constructive criticism helps to make her aware of mistakes when she said, “Continue giving feedback, both positive and negative, on the assignments. The feedback helps enforce good habits and gives a nudge in the right direction on the bad ones” (Cassidy, Reflection 2). Brady discussed, “Having all this feedback has helped me to understand the material better by showing what to do/what not to do, and how to fix anything” (Brady, Reflection 2). Brandon discussed how it helps him to learn through his mistakes when he said, “Keep offering praise for positive aspects of assignments and harsh criticism when necessary. Everyone learns through mistakes, but we must be aware of these mistakes” (Brandon, Reflection 2). In the third reflection, Kelsey explained, “The biggest impact on my writing apprehension in this class was feedback when my work was graded. It made it easy for me to see exactly what I needed to work on” (Kelsey, Reflection 3). Further, Trevor explained how feedback must be clear for the student to understand, “Sometimes I would like to have more explanation of what I did wrong on the paper and what I have done well. I would like it to be more critical.” Amy also explained how at first feedback hurt her feelings,

> At first, it [feedback] made kind of upset in a way because I put a lot of effort into this type of project because it is something that I will use – resume and cover letter – Especially since I took it to the writing center and still had a lot of marks on my paper. (Amy, Reflection 2)

Instructor as Coach. Another dominant theme was the idea of the instructor motivating the students. Students explained how instructor motivation impacts motivation and confidence toward writing. Lynn explained how talking through assignments improved her understanding. “The instructor and TAs have helped me to understand the material very well. This motivates me to do better work.” (Lynn, Reflection 2). Nick discussed how it helped him when the instructor went over the assignments. “Y’all do a great job of talking through the assignments which is really helpful when completing them” (Nick, Reflection 2).

Another thing the instructor did was create a classroom environment that improved motivation. “[My] favorite part would be the classroom environment. I liked how we are given the opportunity to freely ask questions and speak out our thoughts” (Cynthia, Reflection 3). Vivian also explained how an approachable instructor made it easier to ask questions and to discuss her issues, “It is easy to ask questions and discuss my issues” (Vivian, Reflection 3). Macee said, “The lectures and PowerPoint’s were very helpful to see how things should be done and determine what is correct and what is incorrect in writing” (Macee, Reflection 3).

Terri reflected on how the instructor in another course caused her to have writing apprehension:

> I have had several different professors. This one [professor] is big into research and the way he comes off is a little scary. He makes me scared to death to write, and I don’t know what he is looking for. Others are like, “Have fun with it. We want you to enjoy

> this, and we want you to be able to use this knowledge to help you go further in your career and studies." (Terri, Reflection 3).

Similarly, Casey explained how instructors play a role in his writing apprehension:

> Because of my first English course, where I probably had the hardest professor that I have had throughout my career. I ended up with a C, and I barely got that C. It was just frustrating! What's wrong with it? That's why my writing apprehension is so high is because of that class and that teacher. (Casey, Reflection 2)

Conclusion and Discussion

Post-secondary scholars and employers alike have discussed the need for college graduates to be proficient in their writing skills when they enter the workforce (Belkin, 2015; Leef, 2013). Although instructors in college classrooms may stress the importance of writing in future careers, students may still show a lack of motivation or confidence to write (Leef, 2013). Writing apprehension, or the level of fear and the lack of confidence toward writing, has been characterized as a major factor influencing student motivation to master their writing skills (Daly & Miller, 1975). Teaching strategies and the role of the instructor have also been found to impact the effectiveness of students to learn writing skills in the classroom (Leggette, 2015). The researchers explored how specific components of self-efficacy (performance accomplishments, verbal persuasion, vicarious experience, and psychological states) helped to minimize writing apprehension and increase confidence in writing skills through the use of pedagogical strategies and the instructor interventions.

During and at the end of the course, the students reflected upon how classroom strategies influenced their writing apprehension. The emergent themes of *good practice makes perfect, opportunities to edit, opportunities to reflect, following a guide,* and *write about what matters* provided implications regarding what strategies make students better writers. These themes are similar to what other researchers have identified as strategies that can be used in the classroom to impact writing apprehension (Kellogg & Raulerson, 2007; Martinez et al., 2011; Matoti & Shumba, 2011; Pajares, 2007). The instructor was also identified to play a key role in providing guidance to students when enrolled in a writing intensive course through the emergent themes of *nothing but the truth* and *instructor as a coach*.

When compared to the four factors of self-efficacy, each of the themes could be placed in a specific area of self-efficacy: performance accomplishments (*good practice makes perfect*), verbal persuasion (*nothing but the truth, opportunities to edit*), psychological states (*opportunities to reflect, writing about what matters, instructor as a cheerleader*), and vicarious experience (*following a guide*). The ability to complete multiple assignments during the semester helped improve student's confidence toward writing. Similar to prior literature, continuous practice allows students to use their writing skills, learn from their mistakes, and perform with a higher quality (Leggette, 2015). When the instructor provides verbal persuasion such as constructive criticism and allows students the opportunity to edit their work and the work of others, students are given the information they need to improve upon tasks and skills (Margolis & McCabe, 2006). The findings of this study suggested when detailed feedback is given multiple times throughout the semester, the students know exactly what needs to be fixed, how to fix it, and how to use the information in later assignments (Leggette et al., 2013; Pajares & Johnson, 1994). The process of modeling was also recognized in the student comments regarding the instructor providing detailed outlines and rubrics as well as reading assignments to share examples of the type of assignments to be completed. Although Legette and Homeyer (2015) indicated too many examples may inhibit creativity in writing as students may feel constrained to the work of others, the examples and outlines provided guides of prior completed work, while outlines and rubrics provided questions to promote independent thoughts and ideas when writing. Additionally, the students suggested the self-reflection and peer review activities enabled evaluation of their own work as well as the work of others. By understanding how their work and the work of others could be improved, the students invested mental and emotional engagement in a recent experience, and the students were encouraged to generalize about their own learning (Leggette et al., 2013; Meyers & Arnold, 2016). Additionally, the emergent theme of the *instructor as a coach* provided students with encouragement to believe they have the capability to be successful writers. Students also addressed that if the instructor inhibited their confidence, they would not perform well in a course nor would they be confident in their writing.

Prior research has provided evidence that students' writing apprehension level can be changed by increasing self-efficacy. Similar to the results of other studies (Leggette, 2015), the writing intensive course may facilitate improvement in writing skills and attitude toward writing. Findings from this study revealed unique and practical information for educators when planning courses focused on improving students' writing. When classroom strategies are designed to increase a student's confidence in a task, the student is able to become aware of how his or her writing techniques have changed during a semester. Although students expressed they were fearful of feedback on writing assignments at the beginning of the course, they learned constructive criticism helped them notice and correct their mistakes. Additionally, when the students were able to write on topics that interested them, they provided more detail and attention to their assignments.

Students from a variety of disciplines need to be trained to write correctly because it is imperative for graduate education and the workplace (Lindner et al., 2004). Teachers and instructors should use the results of this study to recognize writing apprehension does exist in undergraduate students. To change students' writing apprehension, teachers should focus on developing curriculum structured to increase confidence and motivation toward writing. The results of this study provide recommendations to improve student confidence such as continuous feedback, multiple take home and in class assignments, self-reflection activities, and one-minute papers. Because prior research suggested reflection activities encourage critical and active thinking (Leggette et al., 2013; Meyers & Arnold, 2015), instructors should implement activities that allow students to reflect upon their writing skills. Future research in the realm of writing apprehension should focus on understanding the role of writing apprehension in other courses. Research should seek to understand how writing apprehension is affected when the identified pedagogical strategies are not implemented. The findings from this study were limited to one writing intensive course; therefore, future research should explore the role of writing apprehension at a national or state level on student perceptions of writing. This study could also identify how the role of the instructor changes a student's perceptions of writing and ability to complete writing tasks to a high degree of quality.

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Imaging Service-Learning in *The Agricultural Education Magazine* from 1929 to 2009: Implications for the Method's Reframing and Use

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Abstract

Service-learning's (SL) discourse is written as a story of victory, achievement, and transformation in school-based, agricultural education (SBAE). The resources dedicated to improving both learning and communities through SL can be significant. Little work, however, has been put forth to examine this victory narrative's underlying assumptions and implications. Therefore, the purpose of this historical investigation was to explore how SL was imaged in The Agricultural Education Magazine (The Magazine) from 1929 to 2009. Through the analysis of data, SL's imaging in The Magazine appears to have been positioned through three distinct lenses: (a) cultural, (b) pedagogical, and (c) social justice. In culturally imaged SL, actors emphasized the importance of shaping young adolescents into productive citizens to meet the demands of society and culture. Meanwhile, the pedagogical lens emerged in response to calls for improved instructional effectiveness; consequently, practitioners and scholars outlined how SL could be used to enhance students' academic achievement. The final lens, social justice, arose as a way to address equity, race, and privilege in agricultural education. Based on these conclusions, we offer implications and recommendations that may help reframe SL to respond to contemporary issues and trends in SBAE.

Introduction

During the past two decades, service-learning (SL) appears to have been *depicted* as an instructional method with the potential to transform schools, local communities, and even the world (Butin, 2015). By merging classrooms and communities, theory and practice, and cognitive and affective domains, SL can seemingly reshape the realities of education by addressing local problems through engaging students in real-world, service-based learning opportunities (Bringle & Hatcher, 1995; Eyler & Giles, 1999; Giles & Eyler, 1994). To that aim, Butin (2007) defined SL as "the linkage of academic work with community-based engagement within a framework of respect, reciprocity, relevance, and reflection" (p. 177). The SL literature teems with promises and stories of its transformative benefits (Kaye, 2010; Kraft, 1996). SL seems to speak to noble aspirations, such as duty and honor, which many perceive are missing in society (Billig & Welsh, 2004; Markus, Howard, & King, 1993). Often these possibilities are narrated as *victory narratives* – constructed to illuminate what SL *could* achieve in regard to diversity and pluralism (Butin, 2010, 2013; Gilbride-Brown, 2008). And, in many ways, SL has achieved these aims. For instance, more than 1,100 U.S. higher education institutions are now members of Campus Compact, a national coalition committed to SL; further, 100,000 plus K-12 schools report using SL to engage students every year (Campus Compact, 2016).

SL was established as a *strategic instructional method* with the potential to shift students' theoretical orientations and worldviews (Butin, 2013; Kiely, 2005). To accomplish this, SL challenges the static conception of teaching and learning (Jones & Abes, 2004). For example, teachers, students, and community members become *partners* in the learning process and are freed from many of the hierarchical structures present in education (Green, 2003). As a result, SL may transform current educational labels such as *student* and *teacher* by calling into question the roots of knowledge, power, and identity (Swaminathan, 2007). The practice of SL, therefore, encourages practitioners to work against existing norms in education by embracing a captivating, often local, and impactful approach to student learning.

SL's promise also appears to have seeped into the philosophical foundation of agricultural education (Roberts & Edwards, 2015). A foundation operationalized by an integrated three-circle model consisting of classroom/laboratory instruction, FFA, and Supervised Agricultural Experience (SAE), i.e., its "philosophical tenet" (Croom, 2008, p. 110). However, Roberts and Edwards (2015) proposed that SL could be the instructional tool SBAE instructors use to provide more impactful experiences manifested "through and between [the] programmatic dimensions" of the model (p. 227). Evidence increasingly demonstrates SBAE may be using SL for this purpose. For example, in 2007, the National FFA Organization adopted a SL initiative to better achieve the FFA motto (Slavkin & Sebastian, 2013). This change introduced service-based programs such as the *Living to Serve* and *Food for All* initiatives so SL would become more visible in FFA (Roberts, Terry, Brown, & Ramsey, 2016; Slavkin & Sebastian, 2013). More recent, the *agricultural service-learning SAE* was conceptualized as a distinct SAE category by the National FFA Organization (2014). Through these shifts, SL is positioned to become a powerful instructional tool for unifying SBAE students' learning experiences. Arguably, a *victory narrative* for this instructional method has emerged in SBAE. However, SL also has a darker side. Critics argue the method is merely "curricular fluff" that obscures essential elements of the learning process (Kiely, 2005, p. 5). For instance, although the goal of SL is to connect learning and service through reflective strategies, too often this is not the case (Clark, 2003; Flower, 1997). Devoid of apparent curricular influences and reflective activities, SL at best becomes an *act of volunteerism* and at worst a way to meet *service requirements* for graduation (Flower, 1997). Another critique of SL is that students begin to view the individuals served as *others* because they may appear weak or needy – a view which often contradicts the self-constructed identities of many young adults (Clark, 2003). The literature's limited view of SL may also result from variant conceptual and theoretical views. For instance, Giles and Eyler (1994) suggested SL has roots in both Addams' (1910) concept of *noblesse oblige* and Dewey's (1938) theory of learning.

Addams (1910) argued individuals of privilege have a responsibility to help those less privileged – a view espoused by many contemporary practitioners of SL. Moreover, Dewey (1938) maintained schools should reflect communal life and prepare students to become productive members of a democratic society. Dewey (1938) posited these aims could be achieved by developing impactful learning experiences that allow students to work through relevant societal problems – a view subsumed in learning process models such as David Kolb's (1984) *experiential learning theory* and Jack Mezirow's (1991, 2000) *transformational learning theory*. These theoretical cornerstones seem to influence how teachers, students, and community partners operationalize SL. However, Jones and Abes (2004) contended when SL is conceptualized as a way to help the needy, many students fail to recognize how their own power and privilege shape such experiences. Moreover, too much focus may be placed on producing quality citizens while silencing the roles of curriculum and learning (Henry, 2005). Conversely, when SL is positioned from a purely *experiential* view, emphasis is placed on the learning outcomes of students while ignoring features such as agency, community, and epistemological development (Jones, Gilbride-Brown, & Gasiorski, 2005).

Despite SL's critiques, its discourse in SBAE is written as a story of victory, achievement, and transformation. And, as a result, the resources dedicated to improving both learning and communities through SL can be significant. To this point, Roberts' and Edwards' (2015) historical investigation of the origins of SL noted the method has been used in SBAE at pivotal moments to address "local problems and help[ed] to rejuvenate a sense of community" (p. 226). Little work, however, has examined this victory narrative's underlying assumptions and implications. Such as *Who has conveyed this story over time? What were the terms? Who benefitted?* and *What were the consequences?* By peeling back the layers of SL's *historical imaging,* perhaps SBAE can get to the core of its theory and practice.

By using the term *imaging,* we refer to the conceptualizations practitioners and scholars use to explain and depict a phenomenon (Koro-Ljungberg, 2016). Imaging is used to help individuals construct a conceptual understanding of abstract ideas and provides scaffolding for meaning-making. It can also shape how individuals speak of a phenomenon as they move through context-bound environments. As a consequence, imaging may promote a narrow view while ignoring a phenomenon's many complexities. Therefore, imaging may influence how SL is operationalized, categorized, or even silenced in SBAE. A critical analysis of the pictorial and textual imaging of SL was warranted to assist the discipline in recognizing how normative traditions influence practice. This study was positioned to investigate the historical imaging of SL in *The Agricultural Education Magazine* (*The Magazine*) by examining the "tangled and complex" context in which the imaging was situated (Salevouris & Furay, 2015, p. 43). It is important to note, however, that SL has been "identified by a variety of names" throughout SBAE's history (Roberts & Edwards, 2015, p. 226). Mindful of that inconsistency, we did not disregard data sources if they used different words to describe the method considering the term *service-learning* was not introduced until 1967 (Marks, 1973). Instead, we included all of *The Magazine's* displays of service-based learning as the historical record for our analysis.

Purpose, Significance, and Research Question

This study's purpose was to explore how SL was imaged in *The Magazine* from 1929 to 2009. Specifically, this *working of the past* sought to illuminate how SBAE used depictions of SL to remember. And through this remembering, how the imaging of SL may construct our current understanding of this method while also shaping its future representations. Therefore, this study may hold valuable implications for research and practice. For example, by understanding the motives underlying the ways in which SL was imaged, perhaps new conceptual and theoretical progress could be made regarding its implications for student learning. Findings may also provide valuable insight into existing conceptualizations of SL influencing its practice in SBAE. By critiquing SL's historical depiction, we can begin to question its underlying assumptions and modify instructional behaviors, as may be needed. The current study also sought to address Research Priority 6 of the American Association for Agricultural Education's National Research Agenda, which calls for evaluation of delivery methods used to build "vibrant, resilient communities" (Graham, Arnold, & Jayaratne, 2016, p. 49). This research question framed the study: *How was SL imaged in The Magazine from 1929 to 2009?*

Methodology

We used historical research methods to guide this investigation. Historical research allows investigators to critique the roles of society and ideology on dominant discourses over time (Salevouris & Furay, 2015). This approach does not discriminate among sources of data. For instance, interviews, historical documents, visual artifacts, and video may be used to reconstruct the historical storyline for a phenomenon or issue (Salevouris & Furay, 2015); or, in the present study's case, the imaging of SL. This research method also offers a broad framework to critique the socially and historically influenced narratives of individuals, groups, institutions, disciplines, and paradigms (Linde, 2009). In this form of inquiry, it is assumed the historical record is something individuals create and therefore researchers must carefully analyze artifacts through numerous lenses, especially in regard to *continuity*, *change*, *motives*, and *multiple causalities* (Salevouris & Furay, 2015). To that aim, we placed particular emphasis on the many ways context, society, and philosophical viewpoints may have influenced the imaging of SL.

By following Salevouris' and Furay's (2015) recommendations and use of a critical constructionist (Denzin & Lincoln, 2008) lens, we (a) developed the research question, (b) collected data, (c) analyzed artifacts, and (d) constructed an integrative social critique of the issue. However, their suggestions are not linear in design; instead, we used such as anchor points while interacting with the methodology through a constellation of decisions, quandaries, and discoveries. An in-depth discussion of this process is offered in the procedures section. Of note, during the study's early conceptualization, standards for rigor and trustworthiness were built into its design (Lincoln & Guba, 1985). For example, we offered context-rich descriptions while also being explicit about our uncertainties and biases to achieve *credibility* (Lincoln & Guba, 1985). We also kept a thorough audit trail of artifacts and our analytic procedures to promote *confirmability*. In regard to *dependability*, we emphasized the coherence of data sources by only collecting artifacts connected to the study's purpose (Lincoln & Guba, 1985). However, due to the historical nature of this investigation, *transferability* was more difficult to achieve. As such, we were cautious to only engage data sources likely to be deemed *useful* by others interested in SL in the context of SBAE. Overall, Lincoln's and Guba's (1985) recommendations largely shaped how we collected and analyzed the study's data.

Procedures

In our initial review of *The Magazine*, we noted many authors appeared to depict SL as a *best practice* for both teaching and learning. Through this engagement with our bounded source, we formulated an initial research question: *What did SL mean to agricultural education's discourse?* Our working assumption was that SL's imaging evolved over time. Therefore, we began to question *why* artifacts depicted in *The Magazine* were represented in particular ways. After questioning these factors, we reformulated our research question, i.e., *How was SL imaged in The Magazine from 1929 to 2009?* Published articles, photographs, and captions were key sources used to construct the study's analytic storyline. We grounded our use of these artifacts in Enns' and Martins' (2015) justification for using *The Magazine* as a source of data. Enns and Martin (2015) provided three rationales for how *The Magazine* can serve as a quality historical source: (a) the magazine has maintained an open submission process for scholars and teachers from its inception; (b) the source usually features accompanying visuals with its articles; and (c) it has maintained broad readership among agricultural educators. Because of our emphasis on the depiction of SL in SBAE, we worked *within and against* common conceptions of SL by using this bounded source of data over an 81-year period.

Due to the vast number of articles published during the scope of this study, data collection and analysis was a recursive process over a five-month time span. Therefore, analysis was ongoing as we engaged artifacts in individual issues of *The Magazine*. During this period, we followed Enns' and Martins' (2015) procedures in which we bracketed volumes by decade. During this time, we also read through each issue of the magazine, identified artifacts, and constructed analytic memos to capture the *substance* and *spirit* of each source (Saldaña, 2015). In total, we collected 264 artifacts – including articles, photographs, and captions – published in *The Magazine* from 1929 to 2009. Because *The Magazine* was bracketed by decade, we did not pursue artifacts appearing after 2009 to avoid an incomplete period of analysis.

In general, authors and photographs were clearly identified in *The Magazine;* therefore, we could preserve important layers of nuance, detail, and context as the discursive storyline began to thicken. We then conducted two distinct *reads of the data* (Salevouris & Furay, 2015). In our first reading, we sought to illuminate the general meaning of each artifact to understand the message communicated. Next, our second reading involved critiquing the social and historical features of power, privilege, and culturally influenced ideology represented by each artifact. To accomplish this, we drew on Holley's and Colyar's (2009) concept of *focalization*. Focalization calls for researchers to use "the point of view from which the events unfold or the location from which the actors and characters are viewed" (Holley & Colyar, 2009, p. 681). Using focalization, we began to shift our analytic lens between "internal and external points of view" (Holley & Colyar, 2009, p. 682), which produced codes from a range of different perspectives. Then, to reduce the data, we scrutinized artifacts using thematic analysis (Riessman, 2008). To weave the narrative together, we followed Saldaña's (2015) recommendation to apply analytic memoing to mobilize empirical assertions and propositions. Ultimately, three empirically saturated themes – *cultural*, *pedagogical*, and *social justice* – emerged. To situate this imaging, the findings section presents our social critique while illuminating implicit discourses existing in the pages of *The Magazine*. Table 1 outlines the artifacts analyzed by decade and theme.

Table 1

Artifacts from The Agricultural Education Magazine (1929 – 2009)

Year(s)	Volume(s)	Frequency of Artifacts by Theme			
		Cultural	Pedagogical	Social Justice	Subtotal
1929	1	3	0	0	3
1930 – 1939	2 – 10	11	6	0	17
1940 – 1949	11 – 20	35	9	1	45
1950 – 1959	21 – 30	32	15	3	50
1960 – 1969	31 – 40	10	4	5	19
1970 – 1979	41 – 50	19	7	5	31
1980 – 1989	51 – 60	13	20	6	39

Year(s)	Volume(s)	Frequency of Artifacts by Theme			
		Cultural	Pedagogical	Social Justice	Subtotal
1990 – 1999	61 – 70	8	11	4	23
2000 – 2009	71 – 81	5	29	3	37
Total	**81**	**136**	**101**	**27**	**264**

Findings

Through the analysis of data, three distinct lenses of SL emerged: (a) cultural, (b) pedagogical, and (c) social justice. The lenses illuminate how the agricultural education discipline chose to *portray* SL in *The Magazine*. They do not tell SL's complete story, rather the themes offer an important glimpse into the complexities of its imaging in SBAE during an 81-year period. The findings section, therefore, strives to draw distinctions among the three lenses of SL appearing in *The Magazine*. Each theme is also knit together by a common thread of *motive,* which is woven throughout our *integrative social critique* of the findings (Salevouris & Furay, 2015).

A *Cultural* Lens

Through culturally imaged depictions, the practice of SL focused on shaping young adolescents into productive citizens based on societal demands. As a result, instruction was attuned to foster social sensitivity to promote a cooperative, mutually beneficial society. From this view, the motive to employ SL appeared to stem from a desire to create *moral citizens* prepared to address longstanding societal divisions.

Just before the financial crash of Wall Street in 1929, SBAE instructors recognized the need to engage students in their communities (Ekstrom, 1929; Hamlin, 1929; Mobley, 1929). At the time, instructors emphasized that moral education should permeate all aspects of the curriculum (Ekstrom, 1929; Mobley, 1929). In response, state agricultural education staff in Georgia responded by initiating *community improvement contests* to imbue a spirit of service in students (Hamlin, 1929). This statewide initiative motivated students to use the skills developed through agricultural education to *rethink* their roles as citizens to make a positive difference in communities. Hamlin (1929) summarized the outcomes:

> A summary of all the reports made by the schools [showed] . . . that the boys in the contest built 87 poultry houses and 144 hog-houses. . . . boys set out 3,982 shrubs and 4,744 fruit and nut trees. They built and repaired 3,868 terraces; built 1,946 rods of fence; sowed 2,102 acres to legumes; turned under 848 acres of cover crops. Two hundred ninety-three of the boys treated their planting for disease and 918 inoculated legume seed. In 49 homes running water was installed in kitchens; 29 homes were screened, and 25 sanitary toilets were built. (p. 13)

On first glance, Hamlin (1929) appeared to communicate the outcomes of a competition-based, service initiative. However, when questioning the *context* and *terms* surrounding the development of this excerpt, it is important to situate the report in its historical context. The report appeared only slightly more than a decade after the United States had entered World War I (Urban & Wagoner, 2014). And the war effort had a profound influence on schooling during that period. Teachers and students actively supported the war effort through civic engagement and activities such as the *Student Army Training Corps* (Taft, 1974). As a consequence, a *cultural* expectation was that education should produce loyal citizens prepared to do their part in society. Therefore, Hamlin's (1929) *motive* to publish could be interpreted as an attempt to document that agricultural educators were *doing their part* to fulfill the culture's expectations. This cultural influence continued well into the 1940s, as agricultural education students continued to use their knowledge and skills to contribute to home front efforts supporting the nation's involvement in World War II [WW II] (Cunningham, 1942; James, 1944; LeBeau, 1942; Peeler, 1943; Potter, 1943; Walters, 1945; Woodlin, 1943). Students grew victory gardens and animals, collected milk and eggs, canned fruits and vegetables, recycled and repurposed scrap metal, fundraised to purchase war bonds, established local cooperatives, and used metal and fabrication skills to construct canneries and other buildings dedicated to the war effort (Cunningham, 1942; James, 1944; LeBeau, 1942; Peeler, 1943; Potter, 1943; Walters, 1945; Woodlin, 1943). For instance, SBAE students from North Carolina used their skills to assist at a poultry processing plant as part of the war effort (see Figure 1).

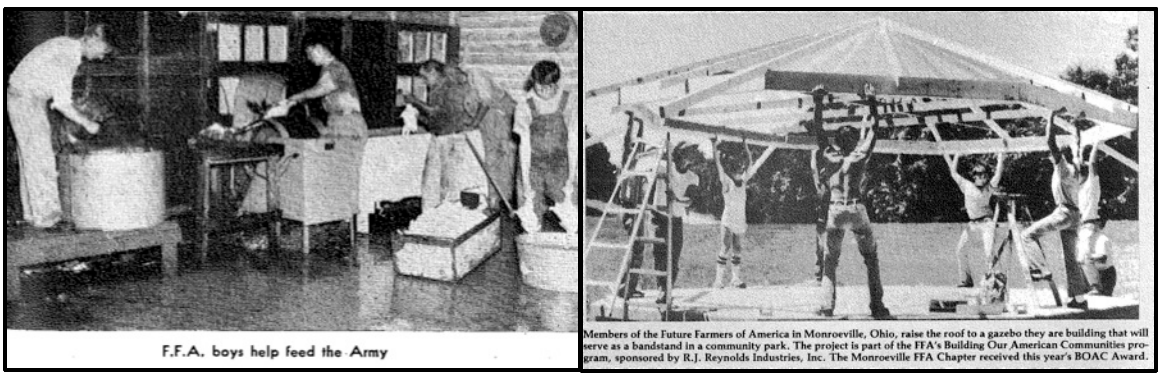


Figure 1. (Left) FFA boys help feed the Army. Reprinted with permission from "Developing a Community War Program" by W. C. James, 1944, *The Agricultural Education Magazine, 16*(7), p. 131. (Right) BOAC activities. Reprinted with permission from "Stories in Pictures" by R. J. Reynolds, 1981, *The Agricultural Education Magazine*, *53*(9), p. 24.

Across this theme's storied terrain, expectations for civic engagement appeared to continue to influence SBAE's curriculum well into the next several decades (Bach, 1954; Bachman, 1981; Calhoun, 1957; Cummings, 1957; Daniel, 1986; Edmon, 1953; Garrison, 1979; Grey, 1957; Jewell, 1979; Menoher, 1957; Ogles, 1950). This discovery was surprising considering progressive approaches, such as SL, came under attack during the period (Ravitch, 2010). For example, Bestor (1952) issued a damaging blow against progressive educators by declaring their pedagogical techniques were *anti-intellectual* and could even *harm the schooling of children*. Moreover, with the Soviet Union's launch of the *Sputnik* satellite in 1957, progressive educational approaches began to diminish due to the United States' renewed commitment to science and mathematics in public schools (Zimmerman, 2002). However, the discursive patterns in *The Magazine* painted a much different picture of this era for SBAE. In fact, 50 artifacts were mobilized for analysis from the 1950s (see Table 1). For example, Grey (1957) highlighted students from Bremond, Texas who created a monument to promote their program while also enhancing the community's appearance. Given *The Magazine's* strong evidence contradicting the dominant discourse of progressive education's decline, it is important to reflect on the philosophical tenets of SBAE. As such, we revisited the artifacts and noted a majority of the activities highlighted had a strong focus on students applying principles of science, technology, engineering, and mathematics (Calhoun, 1957; Cummings, 1957; Grey, 1957; Walters, 1951), or, in today's parlance, STEM. Therefore, perhaps SL was used as a way to uphold the traditions of SBAE programs while also responding to *cultural* shifts calling for more attention to students learning mathematics and science. By 1971, however, progressive approaches began to regain momentum in U.S. public education (Urban & Wagoner, 2014).

Influenced by the words *living to serve* appearing in the National FFA Organization's motto, SBAE's *culture* began to evolve with the introduction of a new program, Building our American Communities [BOAC] (Reese, 2003). BOAC offered a broad framework for instructors to incorporate service-oriented projects into their curriculum (Bachman, 1981; Daniel, 1986; Garrison, 1979; Jewell, 1979; Reynolds, 1981). Projects emerging from BOAC initiatives were wide-ranging. For example, *The Magazine* highlighted activities involving students participating in the application of chemical fertilizer for community members, service through turf and grass management efforts, as well as the construction of outdoor classrooms and community parks [see Figure 1] (Bachman, 1981; Daniel, 1986; Garrison, 1979). The influence of BOAC initiatives on agricultural education should not be understated. The program appeared to influence the culture of SBAE well into the 1990s until it was replaced by new service initiatives such as Food for America and the youth mentoring program, Partners in Active Learning Support (PALS). If the first SL theme is conceptualized through a cultural lens, a range of activities appear to have shaped its imaging in *The Magazine*. However, no single cultural influence could be identified; instead, the motives behind SL's use appeared to have ebbed and flowed with dominant societal and cultural trends. Nevertheless, at this lens's core was the *concept or ideal of producing engaged citizens* (Adams & Clark, 2009; Daniel, 1986; Edman, 1953).

A *Pedagogical* Lens

The second theme, *pedagogical*, first emerged in *The Magazine* in the 1940s (Cook, 1947; Deems, 1947; Evans, 1945; Harper, 1949; Naugher, 1946). The motive underlying this conceptualization seemed to be improving the systematic delivery of SL as a method of instruction. Contributors, therefore, clarified how to align service activities with the curricular aims of SBAE to enrich student learning. Similar to the previous theme, SBAE programs across the United States created initiatives calibrated to assist with the nation's WW II efforts. However, many of the efforts were sustained after the war, especially in regard to school canneries and agricultural mechanics programs (Deems, 1947; Evans, 1945; Naugher, 1946). Although the motives for these programs appeared to be culturally influenced, some key actors recognized a need to outline the *learning value* associated with the activities for both students and community members while also offering suggestions for improvement (Clements, 1945; Deems, 1947; Naugher, 1946). Evans (1945) explained how a WW II community cannery initiative led by the Halfway, Oregon program opened her eyes to new methods and techniques.

> When our School Community Cannery was first proposed, some of us were 'Doubting Thomases.' We were so used to the old way of canning over a hot stove that we could not accept the new and better way until it had been tried. *Our vision was impaired but now we see the light* [emphasis added]. (Evans, 1945, p. 144)

At the close of the 1940s and beginning of the 1950s, educational reformers began to emphasize a philosophical commitment to *life adjustment curriculum* (Fraser, 2014). The intent of this curricular emphasis was to enhance the lives of people and improve society through educational training to bolster the personal knowledge and skills of individuals so they could thrive in an evolving society (Fraser, 2014). Although this educational movement was not broadly implemented throughout American public schooling (Urban & Wagoner, 2014), the philosophy may have influenced aspects of SBAE. For example, in this period, contributors to *The Magazine* emphasized the instructional aspects of SL in the hope of its outcomes improving the lives of students and communities (Edmon, 1953; Roy & Dale, 1960; Scott, 1947; Sutphin, 1979). In this regard, Agan (1954) posed critical questions for agricultural educators to consider when emphasizing citizenship development through students' cooperative, service-based activities. In addition, Urban (1966) stressed the need for instruction *before* students engaged in a "chore service" (p. 152) for local farmers to ensure they experienced impactful learning outcomes. As a result, students were more likely to learn basic skills before implementing such in a service setting. In accord, Sutphin (1979) encouraged agricultural educators to negotiate students' learning objectives with community cooperators to ensure expectations adequately aligned with the local context. Through this increasingly critical view of the method, contributors were stressing the need for *academic rigor* when using SL while also aspiring to improve society.

As SBAE progressed into the 1980s, it faced many new challenges. With publication of the report *A Nation at Risk* also came declining enrollments and the discipline faced increased scrutiny to place more emphasis on academic content and the associated *learning value* of agricultural education courses (McKim, Balschweid, Velez, & Lambert, 2016). Therefore, contributors to *The Magazine* began to feature approaches emphasizing student learning across all three domains of agricultural education's three-circle model, and strategies for improving the delivery of SL appeared to gain popularity during the next several decades. In particular, Lelle (1991), Connors (1992), and Jones and Rayfield (2009) asserted SBAE students could use SL as a way to fulfill their SAE requirements. Moreover, Tarpley (2003) argued SL should be infused into SBAE via FFA chapters' programs of activities (see Figure 2). Other contributors to *The Magazine* (Swan, 2006; Woods, 2002) stressed the need for *reflection* to connect students' learning across SBAE's programmatic dimensions.

Figure 2. Service-learning as a component of a FFA chapter's program of activities. Reprinted with permission from "Service-learning for Pre-service Teachers" by R. Tarpley, 2003, *The Agricultural Education Magazine*, *75*(5), p. 27.

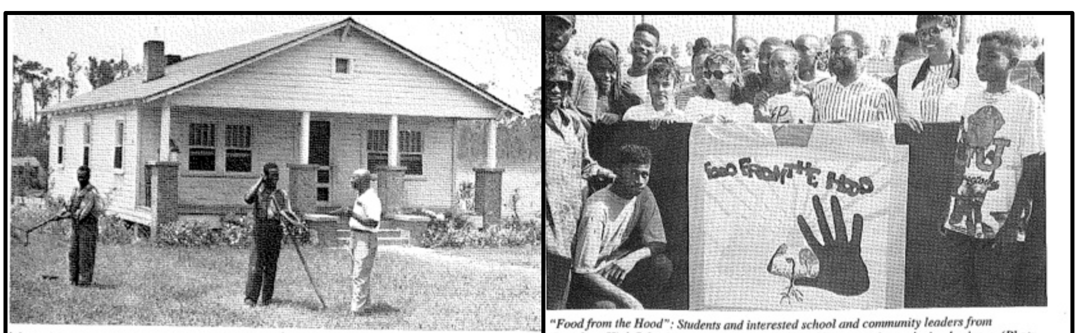
Although the pedagogical lens did not surface in *The Magazine* until the 1940s, it is presumed to have played an important role in shaping SL's imaging and practice in SBAE. By offering insight into the delivery of SL, the authors provided teachers guidance about effectively using the learning method as they navigated the social and cultural trends influencing their programs.

A *Social Justice* Lens

The final theme, a *social justice* imaging of SL, emerged as a way to embolden the voices of disempowered individuals and marginalized populations in agricultural education (Downey, 1985; Flowers, 1946; Hickson, 1950; Kortesmaki, 1970; Ortiz, 1968; Phillips & Dormody, 1993; Rees & Iverson, 1993; Smith-Wong & Baker, 1994). Through this conceptualization, the motive emanating the use of SL was to enable students to confront issues and problems associated with the imbalances of power in society while also harnessing the resources necessary to enact social change. Although SL is often depicted as a harmonious learning method promoting charitable values, when viewed from a social justice lens, it can also demand *respect*, *reciprocity*, and *agency* for students and community members. This view holds the potential to promote social justice through action while explicitly working to bring about change. Framing SL from a social justice stance seems to have been depicted first in *The Magazine* during the 1940s. As evidence, Flowers (1946) highlighted a vocational agriculture teacher from Alamo, Tennessee who was troubled by the poor living conditions of African-Americans in his community. He explained:

> This young Negro teacher was sincerely disturbed by the low living standard in which his people were existing, and he resolved to do all in his power to help them improve their conditions. With the help of his supervisors, his plans were drawn, problem by problem, to include the use of county, state, and government agencies. (p. 95; see Figure 3)

As a result, vocational agriculture students were able to assist their community by applying their agricultural mechanics, horticulture, marketing, and communications skills through a community-wide effort aimed at improving the living conditions of African-Americans. During the next several decades, glimpses of social justice-oriented SL were found in *The Magazine*. To this end, contributors depicted SL efforts designed to help African-Americans, homeless youth, the mentally and physically disabled, as well as marginalized populations in developing countries (Byram, 1965; Cicchetti, 1975; Donahoo, 1953; Hickson, 1950; Hopkins, 1982; Kortesmaki, 1970; Ortiz, 1968).


Many Negro houses are being repaired and beautified and others replaced with neat, modest, attractive farm homes

"Food from the Hood": Students and interested school and community leaders from Crenshaw High School unveil the logo for their budding organic gardening business. (Photo submitted by Rachel Mabie, University of California Cooperative Extension, Los Angeles).

Figure 3. (Left) Social justice imaged service-learning in 1946. Reprinted with permission from "Negro Project for Rural Housing in Alamo, Tennessee" by W. A. Flowers, 1946, *The Agricultural Education Magazine, 19*(5), p. 95. (Right) Food from the hood. Reprinted with permission from "From Fallow to Fertile: Regenerating Inner City Resources" by K. Smith-Wong and M. Baker, 1994, *The Agricultural Education Magazine, 66*(10), p. 6.

Despite the persistence of racial and social discrimination, SL in SBAE continued to bring attention to these problems, especially in regard to race and poverty. Smith-Wong and Baker (1994) articulated how urban, African-American students in Los Angeles used a service-oriented entrepreneurship program to address local inequities. The program, *Food from the Hood*, facilitated students growing a variety of crops and marketing their produce at farmers' markets in and around Los Angeles (see Figure 3). *Food from the Hood* also provided sustenance for the underprivileged because the students donated a portion of their crop to the homeless. Smith-Wong and Baker (1994) explained: "Under a student mandate, students gave 25% of the produce to the homeless. By the end of the year the group had earned $1,500. The money was used to help send three student participants to college" (p. 6). The data demonstrated if SL was examined through a social justice lens, teachers, students, and community members often questioned or challenged the public's framing of race, class, and privilege. To accomplish this, many SL projects sought to create a *space* in which students could begin to comprehend the importance of fairness and achieving equality for all citizens (Flowers, 1946; Kortesmaki, 1970; Rees & Iverson, 1993; Smith-Wong & Baker, 1994).

Conclusions and Implications

Practitioners and scholars have used *The Magazine* as a venue for advancing important *cultural*, *pedagogical*, and *social justice* messages through the use of SL in SBAE. Many contributors throughout *The Magazine's* history depicted the method as noble, fulfilling, and deeply impactful. As an outcome, *The Magazine* contributed to SL's *victory narrative* in SBAE by communicating a *promise of transformation* for students, teachers, and communities. Three lenses emerged as SBAE responded to emerging trends in American society. For example, in response to societal issues such as the Great Depression and WW II, SL was depicted as a way students could use their learning to contribute to society's needs (Cunningham, 1942; Ekstrom, 1929; Woodlin, 1943). This lens emphasized the impact of the *service* provided. Artifacts positioned from the cultural lens perspective often reported the effect that students' service had on their local communities (Daniel, 1986; Grey, 1957; Hamlin, 1929). Therefore, this finding supports Roberts' and Edwards' (2015) claim that SL in SBAE "ha[s] been instrumental in solving local problems and helping to rejuvenate a sense of community" (p. 226).

The pedagogical lens seemed to gain prominence in *The Magazine* in response to increased calls for academic rigor and accountability in K-12 education. For instance, in light of the report *A Nation at Risk* and declining enrollment trends, many educators began to discontinue progressive educational approaches to accommodate more curricular space for science and mathematics (Fraser, 2014; McKim et al., 2016; Urban & Wagoner, 2014). However, *instead of rejecting SL*, contributors to *The Magazine* appeared to demonstrate that *space* existed for learning *and* service in the context of local communities (Connors, 1992; Fear, 1987; Lelle, 1991; Nelson, 1994; Pearson, 1984). Articles viewed through the pedagogical lens focused on *best practices* involving the method to improve student learning (Jones & Rayfield, 2009; Nelson, 1994; Swan, 2006). As a result, SL was imaged as a way students could develop through classroom instruction, SAE projects, and FFA activities by more firmly connecting their learning to service opportunities in local communities (Connors, 1992).

Based on the data analyzed, the social justice lens appeared to emerge as tensions associated with *race* began to pervade U.S. society. It spoke to the importance associated with helping students understand the social impacts of *inequality, racism,* and *privilege* (Byram, 1965; Donahoo, 1953; Hopkins, 1982; Kortesmaki, 1970). Therefore, social justice positioned SL as a method of instruction that reframed relations of power while also questioning the status quo. In this regard, the imaging of marginalized students in *The Magazine* was often framed from a perspective of endorsing tolerance of different cultures, bringing attention to those students' struggles, or calling for change by championing for improved resources (Downey, 1985; Flowers, 1946; Kortesmaki, 1970; Smith-Wong & Baker, 1994).

Recommendations and Discussion

By questioning the imaging of SL in *The Magazine*, possibilities for its future practice and related research become clearer. First, we must more deeply understand the outcomes and consequences associated with *doing SL*. This study highlighted three distinct ways SL was imaged. However, more research is needed to understand the micro-politics, attitudes, and practices of teachers, students, and community members as they engage in SL. For example, how can the framing of SL endeavors influence aspects of *voice*, *assessment*, and *learning* in SBAE? Moreover, how are teachers', students', and stakeholders' views on social norms, such as diversity and inclusion, shaped by SL experiences when examined through the different lenses?

From our analysis of the data, SL's discourse formed a rich narrative. More effort, however, is needed to understand how this discourse *works as a storyline* in agricultural education. For example, how does SL's imaging shape the ways practitioners *talk*, *conceptualize*, and *practice* the method today? Future research should also explore the consequences of positioning SL endeavors through one lens instead of another. To this point, if a teacher champions SL as a way to promote *citizenship*, the carried assumptions and implications will likely differ from a SL activity with *academic learning* as its primary aim. We recommend professional development opportunities be created to assist practitioners with understanding how the unique framing of SL may *support* and *limit* its outcomes. In practice, SL can be difficult and time-consuming to implement (Banerjee & Hausafus, 2007; Kaye, 2010). It takes considerable resources and planning before students *may* begin to have impactful SL experiences. Therefore, by examining educators' motives perhaps their use of SL can be augmented to increase the likelihood of achieving SBAE's learning objectives. This warrants additional research questions: Are the motives purely outcome driven? Are they culturally or politically charged? Are they recognition based? Could instructors' decisions to use SL as a method of instruction be rooted in deeper ontological and epistemological beliefs? And, do practitioners perceive the resources dedicated to SL activities are worth the cost? By exploring these questions, perhaps teachers' capacities for delivering more impactful, engaging, and high-gain SL experiences can be improved.

By examining how SL has been imaged in *The Magazine*, we now understand better *where we have been* and can begin to advance more theoretical and conceptual discussions. Because *motives* appear to influence SL's imaging, we argue more attention should be placed on the role *social processes* play in shaping SL's practice and resulting outcomes. By more deeply understanding the "production and reproduction of relationships between people and things, and people and practice" (Sheehy & Leander, 2004, p. 95), we theorize new, thought-provoking possibilities may exist. For example, perhaps SL could be *reframed* to serve as a more powerful complement to SBAE. Recent literature suggests agricultural education has taken a *critical turn* by questioning the influence of gender, race, power, and ideology (Enns & Martin, 2015; Kelsey, 2007; Martin & Kitchel, 2013, 2015; Roberts, Edwards, & Ramsey, 2016). These investigations have led to increased calls for exploring inclusive approaches that may create a more equitable and inviting socio-cultural climate in SBAE. Perhaps SL could serve as a mechanism for facilitating such change.

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Experiences of Pre-Service Agriculture Teachers in a Reading in the Content Area Course

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Abstract

Being successful in the 21st century requires strong literacy skills. Under Common Core State Standards, all teachers are charged with developing students' literacy skills and abilities. To help better prepare them for this task, pre-service teachers at the University of [STATE] are required to take a Reading in the Content Area (RICA) course. This intrinsic case study focused on pre-service agriculture teachers who were nearing completion of the RICA course. Two focus groups were conducted (one in the fall and one in the spring) with a total of nine participants. Four themes emerged from the data: 1. students held misconceptions and concerns that were dispelled, 2. the structure and content of the class made an impactful but incomplete learning experience, 3. they could identify literacy's role within agricultural education, and finally 4. they were still hesitant to include it in their classrooms. Recommendations for practice included: adding a literacy component to microteaching experiences, developing confidence regarding literacy assessment, and providing pre-service teachers with literacy strategies specific to agricultural education.

Introduction and Literature Review

High quality literacy skills are fundamental for life in and outside of the classroom (Castleton, 2002; Heller & Greenleaf, 2007; Moje, Young, Readence, & Moore, 2000; Pearson, 2013; Schmoker, 2011; Tannock, 2001). Literacy skills have been and will continue to be a cornerstone of quality classroom instruction (Buehl, 2011; Schmoker, 2011). The workforce has experienced rapid change in the past several decades, but the need for literacy skills in the workplace is unchanging (O'Brien & Stewart, 1990; Shanahan & Shanahan, 2008). Students who lack these skills fall behind in classrooms and the workplace. Higher literacy rates lead to increased income levels, avoidance of the criminal justice system, healthier lifestyles, and increased social and civic engagement (Heller & Greenleaf, 2007; Shanahan & Shanahan, 2008). A college and career ready student possesses literacy skills to be successful in a variety of settings.

Literacy instruction in school changes as students progress throughout the grade levels. In elementary school, the focus is often on learning-to-read and learning-to-write (Chall, 1983). During this stage, students learn the basic skills needed to read and write text. Towards mid-elementary school, the focus often shifts towards having students read-to-learn and write-to-learn (Chall, 1983). Students are expected to use literacy skills to aid them in the learning process. Many students struggle with this transition because they are rarely taught how to read and write the types of texts they are expected to use (Buehl, 2011; Pearson, 2013; Schmoker, 2011). Under No Child Left Behind (NCLB) literacy practices were considered stand-alone activities (Gallagher, 2009; Pearson, 2013). The lack of context was problematic. Many high school graduates were left without the literacy skills needed to be successful in college or careers (Pearson, 2013; The

National Commisson on Writing for America's Families, 2004). Common Core State Standards (CCSS) have attempted to address this gap with an increased emphasis on disciplinary literacy (Buehl, 2011; Coleman & Pimentel, 2012; Lesley, 2014). However, even teachers who strive to embed common comprehension building strategies in their instruction also need to contend with specific literacy demands of their discipline (Biancarosa & Snow, 2004; Heller & Greenleaf, 2007; Shanahan & Shanahan, 2008).

Each content area has unique disciplinary literacy, including the way the content is organized and communicates important information (Buehl, 2011; Dougherty Stahl, 2014; Lesley, 2014). Being literate within a discipline, such as agriculture, means identifying and using appropriate communication for the field (Moje, 2008). The language of a discipline can be an obstacle. Students must become comfortable with the vocabulary (Allington, 2002; Dougherty Stahl, 2014; Krajcik & Sutherland, 2010; Park, 2011; Snow, 2010) and syntax (Fang, 2006). Furthermore, each discipline has specific ways to approach and interact with a text (Buehl, 2011). Context is the basis of disciplinary literacy (Heller & Greenleaf, 2007). It is necessary for all content area teachers, including agriculture teachers, to appropriately develop the literacy skills of students in their classrooms (Jewett, 2013).

Content area teachers who integrate literacy into their classroom face many challenges. They must have an attitude that literacy instruction is important, as well as the skills, tools, and knowledge necessary to effectively implement it. Agriculture teachers specifically believe literacy instruction is only supplemental to the content area (Park, van der Mandele, & Welch, 2010). Research has shown teacher attitudes and beliefs toward literacy are grounded in personal experience and disciplinary identity (Fang, 1996). Teacher attitudes also impact the likelihood of implementing reading strategies (Baker et al., 2008; O'Brien & Stewart, 1990). Student attitudes towards literacy are actively influenced by teacher attitudes (Adams & Pegg, 2012; Moje, 1996; Park & Osborne, 2007a; Phelps, 2005). Historically, content area teachers often view literacy skills instruction as something that should occur outside their classroom (Shanahan & Shanahan, 2008).

To aid teachers in integrating classroom literacy, many states have mandated required literacy coursework for pre-service teachers. Over 80% of in-service agriculture teachers have completed some literacy related college coursework (Hasselquist & Kitchel, 2016b), a marked increase from previous studies (Park & Osborne, 2007a). According to research, literacy-related coursework has the potential to affect how teachers view and use literacy strategies. For agriculture teachers, they must be comfortable with literacy strategies to use them with their students (Park & Osborne, 2006; Santamaria et al., 2010). Those agriculture teachers who completed literacy-related coursework had a better attitude regarding literacy (Park & Osborne, 2006) and used 10 additional strategies when compared to non-completers (Park & Osborne, 2007a). When pre-service teachers receive literacy-related coursework it has the potential to positively influence their classroom practices.

Very little is known about pre-service teachers and their attitudes and beliefs concerning literacy integration in the secondary setting. What is known indicates pre-service teachers are not supportive of literacy in the secondary setting. Pre-service teachers believe literacy instruction should occur outside the content area classroom (Lesley, 2014), while others studies showed pre-service teachers believed literacy instruction was inappropriate and unneeded at the secondary level (Hall, 2005). Pre-service agriculture teachers are particularly resistant to the idea of using literacy in the classroom. They perceive agriculture content to be hands-on in nature and believe literacy is counter to that teaching style (O'Brien & Stewart, 1990). Improving pre-service teacher attitudes regarding literacy is one step towards classroom integration (Baker et al., 2008). Literacy-related coursework is designed to increase pre-service teachers' knowledge regarding literacy's importance, expose them to a wide variety of literacy activities, and improve attitudes and beliefs concerning literacy's role in the content area classroom. Given time and support it is possible to change teacher attitudes (Hall, 2005; Spitler, 2011). Literacy-related course work can provide the necessary structure. To create in-service agriculture teachers who incorporate literacy in their classrooms, we must begin to understand and change pre-service teacher attitudes and perceptions (Spitler, 2011). Before we can begin to change attitudes and classroom practice, we must first understand their experiences in the required literacy-related class.

Purpose

Learning how to incorporate literacy requires high quality pre-service teacher training, which is currently provided in a single required literacy course (Snow & Moje, 2010). Focusing on current student experiences is important to understand the current process, evaluate if it is successful/sufficient, and identify any potential changes to be made. The central research question asked what are the experiences of pre-service agriculture teachers in a required Reading in the Content Area (RICA) course?

This study aligns with Priority #5 of the National Research Agenda: Effective Agricultural Education Programs (Roberts, Harder, & Brashears, 2016). Integrating literacy activities into all content areas, including agricultural education, is an educational initiative. To help pre-service agriculture teachers become classroom teachers who integrate literacy, we must first understand their experiences in required literacy-related courses.

Methods

This intrinsic case study focused on pre-service agriculture teachers nearing completion of a required RICA course. The target population was undergraduate students at the University of Missouri. The bounded system was students who were within two weeks of completing the required RICA course. All of the students were of at least junior standing.

RICA is a required course of all middle and secondary education majors at University of Missouri. The course was offered through the College of Education and taught every semester by multiple instructors. The class utilized a common syllabus and course objectives. The purpose of the RICA course was to raise awareness of what literacy is and how it can be used in a variety of classroom settings. Data collection took place over two semesters, in the spring and fall of 2016. Near the end of each semester, agricultural education majors were in invited to a focus group. In the spring an invitation was extended to all eight pre-service agriculture teachers enrolled in RICA, with seven agreeing to participate. In the fall, an invitation was extended to all four pre-service agriculture teachers, with two agreeing to participate, for a total of nine participants.

Each focus group lasted approximately one hour and consisted of a semi-structured format. The focus groups were recorded and transcribed to aid in data analysis. Line by line coding was used to identify categories and themes of the experience. The focus group interviews served as a primary source of data; course syllabus, calendars, and assignments were used as secondary data sources. Data analysis was approached with a constructivist lens (Creswell, 2013). To ensure trustworthiness, researchers used triangulation, member checking, peer debrief, and established an audit trail (Creswell, 2013; Stake, 1995).

The researchers reflexively position themselves as former high school teachers who incorporated literacy into the content area classes. The primary researcher completed a RICA course as an undergraduate student in Wisconsin. The secondary researcher served as a teaching intern for a RICA course at the University of Missouri. These experiences may have influenced the researchers' subjectivity (Creswell, 2013). However, care was taken to ensure accuracy and validity of the findings as discussed above.

Findings

Data analysis yielded four distinct themes related to the pre-service agriculture teachers experience in the Reading in the Content Area (RICA) class.

Theme 1: Concerns and misconceptions exist but are dispelled early in the course

Before starting RICA, the participants held pre-conceived notions about what to expect from this course. When initially asked about their attitudes towards the class, all participants noted some degree of hesitation, or as Jon put it, "I wasn't excited." One of the most common misconceptions vocalized was RICA was not for agricultural education majors, it was only for "English and reading instructors" or "language arts and social studies teachers." This misconception stemmed from what material they thought would be covered. "I thought we were just going to have to read a bunch of different types of readings," said Katie. Whereas Pete said, "I thought we would be writing a lot more, like poetry and stuff." Micah assumed, "we would be doing a lot of what [English teachers] are teaching our students to do." The idea of having to read and write for the sake of gaining perspective was unappealing to the participants and highlighted in their mind RICA was not for agricultural education majors.

The location of RICA was also problematic. RICA is based in the College of Education and this led to concerns and anxieties for the participants. When asked what they thought the class would be like, Rose said, "boring – it's an education class." She thought "it's probably just going be like any other [education] class where you just sit and listen to a lecture on a boring lesson." Sophie's described her viewpoint as, "[education] classes aren't practical." Participants voiced frustrations about the perceived lack of applicability towards agricultural education. The general perceived structure of lecture based courses in education lead to a feeling of frustration. They often noted feeling they were given the background information but never allowed to apply or use the newly acquired knowledge.

Other participants articulated feelings of being an outsider and undervalued by the teachers and how this leads to a feeling of anxiety. "I didn't expect for [RICA] to go well at first because we are the black sheep in the College of Ed. No one understands what Ag Education is," said Beth. Mary followed up by saying:

> Most classes in the College [of Education] don't like us, they are not able to connect with Ag Ed students. I just figured this was one of those things that we were just going to have to check off the list and get through.

The perceived outsider status was an obstacle for the participants. Rather than viewing the class as something to learn and grow from, they viewed it as an experience to be tolerated and a box to be checked. They felt, based on past experiences, their teachers were not excited for them to be there, and neither were they.

However, once class started those fears, misconceptions, and anxieties melted away. "This was my favorite education class of all time," said Sophie. The positive experience started with the instructor. Despite experiencing four different RICA sections and instructors, all the participants were mindful of the positive role the instructor had on the course. Rose reflected, "I don't know about the other RICA classes, but I think just having her as our teacher, we had an amazing experience." Lynn expressed appreciation for her teacher's willingness to learn new information and engage in their lessons. "She really tried to make a connection [with us]. Whenever we had to do our lesson, she'd talked about how much she learned." Beth stated, "I think we have been pleasantly surprised. [Our teacher] really does make an effort to make connections to us . . . connect it to our [content] area." Generally, they also had positive interactions with their peers and felt accepted. "People really enjoy what we taught about and were engaged," volunteered Pete. Katie added that, "People will come up to us after class or our lesson and say, 'oh, that's interesting. I never knew that's why we do that.' It was really cool." Not all interactions were positive, but the mixed experiences did not appear to take away from the inclusive feel of the classroom. The content, how it was taught, and the direct applicability to the secondary agriculture classroom helped create a positive experience.

Theme 2: The structure and content of the class made it an impactful but incomplete learning experience

Despite starting the class with feelings of dread and trepidation, the participants came to recognize the value of it and had a positive experience. As stated earlier, they expressed appreciation for the teachers' influence. They felt like their identity as agriculture teachers and personal time was valued. Sophie said, "Our teacher did not waste our time. She wanted to make sure we wanted to learn and didn't give us busywork." Lynn simply stated, "teachers make your experience." Participants valued being able to learn from the instructors' personal experiences too. Beth said:

> He would give examples of things he used to do, when he was teaching high school. He's like "don't do this, these were the mistakes I made, it wasn't very good." I thought it was good seeing first hand and having a professor who is willing to share their mistakes with you.

They appreciated learning activities and immediately envisioning how they would use it in their classroom. "She actually taught us things we could use in our classrooms, it was a fun class to be a part of," reflected Rose.

While the teachers made the atmosphere welcoming and productive, the participants also valued and appreciated the content of the class. When asked to describe what they thought literacy was prior to the class, participants focused on the mechanics of reading and writing. Pete said, “Before I took the class I thought it was just your ability to read and write, never really went much deeper.” Katie reflected on how her experience changed her viewpoint. “I always just thought [literacy] was about literature, so like reading mostly, but after class I figured out it . . . [it’s] getting students to comprehend the procedures and what’s going on.” All the focus group participants noted having an expanded view of what literacy entailed. Before the class, many of them believed literacy focused solely on reading and writing; however, after the class they all espoused the belief literacy is helping students understand the world around them.

Furthermore, they gained an understanding of the importance of including literacy in agriculture classrooms. The felt the need to include literacy arose from two specific concerns. The first concern regarded the students’ abilities. Beth said, “Just learning the statistics about how under-serviced some of our student are, the levels that they are not able to read at, it’s even more important for us to know how to teach literacy.” Others echoed the sentiment of having a responsibility to help struggling readers and writers. Sophie recognized the importance of quality literacy skills, “whatever you are doing, you are going to have to be able to read . . . and write. I want to include [literacy] in my classroom because they will be using it so much later.” The second reason for including literacy in the classrooms was the importance of increasing student knowledge and retention. Micah said, “The small ways we can incorporate it make a difference in student [learning].” Lynn went on to add, “I think by including reading and writing it’s helping us get to our final goal of [students] actually comprehending the material and be able to apply it.” They felt a responsibility to include literacy to help students build skills and learn new information.

Additionally, the content and how they were taught it added value to the participants’ experience. Micah said, “We were taught a lot of neat ways to improve our classroom. I definitely think this class will help us improve our teaching . . . and [we’ll] be better teachers overall.” During the semester they learned a variety of ways to include literacy, identified multiple types of texts, and practiced incorporating literacy strategies through “mini-lessons”. All the participants felt the information learned was valuable to them. Pete described the experience, “We learned a lot of cool strategies . . . and different activities for your classroom.” The participants describe a wide variety of methods they had been taught in class. Rose said, “I really like exit slips.” While Lynn said, “I liked the idea of doing free writes at the beginning of class . . . [so] that you can figure [out what] your students know about the topic.” Micah identified the experience as “opening your mind to being creative and finding different ways to get literacy out there and for [students] to comprehend what’s going on in the lesson.” Mary described the experience as “learning ways to include smaller bits of reading and writing in a lesson so it’s not so overwhelming.” Beth simply said, “I feel more confident in my abilities to have my students do [literacy] things, more confident in my abilities to instruct them on how to do those things.”

Using a wide variety of texts and being exposed to them was important to the participants. Prior to the course, many of the participants believed books were the only type of text available in agriculture. Sophie and Rose, who had the same instructor, discussed how their teacher's utilization of a wide variety of texts, including websites and videos, was important for them as students. Katie talked about her experience with text:

> One day at the beginning of the semester our instructor said "[literacy] is not just papers and essays, it can even just be a drawing. If you can explain what you drew you are using literacy." I just thought that was great.

The new definitions of text and how literacy can be used with it was helpful for participants to envision using it in their classrooms.

All the participants were required to complete several microteaching experiences for their classmates. The goal of the mini-lessons was to practice incorporating reading and writing activities. Being able to see activities in context was important. Jon summarized the experience as:

> The most helpful thing has been seeing how other [students] put literacy into their lessons. Then being able to take that and be like "I can apply that this way to my [lessons]" and being able to look at what they did and kind of twist it around to make it work for me.

The participants found the actual act of teaching practical too. "Just being able to time things out was helpful," said Rose. While Sophie added, "learning how to write a lesson plan was so good." Many of the students had not yet taken teaching methods courses and had not had the opportunity to teach a lesson before.

Despite its overall positive experience, the participants still felt some areas where lacking and wanted more instruction including discussion on how to assess student work, maximizing the class textbook, and specific strategies that work well in agricultural education. Participants appreciated the wide variety of ways literacy can be included, but they expressed frustration at the lack of discussion regarding assessing student work. Despite talking about how to use literacy in the classroom, Rose wanted more. "It would have been nice to know . . . we didn't touch on how to grade anything." While Beth wondered, "what will assessment for learning be like?" While the participants improved their overall confidence, they still craved more guidance in assessing and assigning work. The underutilization of the course textbook was also a source of frustration. The participants used *Classroom Strategies for Interactive Learning* (Buehl, 2013). The book itself is divided into two parts. The first part focuses on the mechanics of literacy, while the second part focuses on a large number of literacy strategies for secondary classrooms. The participants felt frustrated they only read a few chapters in the front of the book and were not made aware of what was in the second section. Sophie said, "Well, I guess I will be buying it now." Some students did not value it as a potential classroom resource because they were unaware of the resources available in it. Lastly, many participants appreciated the general ways to include literacy in their classrooms, but they also lamented not having clear strategies or specific discussions geared towards agriculture classes. Sophie discussed how her instructor focused on general themes. "She would just approach things very broadly, never really focusing on Ag." Other participants were creative when trying to identify possible methods to use in their classrooms. Lynn said, "I know there is not a lot out there for [agriculture] so we had to branch out to science." Beth said, "I feel like we can closely relate to the science group and what they do" when discussing what they learned from their peers' mini-lessons. While the students were able to watch other content areas teach and adapt their ideas to fit in agriculture, they also longed for agriculture specific strategies.

Theme 3: Literacy has a place in the agriculture classroom

In addition to learning what literacy was and a variety of ways to include it in lesson plans, the participants began to explore what it means to include literacy within agricultural education. Besides the general literacy strategies, the participants surfaced the idea of disciplinary literacy, or literacy skills and strategies unique to a discipline, such as agriculture. "Math has its own kind of literacy, English has its own kind of literacy, and agriculture has its own literacy," said Mary. When asked to describe what disciplinary literacy for agricultural education looked like, Jon replied with, "it's not you just you to go Ag class, write and paper and give a presentation, its different." The participants focused their discussion around the various types of text agriculture students encounter (production records, safety manuals, blueprints, etc.) and helping students understand and apply information. Some participants discussed the importance of helping students understand the technical vocabulary used within the discipline. Others focused on the importance of agricultural literacy. Beth described it, "I want them to know we do what we do [in the agriculture industry] and why." While Lynn added, "I want my students to be good consumers of knowledge and to tell the differences between accurate and inaccurate information." The idea of helping students identify factual information was a focus for several participants. They discussed creating lesson plans designed to help students compare different sources of information and evaluate the validity of each one. The participants believed disciplinary literacy in agricultural education was important and recognized the variety of ways it can used.

Understanding literacy and disciplinary literacy in agricultural education was a key idea for many of the participants. They discussed being able to see a wide variety of ways literacy already exists within agriculture content and the importance of capitalizing on it. Rose said, "[RICA] made me notice how important it is to put literacy into every class." They could identify the subtle ways literacy is present in agriculture. Pete shared, "even doing safety type stuff . . . I never really thought about it too much, but that's one way literacy is in your classroom." The participants discussed the importance of using literacy activities to increase comprehension of key information. "That way [students] still have a reading and writing aspect to [the content] but it's very meaningful to them," said Micah.

They also could identify missed opportunities to improve a lesson through literacy integration. Katie described an observation experience where she watched the teacher explain livestock evaluation and then become frustrated as the students struggled with the associated vocabulary. "She could have taught some of those vocab words with like a word chart or something." Mary explained an observation experience she had with chainsaw safety. "The teacher didn't have them read, he strictly [taught] it from PowerPoint. I think that was a missed opportunity to incorporate literacy." Participants discussed the importance of capitalizing on those opportunities to help increase student learning. In the words of Mary, "a little [literacy] things make a big difference."

Theme 4: Yes, but . . . Still reluctant to include literacy

When asked if they planned to incorporate literacy activities into their agriculture classrooms, all the participants answered yes. Despite their intentions to incorporate literacy, they still held some reservations. One concern raised by multiple participants was potential student resistance. They discussed how many students who register for agriculture classes have specific expectations regarding the material covered and how it is taught. Jon’s concern was, “a lot of kids take Ag as a fun elective and they don’t want to be reading and writing, that could be something they fight you on.” Participants also discussed how using literacy purposefully, yet subtly, is important when fighting student expectations. Lynn noted, “you can’t just drop [literacy] in there. I thought it was really fun to find sneaky ways to incorporate it, like ‘haha you didn’t even realize you’re reading.’”

Another concern raised by the participants was the perceived juxtaposition between literacy and the hands-on nature of agricultural education. Mary’s field observation left her with a distinct opinion:

> I went to a Greenhouse class and then to Construction Mechanic class so the kids were really interested in actually doing the activity. I kind of asked them as I was going through and watching them, "Would you want to write anything about this? Could you read an article about it?" Kind of get that perspective and they kind of looked at me like, "This is a fun class, we don't do reading and writing in this class." You don't do that with hands-on stuff.

Many of the participants reflected on their experiences as students and the lack of literacy integration in their secondary programs. Katie said, “we never did this in my Ag program, we were too hands on.” They felt the hands-on aspect of agriculture was incompatible with literacy integration.

Participants also were reluctant to incorporate literacy for the sole purpose of incorporating literacy. Beth said:

> I think sometimes in education we do things because someone along the line told us that that was the right way to teach. Just because a principal wants you to do something is not a good enough reason to do it.

They discussed the idea of doing literacy right way. Sophie said, “I feel you just have to do it the right way . . . you can’t just give them something.” Several participants worried about finding the right places to include literacy to make the lesson meaningful and not just busy work for the students. “I think once [students] see the value in [literacy], it could go a little more smoothly,” supplied Pete.

Discussion

Before starting the class, all focus group participants had concerns and held misconceptions about the class itself. The participants felt the material they would cover in RICA was not intended for them. Furthermore, participants also verbalized being an outsider to the College of Education which led to more hesitation and concerns. Those misconceptions and concerns quickly evaporated. All the participants found the class to be engaging and useful for their future. Other content area teachers have reported similar experiences of going from reluctant participants to engaged classroom community members (Spitler, 2011). Instead of focusing on reading and writing, the participants discovered the broader idea of literacy: using reading, writing, speaking, and listening to help improve student comprehension and understanding of the material. They appreciated being exposed to ideas and strategies that had the potential to positively impact their classrooms. The outsider status was overcome thanks to purposeful efforts by their instructors to make them feel included and acceptance by their peers. The RICA course became a positive experience for everyone.

Is it possible the perceived “outsider status” regarding College of Education courses inhibits them from maximizing their learning opportunities? All the participants noted it was their teachers who made them feel welcomed in class. When they felt welcomed they began to fully engage with their peers and course material. How can agricultural education departments work to ensure their students feel welcome in College of Education classes? Future research should be conducted to determine if any other external barriers exist regarding students’ participation and ability to integrate literacy in RICA-type courses. To maximize a student’s experience, we must recognize potential mitigating factors and work to overcome them.

Course context was extremely important for the participants. The participants wanted the material covered in the class to be relevant to them as agriculture teachers. There were many unknowns for participants prior to starting the course, particularly regarding the instructors’ attitude towards agricultural education and the content to be covered. One recommendation for practice is to have either course instructors or agricultural education majors who have completed the course provide insight into the structure and material being covered. Understanding and have an informed idea about the class and its usefulness in the future is an important first step for student buy-in. All the participants discussed a common set of misconceptions regarding the course content. Those misconceptions added up to the hesitations regarding the class. An additional recommendation is to start a dialogue between RICA instructors and agricultural education faculty. Discussing how educators can support each other’s efforts is key. It is very likely both parties are uninformed regarding the nature of their positions and content covered within the classes. Agricultural education faculty can offer unique insights on how literacy is used within our discipline and the challenges teachers face when incorporating literacy. RICA instructors can help us embed literacy strategies into our teaching methods courses. By increasing our students’ exposure to literacy, we can help improve their confidence and perhaps their classroom practices.

Once the participants overcame their misconceptions and bought into the content, they reported having a positive and impactful experience. Early buy-in was possible due to the instructors’ efforts to include them and to make the class feel purposeful. The value of perceived applicable content cannot be understated. Perceived applicability is important for students to maximize their learning experiences. When the instructors shared wisdom and expertise from their time in the classroom, the students appreciated and benefitted from it. Agriculture teacher educators should take special care to discuss how they used literacy in their classrooms and share any insight gained with their students.

The main goal of the course, helping pre-service teachers understand what literacy is and how to use it in the classrooms, was met. The participants moved beyond the misconception that literacy was just reading and writing and toward the notion literacy activities can help students understand and comprehend the content better. Additionally, participants developed positive attitudes about the importance of including literacy in their classrooms, which may be helpful for future implementation (Adams & Pegg, 2012; Moje, 1996; Park & Osborne, 2007b; Phelps, 2005). Becoming aware of reading statistics was an important moment for many participants. It is beneficial for pre-service agriculture teachers to understand the literacy demographics of their future students. They also felt integrating small literacy activities was important to maximize student learning.

Receiving instruction on a variety of ways to use literacy in the classroom was something the participants found valuable. All of them spoke of increased confidence. Feelings of increased ability and confidence upon completion of a RICA-type course is not unusual for pre-service teachers (Buehl, 2011). Participants reported developing knowledge regarding a wide range of literacy strategies. Agriculture teachers who have completed a RICA-style course are more likely use wider variety of strategies in their classrooms than those who have not (Park & Osborne, 2007a). A changing the definition of what constitutes a texts is not an unusual outcome for a RICA-style course (Spitler, 2011). Participants also valued teaching and watching their peers teach. It allowed them to gain experience and see literacy strategies used in a variety of settings. They appreciated how those experiences exposed them to new and different ways to use literacy. Pre-service agriculture teachers need to continue literacy-related coursework to improve their future classroom literacy practices Agriculture teacher educators should encourage students to include literacy activities in their microteaching experiences to help them gain confidence and experience. Additionally, consideration should be given to having the students reflect on the different literacy activities they have been exposed to and how the strategies could be adapted and used in agricultural education. Research should be conducted to determine how in-service teachers select and adapt literacy strategies to meet their classroom needs. Identifying and modifying strategies is an important skill the focus group participants began to develop in class. By understanding this skillset in in-service teachers, we can develop a stronger skillset among our pre-service teachers.

Participants could identify a variety of ways literacy is used uniquely within agricultural education. For the participants, the types of texts used, technical vocabulary, and the purpose of creating informed consumers were all part of the agriculture's unique disciplinary literacy (Allington, 2002; Chambers Cantrell, David Burns, & Callaway, 2008; Moje, 2008; Park et al., 2010; Santamaria et al., 2010; Snow, 2010). Participants became aware of the many literacy opportunities within the content area and the importance of capitalizing on them to aid in student learning (Schmoker, 2011). Teacher educators should continue to work towards increasing pre-service teachers' literacy awareness. During microteaching reflection, questions focusing on adding or improving existing literacy strategies should be included. Additionally, having discussions on including literacy to improve student learning regarding common topics (e.g. shop safety) would be beneficial to help improve pre-service teachers' literacy awareness.

Even though the participants found this class highly beneficial, they also left the class wanting more. Agriculture teacher educators can fill the void. Participants felt frustrated and unprepared at the lack of discussion regarding assessing students' work. Helping future teachers understand and develop assessment skills are important. Agriculture teachers who are comfortable in assessing student writing are more likely to use it in their classrooms (Hasselquist & Kitchel, 2016a). Assessing student learning is a vital component of teaching. Pre-service teachers can identify short writings as a method to check for understanding, but lack the skills and confidence to assess it. It is important to help pre-service teachers develop the skills and knowledge needed to assess student learning, not just list different ways to do it. Additionally, agriculture teacher educators should try to determine what, if any, textbook is used for RICA and if possible utilize it in a teaching methods course. For example, requiring students to use at least two strategies from the textbook during their microteaching experiences, which helps them become familiar with new strategies and see the book as a valuable tool for classroom instruction. By using a common text in College of Education and agricultural education courses, pre-service teachers understand the material is important and relevant to their classrooms. Finally, RICA instructors should make an effort to include discipline specific literacy strategies their courses. While knowledge of a wide variety of strategies was valued by the participants, they were keenly aware of the lack of agriculture specific strategies. Having in-service teachers share activities they use and how they use them would beneficial in establishing what disciplinary literacy looks like in agricultural education. Future research should be conducted to determine what common literacy strategies are used within agricultural education and provide direct instruction on the most common strategies to pre-service teachers.

Currently, a disconnect exists between the participants' attitudes and thoughts regarding literacy. They all espoused the belief literacy was important for the students and the planned to include it in the classrooms while also expressing a reluctant to include in their classrooms. Hesitation to include literacy in their classrooms is not a new phenomenon (Hall, 2005; O'Brien & Stewart, 1990; Spitler, 2011). Many pre-service teachers hold similar concerns regarding the lack of student buy-in (Hall, 2005; O'Brien, Stewart, & Moje, 1995; Spitler, 2011). For the participants, overcoming student resistance meant being "sneaky" regarding literacy integration by finding subtle and purposeful ways to include it in the content. Pre-service agriculture teachers have long held the belief the hands on nature of agriculture does not align with literacy (O'Brien & Stewart, 1990). It is important for pre-service teachers identify the variety of ways literacy integration supports hands on learning. Teacher educators should work to help students identify and enhance existing literacy opportunity in many hands-on activities. They should also help pre-service teachers develop a list of a few literacy strategies to enhance hands-on activities. Finally, the importance of using literacy the "right way" was not lost on the participants. They discussed it must been done purposefully and with enough support to help students be successful.

The ambiguous nature of pre-service teachers' literacy beliefs is a point of concern. A discussion should held between literacy and content area experts focusing on how much of pre-service reluctance is developmental in nature (e.g. worrying about student response) and how much of is discipline specific (e.g. literacy is counter to hands-on learning) and what steps can be taken to overcome it together. Future research should be conducted with early and mid-career teachers regarding the literacy integration and adoption process. How did they overcome challenges and what were the importance experiences that aided them in the process? An additional study should be conducted with first year teacher to explore their experiences as they begin to incorporate literacy in their classroom, which may also provide some insight to pre-service teachers' mixed views regarding literacy. Finally, research should also be conducted with pre-service teachers from other content areas to determine what can be done to help improve the RICA experience for all pre-service teachers.

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Pre-Service Teachers' Intentions to Incorporate Literacy into Their Classrooms and Factors of Influence

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Abstract

Literacy skills are the foundation for success in and out of the classroom. Today, all teachers are charged with improving students' literacy skills. Agriculture teachers are no exception. To continue to prepare college and career ready graduates, agriculture teachers must include literacy in their classrooms. This exploratory study sought to determine pre-service agriculture's literacy experiences both in and out of the agriculture classroom; attitudes and beliefs regarding literacy; beliefs about how school district policy may influence classroom literacy integration; their intentions to incorporate literacy into the classroom; and to determine if a linear relationship existed between literacy intentions and their literacy experiences, attitudes and beliefs, and district policy. A backward hierarchical regression determined professional attitudes and beliefs (literacy instruction is the responsibility of all teachers, etc.) as the only statistically significant influencer, accounting for 63% of the variance in their intentions. Recommendations for practice include incorporating literacy activities into microteaching experiences to build confidence, spotlighting the variety of ways literacy is already present in agriculture content, and working with pre-service teachers to increase their literacy awareness. Future research should focus on how pre-service teachers develop their beliefs and explore how literacy integration goes from an intention to an action.

Introduction

Literacy skills are needed for success in and out of academic settings (Castleton, 2002; Heller & Greenleaf, 2007; Moje, Young, Readence, & Moore, 2000; Pearson, 2013; Schmoker, 2011; Tannock, 2001). The use of literacy skills is a cornerstone of effective classroom instruction (Buehl, 2011; Schmoker, 2011). Information presented through a variety of methods (lectures, textbooks, etc.) (Buehl, 2011) and from an array of texts (film, music, blog posts, etc.) (Moje et al., 2000) are just a few examples of how students are expected to acquire and learn new information. Beyond the classroom, literacy skills are needed to gain entry into the workforce. Reading and writing skills are needed to comprehend and complete job applications (Tannock, 2001), while the interview process focuses on speaking and listening skills. Outside of the classroom and workforce, stronger literacy skills lead to an enhanced quality of life. Better health, avoidance of the criminal justice system, and increased social and civic engagement are associated with higher literacy rates (Heller & Greenleaf, 2007; Shanahan & Shanahan, 2008).

Common Core State Standards (CCSS) requires all teachers, regardless of the content area, to be teachers of literacy (Buehl, 2011; Coleman & Pimentel, 2012; Lesley, 2014). Under No Child Left Behind (NCLB), reading and writing activities were viewed as stand-alone practices and taught devoid of context (Gallagher, 2009; Pearson, 2013), which led to increased reading scores but decreased comprehension rates (Heller & Greenleaf, 2007). This trend resulted in many high school graduates being unprepared for the literacy demands of post-secondary life (Pearson, 2013; The National Commisson on Writing for America's Families, 2004). To combat this trend, CCSS focuses on developing student skills holistically by including literacy standards for all disciplines (Pearson, 2013). One way all teachers are accountable for students' literacy skills is through a renewed emphasis on disciplinary literacy (Pearson, 2013). CCSS focuses on disciplinary literacy with the aim of increasing college and career readiness for all students (Buehl, 2011; Coleman & Pimentel, 2012; Lesley, 2014) by building and improving the necessary skills needed to communicate and function effectively within a specific discipline, such as agriculture.

Despite knowing the benefits of literacy, agriculture teachers often fail to incorporate literacy into their classrooms (Hasselquist & Kitchel, 2016a; Park & Osborne, 2006). In-service agriculture teachers viewed literacy as supplemental to the content area (Park, van der Mandele, & Welch, 2010). When compared to other content areas, historically, agriculture pre-service teachers are the most resistant to the idea of classroom literacy integration (O'Brien & Stewart, 1990). Pre-service teachers across disciplines often overlook the literacy strategies they use in daily life which may lead to the belief that literacy instruction is not needed at the secondary level (Spitler, 2011). The failure to use literacy in the agriculture classroom is problematic for the profession and students enrolled in agriculture programs. To remain relevant in the public school system, agriculture teachers must produce college and career ready graduates, this includes literacy skills, which are an important factor in college and career preparedness (Buehl, 2011; Gallagher, 2009; Pearson, 2013). This study explores what factors influence pre-service agriculture teachers' intentions to include literacy in their classroom. By understanding key influencers, pre-service teachers can be exposed to a range of positive experiences and build their knowledge regarding the importance of literacy in the agriculture classroom.

Conceptual Framework

After a thorough review of literature, a substantive theory was developed to identify possible factors regarding pre-service teachers' intentions to incorporate literacy into their classrooms. The framework identifies three areas within literacy research which may influence a teacher's intentions. Attitudes regarding literacy, classroom literacy experiences, and perceptions regarding a school district's literacy policy could potentially be factors.

Attitudes

A teacher's personal attitudes regarding literacy have influence over classroom practices. Specifically, agriculture teachers who identified as readers (Park & Osborne, 2006) or had a high personal value of reading (Park & Osborne, 2007) were more likely to view reading as a teaching tool and use it in their classrooms. Students actively adopt their teachers' literacy attitudes (Adams & Pegg, 2012; Moje, 1996; Park & Osborne, 2006). Teacher attitudes also influence the likelihood of using reading strategies with their students (O'Brien & Stewart, 1990).

Pre-service teachers are often resistant to the idea of using literacy in the content area (Lesley, 2014; O'Brien & Stewart, 1990), with some even believing literacy instruction should not occur at the secondary level (Hall, 2005). Another commonly articulated belief of in-service teachers is that literacy instruction should fall only to elementary and middle school teachers (Shanahan & Shanahan, 2008). Another barrier cited by in-service teachers is the attitude that literacy integration takes too much time (Baker et al., 2008; Hasselquist & Kitchel, 2016b; Moje, 2008; Phelps, 2005).

Agriculture teachers have specific attitudes regarding literacy’s role within the content area. In-service teachers agreed that incorporating literacy skills takes too much time (Hasselquist & Kitchel, 2016b). They have historically believed literacy was supplemental to the content area (Park et al., 2010). However, they also strongly agreed literacy instruction belongs in all classrooms (Hasselquist & Kitchel, 2016b). Pre-service teachers viewed literacy as counter to the “hands-on” nature of agricultural education (O'Brien & Stewart, 1990). Current research in agricultural education has indicated in-service teachers are experiencing positive changes in literacy attitudes and training (Hasselquist & Kitchel, 2016b). However, due to the lack of current research, it cannot be determined if pre-service are experiencing the same changes in their attitudes and beliefs. Timely research is warranted to determine if literacy attitudes are changing at all stages of the profession.

Classroom Literacy Experiences

Classroom Literacy Experiences involves the subjective classroom literacy norms of pre-service teachers. Apprenticeship of observation occurs when teachers use concepts from their experiences as students to guide their practice as teachers (Darling-Hammond & Bransford, 2005). The stress of being an early career teacher often causes them to rely on the apprenticeship of observation during lesson planning (Eraut, 1994). Agriculture teachers are no different. Even mid and late career agriculture teachers use their experiences as secondary students to inform their classroom practice (Rice, 2015). For pre-service teachers, the perception of what is acceptable in a high school classroom is limited to personal experiences as students (Spitler, 2011). It can be argued the more pre-service teachers are exposed to literacy as secondary students the more likely they are to rely on it as classroom teachers. Their experiences in and out of the agriculture classroom could be influential to their practice.

School District Policy

Perceived behavior control is the final component of influence. A school district’s literacy policy has the potential to influence how much, if any, literacy activities are incorporated to the agriculture classroom. In-service agriculture teachers noted administrative pressure to include reading strategies in their classrooms (Park & Osborne, 2006). Because of this pressure, it is important to note a majority of agriculture teachers work in districts with stated literacy initiatives (Hasselquist & Kitchel, 2016b). Additionally, pre-service teachers believe school policy will directly influence whether or not they implement literacy in their classrooms (Hall, 2005).

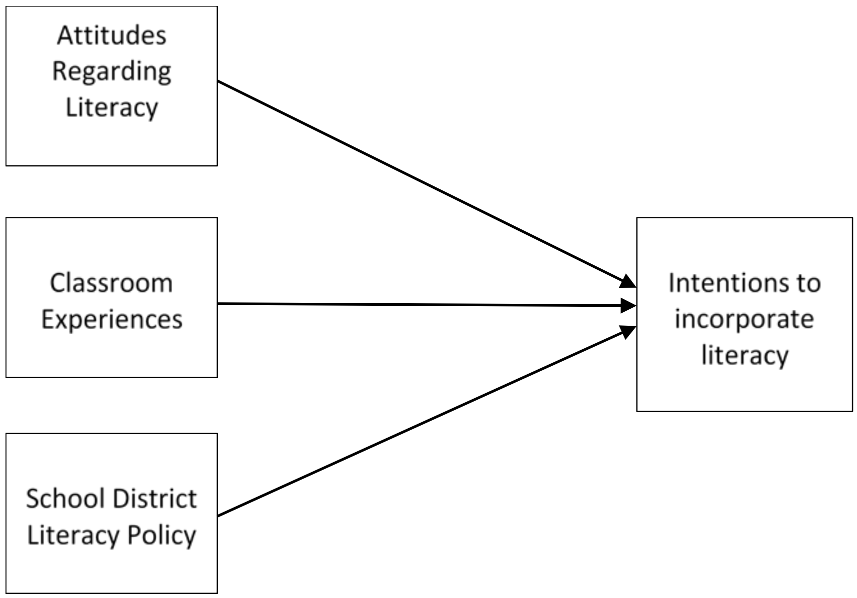

Figure 1. Conceptual model illustrating the relationship between literacy experiences, attitudes and beliefs regarding literacy, beliefs about school district policy's influence, and literacy integration intentions.

By better understanding what factors influence pre-service agriculture teachers' literacy intentions, teacher educators can provide meaningful experiences to help bolster their literacy intentions. The first step to incorporating literacy in a classroom is to understand and develop intentions to guide those actions. Agriculture teachers cannot shy away from incorporating literacy into their classrooms. To become literacy implementers they must develop their incorporation intentions.

Purpose & Objectives

The purpose of this exploratory study was to describe the relationship between classroom literacy intentions and the potential literacy-related influencers of pre-service agriculture teachers. The following objectives guided the study:

1. Describe the perceived levels of literacy attitudes and beliefs, literacy related experiences, and beliefs about school district policy of pre-service agriculture teachers
2. Describe the classroom literacy intentions of pre-service agriculture teachers
3. Determine of a linear relationship exists between classroom literacy intentions and literacy attitudes and beliefs, literacy related experiences, and beliefs about school district policy

This study aligns with Priority #5 of the National Research Agenda: Effective Agricultural Education Programs (Roberts, Harder, & Brashears, 2016). Integrating literacy activities into all content areas, including agriculture classrooms, is broad educational initiative. To help pre-service agriculture teachers become classroom teachers who integrate literacy, we must first explore their intentions and factors of influence.

Methods

A relational survey was developed for all pre-service agriculture teachers enrolled at the University of Missouri. A list of individuals (*N* = 63) was obtained and a time and place sample was utilized. Individuals in a specific group during a specific time are representative of similar groups during similar times (Oliver & Hinkle, 1982). By using time and place sampling the results of this study can be generalized to future pre-service agriculture teachers enrolled at the University of Missouri. The average participant was 19.97 years old (*SD* = 1.35), female (73.8%), of freshman standing (26.2%), had taken at least one high school agriculture course (97.6%), and had not completed a reading the content area course (52.3%).

A researcher-developed questionnaire was utilized for this study. The items were constructed using a Likert-type scale (1 = strongly disagree to 5 = strongly agree). Sample items from the instrument include: “My future school district’s policy will determine how much I incorporate literacy” and “Reading can help students learn agriculture content.” The face and content validity were established using a panel of experts having experiences with pre-service agriculture teacher (*N* = 5). Based on panel suggestions, the attitudes and experiences construct was subdivided into the teacher attitudes construct and the classroom experiences constructs. A panel of pre-service agriculture teachers (*N* = 4) were also consulted to establish face validity. Due to possible participation and the potential to develop bias, the pre-service teachers were only the given the instrument, not the rationale. They were asked to identify any items needing clarification. They recommended only one slight wording change, which had been previously identified by the other panel of experts.

Reliability was established by conducting a pilot test of the instrument on undergraduate agricultural education students from a different institution (*N* = 35). Cronbach’s alpha was calculated. The constructs of personal attitudes, literacy’s role in agricultural education classes, classroom literacy intentions, local district influence, attitudes concerning literacy outside of English class, and professional attitudes and beliefs regarding literacy had scores ranging from .70 to .85. The constructs of reading experiences in agriculture classes and literacy activities encountered outside of English class had reliabilities of .65 and .68 respectively. Due to the exploratory nature of this study, both constructs were deemed acceptable by surpassing the recommended estimate of .60 for exploratory work (Hair, Anderson, Babin, & Black, 2010; Nunnally, 1967).

Data were collected in the fall of 2016 via Qualtrics. An initial email and five follow-up reminders yielded an initial response rate of 58.7% (*n* = 37). To control for non-response error, a random sample of 20% (*n* = 5) of the non-responders were contacted and asked to participate in the study (Miller & Smith, 1983). A Mann-Whitney *U* test was conducted to determine if there were any statistical significant differences between non-responders and responders. Only one construct (beliefs about literacy’s role in agricultural education) out of the eight tested indicated a difference. The researchers combined responders and non-responders for a final response rate of 66.6% (*n* = 42). Caution is warranted as some non-respondent error may exist within the beliefs about literacy's role in agricultural education construct.

Data for objective 1 and 2 were calculated using frequencies, mean scores, and standard deviations. Objective three was calculated using a backward hierarchal regression. To control for the Reading in the Content Area (RICA) course's potential influence, which was outside of the framework but found to have influence (Park & Osborne, 2007), completion of the RICA course was entered into Block 1 and with other variables loaded into Block 2. An alpha level of .05 was established *a priori*. Collinearity diagnostics were examined and it was determined no instances of multicollinearity existed.

Results

Objective one sought to describe the perceived levels of literacy related experiences (literacy experiences outside of English class and reading experiences in agriculture classes) and literacy attitudes and beliefs (attitudes about literacy activities outside of the English classroom, professional literacy attitudes and beliefs , the role of literacy in agricultural education, and personal literacy practices), and beliefs about the school's district literacy policy of pre-service agriculture teachers (see Table 1). The mean scores of for perceived literacy related experiences and literacy attitudes and beliefs were higher than 3.0 on a 5-point scale.

Objective two sought to describe the perceived classroom literacy intentions of pre-service agriculture teachers (see Table 1). The participants strongly agreed (*M* = 4.04; *SD* = .76) they have the intention to incorporate literacy activities into their classrooms.

Table 1
Mean and Standard Deviation for Literacy Experiences, Literacy Attitudes and Beliefs, School District Policy, and Literacy intentions (n = 42)

Variable	*Mean*	*Standard Deviation*
Classroom Literacy Experiences		
Reading in Agriculture Classes	3.02	0.99
Literacy Activities Outside of English Class	3.96	0.71
Literacy Attitudes and Beliefs		
Literacy Outside of English Class	4.21	0.63
Role of Literacy in Agricultural Education	4.28	0.61
Professional Attitudes and Beliefs	4.35	0.60
Personal Literacy Practices	3.68	0.75
District Policy	3.91	1.02
Classroom Literacy Intentions	4.04	0.76

Note. 1 = Strongly Disagree, 5 = Strongly Agree
Respondents were asked to what degree they agreed they were engaging with or had experienced the above variables.

The third objective sought to determine if a linear relationship existed between classroom literacy intentions and perceived literacy experiences, attitudes and beliefs, and beliefs regarding school district policy. A backwards hierarchal regression was calculated with completion of the

Reading in the Content Area course being entered in the first block and all other variables entered in the second (see Table 2). The analysis resulted in a statistically significant model (p = .001) accounting for 63.0% of the variance in the dependent variable of intentions to incorporate literacy into their classrooms. The statistically significant predictor was the construct regarding professional attitudes and beliefs about literacy. Classroom literacy experiences; attitudes and beliefs about the use literacy outside of the English classroom, role of literacy in agricultural education, and personal literacy practices; and beliefs about school district policy were determined not to be statistically significant influencers in this model.

Table 2
Hierarchical Multiple Regression of Literacy Intentions as the Dependent Variable and Constructs related to literacy experiences, literacy attitudes and beliefs, and beliefs about school district policy as independent variables (n = 42)

Variable	β	Std. Error	t	p
Model 1				
Constant		0.17	21.45	0.01
RICA Completion [b]	0.12	0.25	0.74	0.47
Model 2				
Constant		0.67	-0.65	0.52
Reading in Agriculture Classes [a]	-0.22	0.10	-1.76	0.09
Personal Literacy Practices [a]	-0.04	0.13	-0.32	0.75
Role of Literacy in Agricultural Education [a]	-0.04	0.22	-0.21	0.84
Literacy Activities Outside of English Class [a]	0.05	0.13	0.37	0.71
District Policy [a]	0.06	0.11	0.48	0.66
RICA Completion [b]	0.11	0.18	0.93	0.36
Attitudes- Literacy Outside English [a]	0.21	0.20	1.19	0.24
Professional Attitudes and Beliefs [a]	0.71	0.22	4.03*	0.00

Note. Model 1 $R^2_{\text{Adj.}}$ = -1.3%; Model 2 $R^2_{\text{Adj.}}$ = 63.0%
* $p < .05$
[a] 1 = strongly disagree, 5 = strongly agree
[b] 0 = no, 1 = yes

Limitations

This study has several limitations. First, it focused only on pre-service teachers at the University of Missouri and cannot be generalized to other institutions. Participant responses regarding incorporating literacy into their future classrooms may be inflated due to social desirability bias. Agriculture teachers recognize the importance of literacy skills in their classrooms, but it does not lead to higher implementation rates (Hall, 2005; Hasselquist & Kitchel, 2016a; Park & Osborne, 2006). Caution should also be exercised when applying the results of the attitudes about literacy's place in agricultural education construct to non-responders since there was a statistically significant difference between the two groups. However, it is important to note this factor was not a statistically significant influencer in this model.

Discussion

Objective one sought to determine pre-service agriculture teachers' literacy experiences, their attitudes and beliefs concerning literacy, and beliefs about how school district policy might influence literacy integration. The participants all agreed they have experienced literacy activities in a variety of content areas and used reading within their agriculture classes. The use of reading activities by agriculture teachers is consistent with previous studies (Hasselquist & Kitchel, 2016b; Park & Osborne, 2006). They also agreed they had positive attitudes about personal literacy practices which is consistent with literature (Hasselquist & Kitchel, 2016b). They also agreed their future school district's policy would have an influence over how much they incorporate literacy activities into their classroom, which is consistent with previous research (Hall, 2005). They had positive attitudes regarding literacy activities outside of the English classroom and literacy's role within agricultural education, which is consistent with previous studies (Hasselquist & Kitchel, 2016b). Finally, the participants strongly agreed literacy is the responsibility of all teachers, which is consistent with prior research (Hasselquist & Kitchel, 2016b). Pre-service agriculture teachers have experienced literacy activities outside of the English classroom and are developing positive attitudes and beliefs about literacy. The development of positive literacy attitudes is an encouraging trend. Traditionally, pre-service agriculture teachers have rebuffed the idea of literacy because they felt it directly contradicted the hands-on nature of agriculture (O'Brien & Stewart, 1990). This attitudinal softening may indicate changes in how pre-service teachers perceive literacy and its role concerning the hands-on nature of agricultural education. Efforts should be made to sustain this trend by promoting literacy's importance within the content area. It is important to continue to make pre-service teachers aware of the variety of literacy based activities they regularly encounter. By increasing their awareness, we can hope to increase their efficacy with literacy activities which leads to increased implementation (Adams & Pegg, 2012; Santamaria et al., 2010; Spitler, 2011).

From objective two, it can be concluded pre-service agriculture teachers moderately agree they plan to incorporate literacy activities into their classrooms. Pre-service teachers should be encouraged to incorporate literacy into microteaching experiences to help build efficacy and confidence with a variety of activities (Park & Osborne, 2007; Santamaria et al., 2010). Agricultural education cannot afford to ignore literacy and its importance for students. Career and technical education fields, like agricultural education, have prided themselves on producing college and career ready graduates for years and being literate within the discipline is a key component of readiness. Research should be conducted to determine what types of literacy activities pre-service teachers plan to incorporate and how they are selected, with special attention on examining if selection is based solely on familiarity, or if they are beginning to develop basic pedagogical content knowledge regarding literacy, or if it is for some other unknown reason.

Objective three sought to determine if a linear relationship existed between classroom intentions and the areas of literacy experiences; attitudes and beliefs about literacy; and beliefs regarding school district literacy policy. It can be concluded professional attitudes and beliefs regarding literacy has a statistically significant relationship with pre-service teachers' literacy intentions. Previous research has indicated in-service agriculture teachers have positive professional attitudes regarding literacy (Hasselquist & Kitchel, 2016b). The professional attitudes and beliefs construct focused on idea that literacy is the responsibility of all teachers, belongs in all classrooms, and helps students learn. In the CCSS era, with increased accountability and high stakes testing, agriculture teachers must incorporate literacy. Therefore, teacher education programs should make time to underscore and describe literacy's positive role in agricultural education. Teacher educators should model literacy behaviors for pre-service teachers to build positive attitudes and intentions to include literacy in the classroom. Given the recent emergence of content area and disciplinary literacy, teacher educators may need to find resources themselves to effectively teach these skills to pre-service agriculture teachers. Teacher education programs need to embed literacy activities to illustrate the fact literacy supports and is an authentic part of good teaching. While Reading in the Content Area-style courses give pre-service teachers a basic understanding of literacy, it also gives them a narrow prospective. It falls upon agriculture teacher educators to help pre-service teachers understand and realize how intertwined and necessary literacy is to the content area. They need to send the message literacy integration is not an extra, but a necessary part of the classroom.

This area would benefit from further research. A qualitative study should be conducted to better understand how pre-service agriculture teachers develop their beliefs about the role of literacy in agricultural education. Research indicates they begin to develop those beliefs in the high school classroom (Rice, 2015), but what specific experiences shape them? Pre-service teachers acknowledged their high school agriculture teachers used literacy, therefore field research should be conducted to determine what literacy practices are taking place. Special attention should be paid to writing activities and how agricultural teachers utilize texts to determine if student perceptions match reality. Finally, longitudinal research should be undertaken to determine if pre-service teachers follow through on their intentions. The first year of teaching is one of immense professional growth and change, are their literacy attitudes and intentions affected as well?

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Student-related Expectations and Experiences Prior to, During, and After Completing a Congressional Internship Experience.

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Abstract

Congressional internships provide opportunities for students to gain firsthand knowledge of how the U.S. government functions. Past the basic understanding of what the internship might provide for a student, analysis of the experience is necessary to better understand students' expectations and the benefits and barriers of the internship experience. The purpose of this study was to identify the motivations for students' interest in a congressional internship, outcomes of the experience, and the situational and contextual considerations that may affect those outcomes. A qualitative, grounded theory analysis through a comparative method of open, axial, and selective coding was utilized to reveal students' expectations, shared experiences, and student outcomes. Documents, artifacts, and researcher's notes regarding 58 students who interned in Washington, DC in the spring, summer, or fall 2015 semester through one of two Texas Tech University (TTU) congressional internship programs were analyzed. The results revealed a framework of internal motivations and internship-specific factors that influence students' personal growth from the internship. Additional recommendations for research and practice are provided.

Introduction/Conceptual Framework

Apprenticeships and residencies offer career-entry opportunities through training and hands-on experience. Like a residency, internships emerged from the apprenticeship model. However, the internship was not intended to comprehensively train an individual to enter into a career but rather give him or her an idea of what a career in the field might entail.

The concept of the internship began early in the twentieth century. According to Spradlin (2009), at that time, businesses utilized messenger or copy boys. It was not until the 1960s that internships became commonplace throughout American higher education (Gross, 1993). "As the need for knowledge workers increased, so did the importance of the internship" (Spradlin, 2009, para. 10). Business schools first initiated the concept of an internship, and businesses would use the opportunity as a recruiting tool for high quality students with some occupational experience after completing an internship. In fields like communications, business, and entertainment, internships were also utilized as networking opportunities (Gross, 1993).

In the late 1970s and into the 1980s, more college and universities established internship programs and encouraged their students to participate (Spradlin, 2009). To make the opportunities more productive and worthwhile for the students, universities and colleges began to offer course credit for internships, and advisors promoted the internship experience as a way for students to get ahead when competing for jobs. As internships rose in popularity, students began to use them as opportunities to test-drive careers (Spradlin, 2009) and utilize an internship like the apprenticeship model for career entry (Gross, 1993).

As the internship trend grew throughout the 1980s, students continued to view internships as valuable learning experiences. Participants felt they should receive academic credit for the internship, be financially compensated, and earn only a pass/fail grade (Hite & Bellizzi, 1986). Students also felt that internships are a more valuable learning experience than case teaching, but that formal training should be provided at the beginning of internships and direct supervision be present throughout. Students felt that internships may lead to permanent positions within the company where the internship takes place. Interns benefited from increased professional contacts, leadership skills, attitudes about self, job placement, and pay. The benefits of cooperative education increase motivation for further study in the student's chosen field, clearer understanding of theory, practice, and development of skills, increased relevance of existing knowledge, and a more realistic view of the workplace (Hite & Bellizzi, 1986). Additionally, Cannon and Arnold (1998) found that students not only see internships as a learning experience, but as a way to gain a competitive edge in the market place.

As the need for highly-technical skills progressed, cognitive apprenticeships emerged to provide an apprentice a complementary regimen of both formal, higher education classroom instruction and hands-on training. "Cognitive apprenticeship focuses on the development of learning and skills beyond the apprehension of subject matter content" (Cash et. al, 1997, para. 8). A cognitive apprenticeship at the college level has proven to provide higher-level thinking proficiencies and skill transferability capabilities (Cash et. al, 1997).

The congressional internship experience and programs on Capitol Hill have grown in number and popularity with many colleges, universities, and foundations having formal congressional internship programs (Gryski, Johnson, & O'Toole, 1987). Originally, these internships were limited to students who were seeking a degree in the political science field (Gryski, Johnson, & O'Toole, 1987), but have since spread to all disciplines (Fleishman, 2004).

Despite the popularity and resources dedicated to congressional internships and the participants, Hedlund (1973) stated the literature has largely ignored questions regarding the scope, structure, and strategies of congressional internship programs. "Anyone concerned with how students respond in these settings or with what can be done to maximize student learning would find little assistance in the journals, books, and monographs" (p. 19). Hedlund (1973) also found that the work a congressional office assigns an intern may affect a student's experience along with the size and specialization of the office. While the literature highlights the importance and appeal of a congressional internship to complement time in the classroom and supplement the job search, it does not focus extensively on the type of student that could be successful in a congressional internship setting, the proper and tried structure for the internship, appropriate office placement process, or support systems for the intern.

Purpose and Objectives

At Texas Tech University (TTU), the objectives of the congressional internship program are to provide students, who have an interest in government and public policy, the opportunity to participate in public service by observing and contributing to the legislative process. This study sought to reveal potential personal and professional development changes in university students as a result of completing a congressional internship in Washington, DC. To explore this phenomena, the following research objectives were used:

1. Describe students' motivations to apply and expectations for a congressional internship experience prior to their start in a congressional internship assignment.
2. Describe the students' workplace and contextual congressional internship experiences and related changes that occurred during the internship term.
3. Identified the areas in which the students' experience personal growth or change as a result of the congressional internship experience.

Methodology

A qualitative grounded theory approach was used to design this study. With little previous research on the topic and the need for a better understanding of what students' experience and gain from the internship, a grounded theory approach allowed for the potential development of a model or theory based on the unique experiences, thoughts, and views of the programs' participants (Creswell, 2009) as it allows themes to emerge from the data as the study progresses (Glaser & Strauss, 1967). Substantive grounded theory may be developed for a specific group or use (Glaser & Strauss, 1967) and "relates to a specific phenomenon in the context of a clearly identified group of individuals" (Birk & Mills, 2011, p 156).

To better understand a congressional intern's experience, a researcher must also understand how an intern constructs meaning in his or her own world in regards to the internship experience (Glesne, 2011; Merriam, 2002). To this end, the researchers utilized constructivism as a philosophical approach to the study. Constructivism recognizes that an individual will view and experience a situation differently (Crotty, 2004) and accepts reality as a construct of human mind, therefore reality is perceived to be subjective (Dudovskiy, 2016). However, while an intern might experience the situation differently creating their own reality, he or she is still part of the same overall internship experience. Because of the uniqueness of a congressional internship, this study is not intended to generalize the data to internship opportunities in specific disciplines, industries, or other public sectors. Instead, this qualitative study allows for a comprehensive understanding of this particular phenomenon (Erlandson et al, 1993).

In qualitative research, multiple data sources should be used to strengthen the findings of the investigator (Creswell, 2013). In this study, the researcher utilized interview notes, direct observations by the researchers in interviews with students and one trip to Washington, D.C. during each internship period, weekly journal entries, and final experience paper from the individual students limited to the period from when they applied for the program until they completed the final requirements for the internship. TTU's Institutional Review Board (IRB) approval was obtained prior to analyzing the data for this study. Though not required, interns were encouraged to use the hashtag "#ttuingov" when posting to social media sites, such as Facebook, Instagram, or Twitter, when sharing something about their experience in the office, in the city, or related travels. Besides providing an easily searchable option for looking back at social media posts, the hashtag allowed for sharing accessibility for the researcher, coordinators, and course instructor to follow.

Throughout the research process, the researcher kept a journal to reflect on the process, reactions, and reflections. The journal was used as a complement to the journals and coursework, observations, field notes, and social media posts. The journal served as an additional data point to help the researcher better understand the themes as they emerged (Creswell, 2013). The varying data sources allowed for the researcher to consider the interns' diverse views on the experience and multiple realities. This holistic and complex consideration of the views of the students' regarding their experiences results in a multifaceted look at the outcomes of a students' time in the congressional internship position.

Participants were limited to those who completed the internship program in Washington, DC during the spring, summer, or fall 2015 semesters (January 2015 - December 2015) with individual data beginning with the application and interview selection process until all requirements for the internship were completed. The resulting population included 58 students. Participants were not selected at random, because purposive sampling allows for the researcher to discover patterns that exist within a particular phenomenon (Erlandson, et. al, 1993; Lincoln & Guba, 1985). Because students were not told of their participation in the study, the confidentiality of their participation was held to the highest standard. Pseudonyms were assigned to each participant to protect their identity and their responses from being identified in any way. Of the 58 participants, there were 38 females (65.50%) and 20 males (34.50%). The youngest student was 19 years old at the start of the internship, and the oldest was 27 with an average age of 21.7 years. There were 11 graduate students (19.00%) and 47 undergraduates

(81%). Students selected represented the following colleges: (a) [Agriculture] (*n* = 13; 22.41%); (b) [Arts and Sciences] (*n* = 15; 25.86%); (c) [Business] (*n* = 7; 12.06%); (d) [Education] (*n* = 6; 10.34%); (e) [Engineering] (*n* = 5; 8.62%); (f) [Honor's] (*n* = 5; 8.62%), and (g) [Media/ Communication] (*n* = 7; 12.06%).

A comparative method of open, axial, and selective coding was utilized. This method allowed for development of categories, emergence of how the categories connect, story development, and the acknowledgment of possible themes and theories (Strauss & Corbin, 1990). Open coding was utilized as broad categories were identified through the prevalence of phrases, terms, and concepts (Creswell, 2013). From the open coding, axial coding was then utilized to further organize the concepts, codes, and phrases. Continuous review of the data helped to ensure that potential themes were not missed. Final themes were created through continuous comparison and refining of the open and axial codes. Utilizing coding allowed the researcher to create relational categories (Glesne, 2011) and allowed for the data to be reviewed in an effective and efficient manner (Miles, Huberman, & Saldana, 2014).

Trustworthiness in qualitative research is essential to ensure rigor, confidence, and validity (Lincoln & Guba, 1985). To ensure trustworthiness, credibility, transferability, dependability, and confirmability should be considered. To meet credibility standards, triangulation of the data was used to ensure the understanding and context of the information gathered (Erlandson et al., 1993, Lincoln & Guba, 1985). Peer debriefing was also utilized to ensure objectivity and fresh perspective from experts in the field, within the internship programs, and with knowledge and experience withing qualitative research (Erlandson et. al, 1993). To ensure transferability, rich, thick descriptions were used to help the reader feel as if they were undergoing what the interns experienced. If the reader has a better understanding of the phenomenon, he or she is able to decide if the findings are transferable to his or her situation (Lincoln & Guba, 1985). To achieve dependability, it is important to keep an audit trail of all documents, artifacts, notes, and other data sources. For this study, an audit trail was maintained and could be retrieved and referenced. Confirmability may only be achieved when credibility, transferability, and dependability have been established (Lincoln & Guba 1985). In this study, a researcher's journal was kept to document the investigator's comments that explained how findings were interpreted and how bias was managed (Creswell, 2009) which was part of the audit trail (Lincoln & Guba, 1985).

Findings

Research Objective One

Students who participate in the program hoped to earn an internship for a variety of reasons. Throughout the interview process and in the orientation sessions, students discuss their motivations for applying. Four themes illustrating the student's motivation were identified.

Adventure.

In the interview process, 43 students (74.13%) discussed their interest in adventure, exploration, and the desire to explore Washington, DC. Just over half of the students (*n* = 31; 53.44%) selected for the three terms had been to Washington, DC before. There were four students (6.89%) who had never been on an airplane. Of the students, 24 (41.37%) had traveled abroad, and 19 (32.75%) of those students had at least one study abroad experience. There were four first-generation college students making up 6.89% of the participants. From notes taken from Rachelle's interview, a fall intern, she said:

> *I went to DC in high school on a class trip, and we saw a lot of the monuments. But, I want to see it all again.*

Stephanie, a summer intern, interned in DC the second half of the summer, because she was interning in China the first part. During her interview, she said:

I want to see and experience as much as I can. I love a good adventure.

Resume builder.

All of the students saw the internship as a strong resume builder for their future. Jerod said he was not sure if he wanted to be a lobbyist, but he could see why the internship was a career-entry opportunity. Jerod also said he knows he needs more on his resume. In the interview, he stated that he has worked hard to maintain the high GPA that he has, but he has not participated in as many extracurricular activities. He wanted the internship to help supplement where he felt there was a gap.

> *I'm proud of my grades, but I haven't been the most social college student. I have a core group of friends, but I haven't really gotten involved. I think this internship would help with that.*

Of those selected, 48 (82.75%) of the students had two or more extracurricular activities on their resumes, which often included a leadership role, and 19 (33.75%) had a part-time job. Just under half of the participants (n = 28; 48.27%) had at least one prior internship. Stephanie, a summer intern, and many of her fellow interns sometimes felt overextended with all of their activities and mentioned that the only time she could go to DC was in the summer, because she was triple-majoring and still hoping to graduate in three and a half years. In her interview, she said that if she's going to participate in something, she wanted to do it to the best of her ability, and she admitted to not getting much sleep.

> *Sleep isn't something I get a lot of, but I guess that's okay. I didn't come to TTU to sleep.*

Networking.

Many of the selected students saw the internship programs as a networking opportunity and applied to the program to meet new people. Students were intrigued by the possibility of meeting and working with members of Congress. In Sam's interview, he said he had aspirations of going to law school on the East Coast. In his final paper, he found out he had been accepted to the school while on the internship:

> *I don't know if I would have been as successful getting into law school on the East Coast if I hadn't met all of these people.*

Kelly, a summer intern, in her interview said that she has a "major political crush" on a Texas senator. She felt that working for the member or at least meeting the Senator could open doors for her in the future. Kelly did go on to intern for the Senator, but she never got to meet the Senator during her time there. In one of her final journals, Kelly did express frustration for not meeting her boss:

> *I know the Senator is busy, but I wish he could make more time for the interns. This has still been a good experience, and I know I have made connections elsewhere. I did really want to get a picture with him though!*

Interest in politics.

In the interview and orientation processes, many of the students expressed an interest in politics. Of those selected, 43 (74.13%) students said they had an interest of going into politics in the future. Of those, less than a quarter had worked on a campaign on the local, state, or national level. There were six students who mentioned an interest in public service. Just over half of the students considered themselves to be avid followers of the news. Some of the students said they knew very little about the political process at all. In spring intern Liz's interview, she mentioned that she does not do a good job of watching the news, and past her political science and history lessons, she did not know much about the legislative process. She also said she had never voted in an election before. She was interested in the program because she wanted to be more aware and engaged with the legislative process. Liz had aspirations of applying to the Peace Corp in the future, and thought the program might be a good way to build her resume, network, and gain insight into the Peace Corp program.

Some students proclaimed to be political gurus. Anthony, a fall intern, said that he watches Fox News constantly. His father and grandfather both ran and at one point held local, elected positions in his hometown. In the future, he would like to run for governor of the state he is from. Anthony had worked on a campaign before, and specifically asked to work in that member's congressional office. In his interview, Anthony said that politics is in his blood, and he wants to be a politician in the future.

Research Objective Two

During the spring and fall semesters, the internship duration runs parallel to a course semester, but does not coincide exactly with the start and end dates of TTU's academic calendar. Some congressional offices would like students there earlier or later in the semester. Summer internships are more of a jigsaw puzzle, because the internship times are shorter and some congressional offices or committees try to accommodate more interns during the summer months. An intern could spend anywhere from four to 10 weeks in a congressional or committee office. In some cases, an intern might also split their summer between two offices.

Office responsibilities and confidence.

The longer a student was in Washington, DC, the more responsibilities an office typically gave him or her. During the first three to four weeks of their experience, interns described their primary internship tasks as including answering phones, filing and cataloging incoming information to the office, and running errands. As the students' internships progressed through the term, their confidence in themselves and their tasks would often grow. Kyle, a summer intern in his first week, wrote:

> *I answered a million calls this week and said the same thing over and over and over. You can tell when a constituent is watching Fox news, because we have Fox on in our office. They are calling about the same thing that is on TV. I'm still trying to better understand all of the issues they call about. Maybe I will do better next week, but I better watch the news more this weekend.*

If an intern was in the office for a longer period of time, the office would sometimes put more faith into their abilities and allow more complex tasks. During her eighth week in the office, fall 2015 intern Caitlin wrote:

> *I got to write floor remarks for the Congressman this week! Because of my major, my communications director knew I had an interest in the topic that he was going to address on the floor. My comments will actually be logged into the House archives, because he'll read them word-for-word when they take the vote. I can't believe I'll be published in the archives. It won't say my name obviously, but I'll know it's there.*

Casside, a fall intern in her second week, wrote that she was uncomfortable with her capabilities at the beginning of her internship.

> *I just don't think I know enough to be here. I can't answer callers' questions, and I get lost all the time.*

The sixth week of the internship, the researcher traveled to Washington, DC. During the trip, the researcher was able to observe Casside in her internship office and talk to her during a dinner the TTU hosted to thank the interns for their time on Capitol Hill. In the office, Casside seemed confident on the phone when answering questions, gave directions to the cafeteria to a constituent, and was the first to volunteer to guide a Capitol tour. At the dinner, Casside expressed her comfort in her internship and how much she liked Washington, DC. Casside, who graduated at the end of her time in the internship, had already started looking for jobs on Capitol Hill hoping to transfer her career exploration into career entry.

Office quality.

All of the offices in Washington, DC provide a unique experience for students. The congressional offices and committees may choose to structure their individual internship needs to what will work best for their situations (Eckman, 2016). Some offices, especially in the summer, will choose to host a multitude of interns. Some offices purposively choose to keep their intern numbers lower. Offices may also choose what types of work they want their interns to accomplish. In 100% (*N* = 58) of the journals and final assignments, students who worked in either a congressional or committee office discuss answering the phones, greeting individuals who come in their offices, filing paperwork, and sorting through emails.

For students who work in offices with an average of three of more interns during the internship period, there is a smaller chance for additional work beyond administrative duties. Of all of the participants, 19 (32.75%) of the students were placed in an office with a large intern employment. Of those 19, 26.31% (*n* = 5) were summer interns. Kay, a summer intern who worked in an office with six other interns, said:

> *I wish I could do more than answer phones. It gets a little old, because the day can go by so slow.*

Dailey, a spring intern, worked in an office with only one other intern. He wrote:

> *Even during recess (when Congress is not in session), I'm busy. I love it, especially now that my LA (legislative assistant) allows me to do more research for his bill prep.*

However, as discussed by Hedlund (1973), the intern makes the experience. Chris, a spring intern, was in an office that employed more than six interns at a time. In his final assignment, he wrote:

> *There was not always a lot to do in the office, especially during the slow times. But, the office didn't mind if I went and explored the Capitol or other House buildings. I probably saw more of the Capitol grounds than any other intern, because I was willing to go exploring.*

Washington, DC areas experiences.

During their orientation, students are encouraged to explore Washington, DC, travel to surrounding areas, and take advantage of networking opportunities. As they explore, the students' exploration and attitude toward the internship and living arrangements can sometimes be affected by the weather. Ashlee, a spring intern, along with her fellow students, were faced with a massive blizzard in January that shut down Capitol Hill and much of the city three weeks into their internship experience. Ashlee wrote:

> *I am so tired of being stuck in this house, and I hate the snow. I miss my friends in Lubbock, and I'm not certain I made the best decision coming here. When we are at work, all I do is answer phones. My roommates are annoying and messy. I don't think this semester is ever going to end, and it's barely even started.*

In Ashlee's final paper at the end of the spring semester she wrote:

> *This internship has been some of the best months of my life! I can't wait to graduate and come back to DC. I'm going to miss going out and going to brunch with my roommates…I couldn't have been in a better office for my internship. I feel like I've learned so much. I'm not ready to leave DC!*

Scott, a summer intern, wrote in his final paper:

> *I am going to miss running at the National Mall every morning. It was too hot to go after work, but if I dragged myself out of bed before work, I loved to run by the monuments.*

He also said he enjoyed the traveling.

I will also miss traveling every weekend to cool places every weekend. It's harder to do that in Texas. I also got to go to Yankee stadium, and see the Rangers in DC when they played the Nationals.

Brandon, a summer intern, utilized the hashtag "#ttuingov" throughout the summer to document his time in the city and surrounding area. Brandon and other interns would use the hashtag when exploring the city with their roommates, coworkers, family, and other friends. On the seventh week of his internship, on Facebook, Instagram, and Twitter, Brandon posted a picture at the Lincoln Memorial.

Honestly, I'm going to miss hanging with my man Abe. #ttuingov

Research Objective Three

Because of the interns' various experiences, time in the internship, and expectations for the internship, outcomes may vary. However, there were several commonalities and standouts within the students' educational and social experiences. In students' assignments for the semester, amongst other projects, students were asked to complete weekly journal entries and a final paper that discussed their overall experience. Students were told that the content of these papers would not be graded because the programs hoped that students will give honest, thoughtful responses regarding their experiences, feelings, and opinions.

Confidence and maturity development.

The coordinators and administrators of the programs initially select students based on many holistic factors, including the presumption and assertion of the students' confidence and maturity throughout the interview process. Knowing that the program is sending competent, mature students to Washington, DC is of pivotal importance to ensure the programs' strength, continuation, and synergistic relationship. During the interns' time in Washington, DC, in the offices, and the Tech House, their maturity and confidence continues to grow.

At the beginning of her internship, Kate, a fall intern, called the internship program coordinator crying, because she was unable to get into the residence. Kate had just flown into Washington, DC by herself and was one of the first to arrive at the residence. The coordinator reminded Kate that she had an email with detailed instructions on how to enter the residence. After taking a moment on the phone to collect herself, Kate was able to access the email and gain entry. In her second week of the internship, Kate wrote that she was still feeling overwhelmed by the experience and was not sure if she would be able to improve. By the sixth week, Kate spoke about her excitement for the new projects she was being assigned. By the end of the semester, she was offered a job in the member's district office in central Texas upon her move back to the state. Later in the semester, Kate wrote about her experience of meeting a past Speaker of the House in a restaurant the Speaker went to every morning for breakfast.

After doing my research, I knew he went to this restaurant every morning, and I made it my goal to meet him before I move home. I finally convinced Whitney to come with me, and we went to the restaurant this morning. I didn't think he was going to show, and we were about leave to not be late to work, but he finally came in! I walked right up to him and asked for a picture. I don't think the Secret Service liked it, but I was so proud and excited!

Maturity and confidence not only grows in the office setting, but also with peers. The internship program residence holds up to 19 interns at a time. The students have expressed that it is normally fun to live with their peers and to have a built-in support system, but it also can be tedious at times. In the summer semester, three roommates all wrote about their frustrations with each other at the beginning of their time together in the house. They each individually discussed arguments, tears, and concerns. These students all lived in the same room and were interning for 10 weeks. By the end of their time in the city, they had learned to curb their frustrations with each other for the sake of all of their roommates and their own well being. Jessica explained in a journal during their ninth week together.

> *Things are still tense with Kimberly, but we have learned to let her be. I know my actions aren't going to change her attitude no matter what. We tried, and that's the best we could do. I'm glad I won't have to see her every day soon, but I'm proud of how we chose to handle the living situation.*

Students also gain confidence in social settings. Matt, who was admittedly not extensively traveled, was nervous about the Metro System, one of the city's public transportation options. In his first week, he wrote:

> *I can't figure that thing out. I was supposed to be on the yellow line, but somehow got on the blue. I guess if nothing else it was an adventure.*

Matt's confidence increased throughout the semester. By the end of the semester, in their final papers, some of Matt's fellow interns discussed one of their favorite experiences from the semester. Kyle wrote:

> *We went to New York last week for a baseball game. It was awesome! Matt planned the trip, and we just gave him money for our portion.*

On the trip, Matt posted a picture on social media of the three of them at the New York Yankees' stadium on posted to social media exclaiming:

> *Coolest trip ever! #ttuingov*

Skills development.

Social and work skills are both developed throughout the internship experience. Like Matt's ability to better navigate the Metro and plan a trip to New York City, interns are better able to manage their office duties, prioritize, and network. Rachelle, a spring intern, started her internship when Congress was in session, which makes things much busier on Capitol Hill, because the members are there. When Rachelle first started, in her second journal she wrote:

> *The phone rings off the hook, and I have so many emails to sort. I love how fast-paced it all is, but I don't think I do a good job of keeping up with it all.*

In the eighth week, she wrote:

> *I was named the lead intern today, so I get to schedule all the tour and flag requests. I love my fellow interns in the office, and I'm really proud they gave me this responsibility. It makes me feel like I've been doing a really good job.*

There were 51 interns (87.93%) who discussed how frustrating the phone calls are at the beginning of their time on the Hill. As their time progresses, their confidence in handling the calls and maturity of dealing with a tough constituent grows. Mike wrote on his fourth week:

> *My favorite angry constituent called today. Instead of wanting to argue with him, I'm finally starting to realize that he's just lonely. He's told me before that he retired, and I think he just wants someone to talk to…even if he isn't very nice.*

Networking capabilities.

In the students' internship experience, they are exposed to a multitude of networking opportunities ranging from members of Congress to peers. Within their course assignments, there are specific networking opportunities that encourage the students to connect with individuals that they meet at receptions, in their offices, other professional opportunities, and other social settings. However, through the interns' developing confidence, maturity, and skills, it is hoped that their network is also expanded on their own accord. Caitlin wrote about meeting with the member of Congress she worked for during her semester in Washington, DC.

> *We got to go to breakfast with the Congressman this morning! I've been waiting for this all semester, because our staff assistant told us he liked to do this with us. I had no idea he liked baseball so much, so we got to talk about my brother's team. He said next time he's at home he'd like to go see my brother play. I*

thought it would be really cool if he came to one of their games, and I already sent the schedule to our scheduler. Maybe he could throw out a pitch!

Not only do the interns have the opportunity to network with members of Congress, but also other professionals and their peers. Casside, in her final paper wrote:

I am really grateful for my staff assistant. Every time she hears about a job on the Hill, she forwards the description to me. When I find a job here, it will most likely be because of her. She said she wants to help me, because she remembers being in my shoes last year.

Professional networking can also prove to be fruitful. In Scott's time in Washington, DC, he attended post-work receptions that he was not only interested in, but also could prove to be beneficial to his future career plans. The third week of his internship, he wrote about an opportunity that laid way for a future internship opportunity.

After the reception, I emailed Mike (who he met at the reception) to follow up on our conversation. He's already sent my information on to their HR company. Hopefully, I'll get a call from them soon!

New perspectives.

Students participating in the internship were interested in learning and experiencing opportunities outside of their typical routine and comfort zone. Through the course syllabus, students are required to document at least one cultural experience during their time in Washington, DC. The experience may be a new food, trip, play, concert, poem reading, etc. Some of the interns embraced the experience, and did not find the task to be overwhelming. Kay discussed her excitement over trying Ethiopian food in one journal entry.

I didn't think I would like it, but I ate my whole plate and then some. I was nervous about the restaurant, but I'm definitely coming back again."

Professionally, students who participated in the program with strong political leanings and considered themselves highly knowledgeable about Capitol Hill sometimes struggled to see the bigger picture of the internship. For example, Anthony was a self-proclaimed "political guru" and closely aligned himself with one of the main political parties. Anthony would often try to discuss politics at the house with his roommates, and would often get defensive about differing viewpoints. Casside wrote:

I don't know why he wants to argue with her about politics. They aren't going to agree. Can't we just eat dinner in peace? I think she handles his questions professionally, but I understand when she gets irritated.

Like the cultural experience assignment, some students embraced the internship and the new lessons it could teach. Caitlin wrote:

I wasn't crazy political when I came to DC, and I still don't think I am. I think it's interesting to hear both sides of the story. I see why compromise is essential.

Public service and career paths.

For many of the interns, they felt that they have a clear plan for their future prior to starting the internship. For example, many intend to go to law or graduate school. Students aspire to working in "politics" as either an elected official, campaign manager, or high-level staff. This internship experience can prove to be a career path changer or starter for some students. In Ashlee's interview, she mentioned she had hopes of going to law school at TTU, moving back to Dallas, and working in a corporate law firm. However, during her internship she wrote that she caught the "DC bug" and did not want to leave DC.

I can't wait to graduate and get back to this city! I'm sure I might move back to Texas for good one day… but this city and working on Capitol Hill are so fun! If you work for the Senate, they will pay for some of your law school.

After I graduate, I'll start applying for jobs on the Senate side. I could go to law school here part time and still work.

Along with Ashlee, in their journals or the final paper, 18 (31.03%) of the students discussed catching the "DC bug" and had intentions of staying in Washington, DC immediately after their internship or plan to move back after graduation from TTU to continue working on Capitol Hill or in other facets of government. At the beginning of the internship, of those 18 students, less than half (n = 7; 38.88%) had hopes of living and working in Washington, DC long term. For the students who choose not to further their career on Capitol Hill, they still discuss the importance of what they learned in the internship and how they will carry that forward.

I don't think I want to come back to work in DC, but I'm glad I have a better understanding of how government runs. I know I'll vote in every election going forward (Scott).

In the interview process, 43 (74.13%) of the students mentioned one catalyst for applying to the internship is their interest in politics. Politics is defined as activities that relate to influencing the actions and policies of a government or getting and keeping power in a government; the work or job of people (such as elected officials) who are part of a government (Politics, 2016). Besides better understanding how our government works and working in politics, the interns also expressed interest in helping people. Jenny, a spring intern, said:

I'm a first generation college student, and I didn't come from a family with a ton of money. However, my parents taught me that people who are truly rich are the ones that go to work each day to help another.

Barry, a fall intern, whose immediate family held a statewide elected office in a Western state at the time of his applying for the internship, explained:

Politicians can be truly good people with the best interest at heart for their constituents, but it's the public servants that truly do the work of the people.

Public service is defined as something that is done to help people rather than to make a profit; work that someone does as part of a government: the work done by public servants (Public Service, 2016). As students progress through their internship experience, they begin to learn the difference between politics and public service and the type of work they might truly want to do in the future, but understand the importance of both. They also learn that both politics and public service are not always as glamorous as expressed on television or the movies. Going into the internship, Mike said he had an interest in working in politics and helping people. In his final paper, Mike wrote:

I think there is a big difference between what we do in the office and what you see on TV. When I first got here, I didn't know what to expect, but the Republicans and the Dems are friends. They may not always compromise, but they do all want to help their districts. They have different views, but are all working toward the same goal. They just want to get there in a separate way.

Conclusions & Recommendations

Congressional internships are unique experiences, because it gives students from a variety of backgrounds and academic interests an opportunity to learn more about the way the federal government functions. It also allows students networking opportunities, confidence building, and professional and career skills development. Whether students choose to remain in government or not as their careers progress, they do become more civically aware and possibly active in their lives and chosen career fields. As themes began to emerge throughout this grounded theory study, the researcher was able to focus on students' drive for participating in the internship, how their experience is shaped during their time in Washington, DC, and what they gain throughout the experience. Although all students' personalities and backgrounds are different, their interest in the program, motivations for applying, and their shared experiences while in Washington, DC create commonalities which helps the researcher to better understand how students' could be better recruited to the program and supported throughout their time in the program and after (Figure 1).

The initial motivation themes showed that students expected the internship to be beneficial, but did not realize all of the resulting personal growth they could gain from the experience including expanded marketable skills and growth in maturity and confidence. The research also illuminated potential barriers and circumstances that must be overcome to ensure a student maximizes his or her experience to fully achieve all of the potential personal growth. To ensure the full scope and possibility of the experience, Hedlund's (1973) assertion proves that the intern does make the experience. If an intern is willing to make the most of the experience and their situation, the Figure 1 themes may be achieved. A student's satisfaction in the congressional internship program and their internship office, may influence if they choose to shift from the internship's career exploration opportunities to possible career entry.

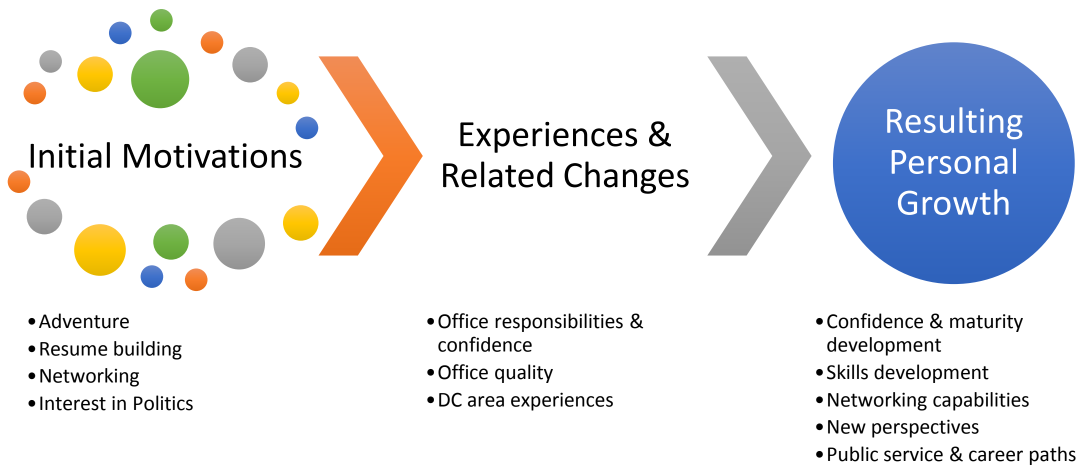

Figure 1: Congressional Intern Personal Growth Outcomes Resulting from the Student's Initial Motivation for the Internship and the Experiences During the Internship.

Because of the focus on TTU programs, research should be conducted to determine if other schools with formal congressional internship programs have similar findings with their interns. Program structure should be considered and the financial, academic, and housing support may be studied. Additionally, students' program satisfaction should be analyzed outside of a study where they are being graded. Even with student satisfaction currently considered, the needs and satisfaction of congressional offices should also be analyzed. At the end of the interns' experiences, intern coordinators are asked to fill out evaluations. The evaluation focuses on students' professionalism, overall experience, and areas for improvement. Because of this available analysis, office satisfaction could be studied to determine if Hedlund's 1973 assertion is true from the employer's experience as well.

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An Exploration of the Development of an Educational Instruction Specialization in a Post-Secondary Natural Horsemanship Degree Program

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Abstract

All university programs must to be willing to change and adapt curricula based on student needs and workforce readiness. To do so, academic programs must look towards alumni, current students, peers, and industry professionals for recommendations on how to better prepare students. The purpose of this study was to explore the development of an educational instruction specialization within a post-secondary Natural Horsemanship Degree program. Key informant interviews were conducted with university equine program directors (n=5), equine professionals (n=6), and university equine program alumni (n=5). Participants identified common skills, knowledge, and coursework to be integrated into this new educational instruction degree specialization. The primary needs were unique hands-on experiences, educational coursework on teaching and learning strategies, business management knowledge, and proficient technology skills. Additionally, educators must connect coursework with real world industry experiences through quality internships that lead to careers. Specialized educational instruction internships would help students network in the industry and make connections. This develops a renewed opportunity for agricultural educators to partner with equine programs and offer teaching methods instruction, experiences, and coursework. These fundamental skills apply across all fields of agriculture and are becoming more important in this evolving relational society.

Introduction

According to the American Horse Council (2005), the horse industry is a highly-diverse, national, and economically significant industry that deserves the attention of the general public, the media and federal, state and local officials. Direct effect of the equine industry on the economy in the United States is $39 billion every year. The American Horse Council (2005) states, "The industry directly provides 460,000 full-time equivalent (FTE) jobs." These jobs are in racing, showing, recreation and other avenues in the equine industry. With this many types of jobs available, it is important to be educated in order to compete for the higher level jobs.

Educating and preparing students to enter the equine profession is a fundamental part of any university academic equine program. The equine program at the University of Montana - Western has been in existence for seven years. Currently, the program offers a Bachelor's of Science degree in Natural Horsemanship with three specializations: Management, Psychology, and Science. Current enrollment includes 96 students who were receiving a two-year or four-year degree in Natural Horsemanship. Out of the 96 students in the program, there were 73 students working on a Bachelor's of Science degree in Natural Horsemanship. This program has had continuous growth since its inception. In 2010, there were 30 students in the program who declared a Bachelor's degree. At the start of the 2014 school year, there were 73 Bachelor degree seeking students in the Natural Horsemanship degree.

One major element that has led to the success of the Natural Horsemanship program at University of Montana Western was the experiential learning that the degree offers. Students receiving the Bachelor's degree take six horsemanship classes in four years, including a colt starting class. In these classes, the students are required to bring their own horse to use in order to learn new training techniques and develop an understanding of horse psychology. Each class builds upon one another and offers opportunities for application of the knowledge as the student grows in the program. Yet, students have expressed interest in additional horsemanship classes to help better prepare them for their future in the equine industry. Continuing with the interest, the idea of creating a new specialization in educational instruction was brought to the attention of the instructors and university administrators. This new specialization would be focused on helping those students who want more hands-on experience with horses and desire to teach others about horses.

Prior to developing this degree specialization, it was necessary to assess students' needs and interests that were already enrolled in the program. A survey was administered and results showed a strong student desire for the educational instruction specialization. Students strongly recommended that this specialization include coursework in the areas of training horses, organizing equine events, business and education, and the theories of teaching and learning. Based on this positive needs assessment, the development of an educational specialization within the Natural Horsemanship program at University of Montana Western began with the goals of educating students to master fundamental horsemanship skills, become knowledgeable in business management practices, and gain the educational skills necessary for the equine training and instruction profession.

Literature Review/Theoretical Frameworks

A Philosophical Examination of Experiential Learning

According to John Dewey (1938), "All genuine education comes about through experience does not mean that all experiences are genuinely or equally educative" (p. 25).   Dewey noted five steps people encounter during their learning process: "(1) a felt difficulty; (2) its location and difficulty; (3) suggestion of possible solution; (4) development by reasoning of the bearings of the suggestion; and (5) further observation and experiment leading to its acceptance or rejection" (Dewey, 1910, p. 72). It has been described as an impulse that ignites the process of learning which then motivates the learner to observe others for success.   During the observation stage, Dewey suggests that is where the knowledge begins. From the knowledge stage, a person can begin his or her judgment towards the lesson. Dewey stated this whole process of impulse, observation, knowledge, and judgment ensures that every experience builds on past experiences to make a cyclical process (Figure 1).

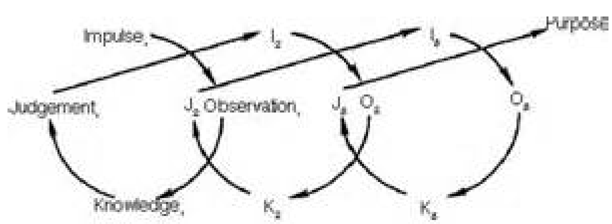

Figure 1. Dewey's model of experiential learning by Kolb (1984).

Extending on Dewey's work, Laura Joplin (1981) stated, "All learning is experiential" (p. 17). She developed a model that had five stages and also agreed that experiential learning was cyclical (Figure 2). The first stage is "Focus" where the learner is first introduced to the information that is being taught. Focus then leads into the "Challenging Action", the second stage where the learner has experience with the lesson. At this stage, the learner should be engaged in analyzing, sorting, and ordering all the information provided. Stages three and four are where the experiential learning occurs and feedback and support for the learner is provided. The fifth is "Debrief", where "learning is recognized, articulated, and evaluated" (Joplin, 1981, p. 18).

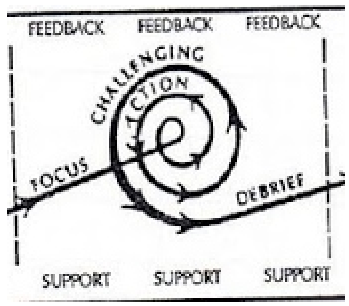

Figure 2. The five-stage experiential learning model (Joplin, 1981).

David Kolb (1984), another key theorist from the John Dewey era, continued the theory of experiential learning. Experiential learning is "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience"(p. 41). Kolb agreed that experiential learning is cyclical and has four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Figure 3). Learning can start at any point in this model, there is no beginning.

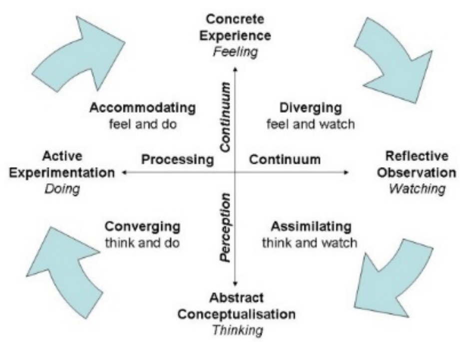

Figure 3. Model of the experiential learning model (Kolb, 1984).

Taking Dewey, Joplin, and Kolb's models of experiential learning, Roberts (2006) proposed the *Model of the Experiential Learning Process* that starts with "an initial focus of the learner, followed by an initial experience" (p. 22). Roberts (2006) attempted to, "summarize experiential learning theory from multiple disciplines and develop models useful to agricultural educators" (p. 18). Once the learner goes through the experiment process then they can reflect and come to generalizations. Next, the learner will experience the phenomenon again and "further reflect and refine the generalizations, thus leading to further experimentations" (Roberts, 2006, p. 22). From this cyclical process, Roberts developed the *Model of the Experiential Learning Process (*Figure 4) and believed this model "will provide a common language and facilitate greater continuity in furthering what is known about experiential learning" (p. 27).

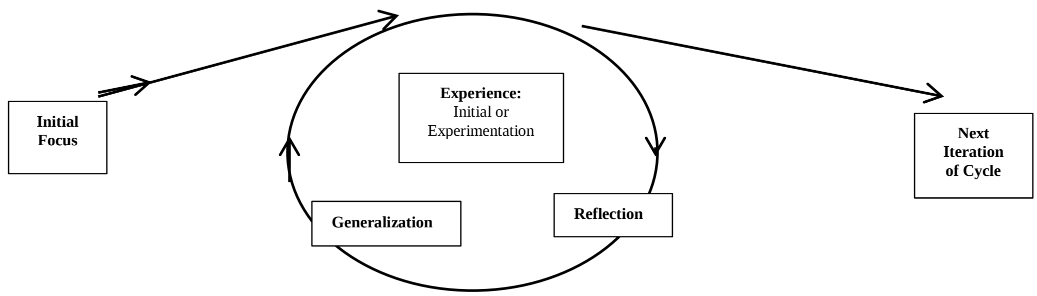

Figure 4. Model of the experiential learning process (Roberts, 2006).

Experiential Learning Supports Demographics of College Students

According to Anderson (2009), "Students in colleges of agriculture have shifted from primarily rural backgrounds to students coming from urban and suburban backgrounds" (p. 19). With the shift of the demographics in agricultural programs, classes need to be adjusted and developed to help the students gain practical experience. "Because many of these students lack practical and applied knowledge of animal husbandry and management, it becomes even more critical that college curricula include experiential learning opportunities" (Bormann & Slough, 2011, p. 59). University programs must keep updating courses in order to fit their student's needs. The Equine Sciences Advisory committee at Colorado State University (CSU), which has over 400 equine science majors enrolled yearly stated, "To best prepare our graduates for a successful future, educational programs must be current in industry technology, trends, and needs" (Denniston & Russell, 2007, p. 2). The advisory board wanted to know how their program helped alumni in job placement and the impact of their classes. In order to gather the information, they developed an online survey for their alumni. This survey inquired about alumni's current and past employment, satisfaction of the program curriculum when they attended, and their overall satisfaction of their education and program. The advisory board found the majority of the alumni that responded were employed in the equine industry with the majority being employed in horse training. As a result, the board had reason to change the composition of the equine program.

A study was conducted by six universities (Utah State University, University of Arkansas, Texas A&M University, Sam Houston State University, Montana State University, and Michigan State University) to assess life skill development of equine students. "Due to the wide range of careers sought by equine majors after graduation, equine faculty may want to discuss life skills that may be gained in their programs" (Cavinder, C.A., et al., 2009, p. 42). Leadership was a primary life skills developed by students in equine training courses. Cavinder et al. (2009) proved, "Students completing semester-long equine behavior and training courses perceived positive shifts in life skills needed for successful employment" (p. 42). Students attend a college or university to become educated for a lifelong career. According to Bormann and Slough (2011), "College-wide experiential learning programs aid students in gaining technical skills, being able to apply coursework to practical situations, and in developing research skills" (p. 59).

Education through Horsemanship

Horsemanship has been documented to improve one's physical and emotional well-being (EAGALA, 2017; PATH Intl., 2076). It has been found that "working with horses can create positive changes in adolescents and possibly even improve basic life skills of young adults" (Antilley, et al., 2010, p. 7). The Texas AgriLife Extension Service partnered with Texas A&M University to organize a Summer Horsemanship School Program that has been operating for the last 37 years. The purpose of this program was to help educate people on horse safety, riding, equipment, problem solving, and to improve confidence and the job of working with horses. The program has had approximately 45,161 clinic participants and spectators in 1,275 clinics. In 2010, the program was evaluated to determine "the effectiveness of this teaching program, with the intent to quantitatively measure the usefulness of such an educational program" (Antilley et al., 2010, p. 2). The main purpose of this study was to examine the need to increase the public's knowledge about equine related topics and life skill development. Antilley et al (2010, p. 7) stated, "Those participating in horse-related activities can experience beneficial improvement in self-motivation, responsibility, confidence, and self-esteem." Most of the participants did not have horse background or come from a rural background, so this program was shown to be a valuable experiential learning opportunity for those that have an interest in horses. This program can be "beneficial to all who are interested in improving their own abilities as horse men and women and ultimately will improve the quality of life for horses" (p. 7).

"The active involvement of students with horses, the sensory involvement during hands-on activity, and the individualization of the student-horse partnership, all contribute in a positive manner to learning" (Potter, Vogelsang, & Webb, 1989, p. 46). Ray Hunt was a legendary horse clinician who conducted horsemanship clinics throughout the world, helping people understand the connection of horses and themselves. His philosophy of educating horses can be related to educating people, "This isn't about making the horse learn, it's about allowing him to learn. He maybe has to go through some troubled times in order to learn. They're going to make mistakes while they learn. If you get too critical about mistakes, then they stop trying to work at figuring it out. Don't worry if he doesn't get it right at first. He just doesn't know." (Hunt, n.d.)

Purpose and Objectives

The purpose of this study was to explore the development of an educational instruction specialization within a post-secondary Natural Horsemanship Degree program. This study aligns with the American Association for Agricultural Education's National Research Agenda 2016-2020 Research Priority Area 4: Meaningful, Engaged Learning in All Environments (Edgar, D., Retallick, M. & Jones, D., 2016; Roberts, T. G., Harder, A., & Brashears, M. T. (Eds), 2016) by addressing the following research objectives:

1. Describe existing university equine training programs curriculum and hands-on experiences used to prepare students to enter the industry
2. Describe equine professionals' expectations for employment of graduates from an equine program.

3. Determine critical competencies needed by equine program graduates to gain employment in the industry.
4. Summarize curriculum requirements, employment expectations, and student competencies necessary for the development of an educational instruction specialization in the Natural Horsemanship degree program.

Methods and Procedures

Data Collection

Qualitative methods were the best fit to measure this collection of data according to John W. Creswell's characteristics of qualitative research, "Qualitative researchers collect data themselves through examining documents, observing behavior, or interviewing participants" (Creswell, 2014, p. 185). To develop this specialization, it was essential to research what other equine programs were offering to students, successful and unsuccessful strategies, and suggestions for improvement. From the employer's perspective, it was critical to understand their expectations when hiring personnel for an equine instruction position. Finally, it was critical to gain perspectives from program alumni on necessary skills, knowledge, and coursework to be successful in the field. Therefore, three groups of key informant interviews were conducted with equine program directors, horse professionals hiring graduates, and UWM equine program alumni. Questions were developed based on previous literature (Antilley et al., 2010; Cavinder, C.A., et al., 2009; Potter, Vogelsang, & Webb, 1989) and the results of an internal departmental current student needs assessment. The questions were then reviewed by an agricultural education professor and equine science academic program director. All research procedures were approved by the IRB for Montana State University.

All participants were contacted by phone or via email to participate in an interview with the researcher. To ensure complete voluntary participation and collection of data from subjects involved in the research, an informed consent form was given prior to the interview and collection of data. Thirty minute to one hour phone or in-person interviews were conducted with five post-secondary equine program directors, six equine professionals, and five program alumni. Each person interviewed in each category were asked the same open-ended questions in a semi-structured interview process with modifications based on their role in the study (Merriam, 2009).

Equine Program Directors

The five post-secondary equine programs were chosen using the following criteria. Each program offered classes in colt training, English riding, or Western riding. Three of the programs were located in the Western region and the other two were located in the Midwest. This was crucial because of the large population of out-of-state students that the Natural Horsemanship program has at University of Montana Western. Students were coming to University of Montana Western to experience the Western way of life and traditions of horsemanship out Western; therefore, it was important for the NH program to understand what equine programs were teaching in different locations. Four of the five programs have their own horse sale organized by the students. All of the program directors chosen had experience in hands-on equine classes and preparing students for industry employment. There was a range of educational content and horsemanship differences in the programs from professional showing to working cattle. Each brought in their uniqueness on horsemanship and how to best prepare students for industry employment.

Equine Professionals

The six equine professionals were chosen because of their individual knowledge in natural horsemanship and the equine industry. Five of the professionals have conducted horsemanship clinics throughout the world and shown horses in a professional setting. All six had the knowledge to assess the need for this degree option, availability of jobs, and could provide student internships and job placement. Therefore, it was important to assess their perceptions of work preparedness, thoughts on educational coursework in equine programs, and advice on preparing to enter the equine industry.

Equine Program Alumni

All alumni received a B.S. in Natural Horsemanship from University of Montana Western and have been graduated at least three years from the school. The selected alumni were asked questions regarding their experience in the NH program, employment opportunities, and suggestions for the curriculum. The five alumni chosen had to be gainfully employed and each person interviewed was asked questions related to graduate preparedness, thoughts the educational specialization, and advice on how to better prepare students to enter the industry.

Theoretical Lens: Constructivism

Constructivism supports the internal construction and understanding of one's knowledge as a result of reflection on experiences (Merriam & Cafferella, 1999). The use of constructivism acknowledges the importance of the reflective process for continued learning (Crotty, 2004). Through the use of interviews, the researcher and participants engaged in the construction of a narrative to detail the participants' perspectives of the issue. Each participant shared personal beliefs and individual experiences which allowed them to reveal their thoughts and provided evidence of the decision making process in a structured format.

Data Analysis

All interviews were audio-recorded with permission and data was analyzed using content analysis, or summarizing similar themes (Patton, 2002). Data was analyzed to determine if there were any trends that could be used to strengthen the degree option being developed. The content analysis method entailed finding similar words or phrases throughout all the interviews and grouping them into categories. This information was analyzed to strengthen the degree option and identify areas of improvement. The researcher reviewed the hand written notes and made edits for clarification immediately after the interview. The researcher then reviewed the audio recordings and key quotes were organized according to the question. The final step was to combine the written and oral data to develop overarching themes.

Once all the data was organized, the researcher went through each question individually and found common themes from each interview. A pseudonym of the participant was labeled next to the response. In addition to finding the common themes and phrases, data showing any other importance towards the topic was noted. Confirmability, or a non-biased research approach, was established through audit trails and a peer review of findings using a panel of professors (Ary, et. al., 2006). Creswell (2014), Guba (1981), Denzin (2006), and Merriam's (2009) measures of criteria to control error were followed in analyzing the qualitative data. Transferability, or application of findings to other situations, was addressed using rich details of the participants' contexts and situations (Merriam, 2009). The credibility, or accurate representation of findings, strategies was accomplished through member checking as participants were provided their own transcriptions for accuracy (Creswell, 2014). For triangulation, once all the data and its themes where converged together, common themes were examined related to their support of the research objectives. The themes that were useful, positive or negative, were highlighted and analyzed for their importance on the topic. Finally, dependability, or consistency of findings, was addressed using peer examination of coding procedures and analysis as well as inter-rater reliability checks as the themes were verified with professors and the equine program's department chair (Denzin, 2006; Guba, 1981).

Results/Findings

Objective 1: Describe existing university equine training programs curriculum and hands-on experiences used to prepare students to enter the industry.

All five equine directors agreed that students in their programs have interest in instructing horsemanship and training horses from Western to English to natural horsemanship. Yet, all agreed of the differences between a trainer and an instructor as one participant said, "We've always felt like riding instructors and horse trainers are not the same". Another added, "Eighty five to ninety five percent of our students give lessons and will not make public trainers, but they will become the best instructors because they understand the philosophy."

When asked about the training methods or theories taught in their courses, Western discipline programs taught newer natural horsemanship techniques and methods (using the psychology of the horse in order to train), while English disciplines taught more traditional methods and techniques (looking at the physical side of the horse in order to train). All emphasized the importance of keeping current with industry standards was crucial for the programs and their students' success. It was also critical to give students as much outside exposure to trainers and methods in order to make them more well-rounded equestrians.

Learning outcomes of post-secondary equine programs were on graduating students that have a comprehensive understanding and hands-on experiences with horses. Two of the programs required students to maintain a 3.0 GPA and have a 90% or above on their equine exams in order to stay in the program. All program directors agreed that more coursework in education and business would be extremely valuable.

When asked about their opinion of the educational instruction specialization, all program directors were positive and encouraging. Comments included, "I could not support your idea any more, it's a special niche that would make an employable student by the end of the process" and "There is not a credible process in order to teach." One program director said that agricultural education experience is a requirement to teach in the equine industry in their state. All agreed that, "Training and teaching goes together."

The educational value of hands-on and real life experiences with horses was stressed by all directors. "It's one of the most important aspects, to have hands-on experience. You need to have lots of hands-on opportunities for the students." Four of the program directors said that the hands-on classes with horses are the basis for their programs as they strengthen the students' skills for future employment. "The practical part is huge if they are seeking a career in training horses."

Most programs were organized with lecture classes coexisting with experiential lab courses. To better prepare students looking towards instruction in the industry, the majority of directors said that quality internships matter. One director said, "Students do not ride enough. Placing students with high end trainers and high quality internships is a big deal for success." In addition, faculty must be current with trends and involved with the industry outside of the program. One director stated, "I do not think we can give them what they need in a university environment. They need to get out in the real world and they need a certain amount of that before they graduate."

Overall, the directors said that connecting coursework with real world industry experiences will help prepare students better. "Experiential learning will prepare students better." "Getting students with equine instructors and clinicians" was an important industry connection. This may involve narrowing down the topics taught in a course or giving students more variety in courses to choose from. Courses must be designed to get students enthusiastic and ready to enter the industry as one director stated, "It seems that the work ethic of the students on average is lower. This could be related to readily available information, as it does not take much effort to find the answers."

Objective 2: Describe equine professionals' expectations for employment of graduates from an equine program.

When asked about the preparedness of equine graduates entering the horse training industry, equine professionals agreed that students need to get out in the industry more to see and experience the real world but with "school as a foundation." This way, students can gain a realistic view as to what it takes to have a successful business and realize how much they need to learn in order to reach that level. One professional described the process as, "A lack of practical experience, you need to overinflate them to get a job but keep them in check and find a balance between the two." Internships and mentors were highly valued to prepare students for future careers.

There was an identified need for more people with instructional and training skills. As one participant stated, "People are less knowledgeable about a horse, so there's a need for basic level horsemanship." Skills on how to work with people are becoming more important as, "Future horse owners are concerned about things that the baby boomers took for granted, trust in everybody. With a shift of social responsibility about mothers being concerned about safety of their children, certified by something that is recognizable."

The most important attributes for hiring were work ethic, good attitude, and a love of horses. A professional stated when faced with "work ethic versus ability, we all choose the person with work ethic over ability." Another said, "I want them to have common sense, the ability to speak with people especially the new type of horse owner that is not very knowledgeable… they must have patience and a business sense." It is becoming tougher to find this person as one participant declared, "You can't get a job with no experience but you can't get experience without a job."

All industry professionals agreed that coursework in education and business would better prepare students. Educational courses were critical as described by many, “You cannot have too much education. Education should never stop”, “Verbalizing to someone else helps you learn” and “When you have to teach someone else to do something, you’re learning. Teaching is learning and how you express your thoughts.” Additionally, strong business skills and relationships were necessary to build a successful business. “Human relations are hard to get in a classroom.” The changing nature of the horse business was discussed, “The days of a cowboy horse trainer is over and it is more about professional business relationships.” Because of this, hands-on experience and internships were essential for learning. “It’s easy to learn the science but the practical knowledge experience is harder to learn.”

Overall, all the professionals supported the idea of the educational instruction degree specialization as long as it consisted of more specific hands-on and real life experiences. The notion of two internship experiences was discussed by several participants, “Two internships would be huge. More real world and horse experience” and “If the degree has been remodeled towards hands-on with horses and two summer internships then they will have a leg up in the industry.”

Advice for students pursuing a career in equine training and instruction was to find a mentor in the industry to help continue their education and have a good work ethic. One professional said, “By the third year of school, they must put the pedal to the metal so they can hit the ground running after college and be a real asset in industry.” The need for quality interns and employees was expressed by all.

Objective 3: Determine critical competencies needed by equine program graduates to gain employment in the industry

Equine program alumni felt the natural horsemanship program gave a good foundation with the horses but they needed the next level of horsemanship to help them get a position. There was an identified need for business courses to educate in the areas of advertising, liabilities, and current equine industry standards. All agreed that gaining more experience through internships was critical to being prepared.

Alumni recommended additional internships and classes focused on instructing horsemanship. The need for teaching skills was emphasized by all alumni, “When you actually have to teach it to somebody, it really takes it to another level” and “So you learn how to teach and learn how to interact with people better.” Business classes on financial management, technology skills, and problem solving were also highlighted as academic needs.

The need for an educational specialization degree was expressed by all. “There is a need for teaching in the industry, having the ability to teach helps.” The inclusion of teaching into the program was considered a positive advancement, “Education is important, if you know enough about something the best way to know if you know it is to teach it” and “I think specific training would be helpful in our industry. I think a lot of gifted people are good at communicating with horses but not necessarily with people, I think there is a big void there.”

Objective 4: Summarize curriculum requirements, employment expectations, and student competencies necessary for the development of an educational instruction specialization in the Natural Horsemanship degree program.

Across all participants in this study, the following common themes were found relating to the development of the educational instruction option for the Natural Horsemanship degree program.

1. Describe existing university equine training programs curriculum and hands-on experiences used to prepare students to enter the industry.
    a. Provide students with more hands-on experiences in basic level horsemanship in related classes.
    b. Partner with outside entities to develop quality internships in their field of interest.
    c. Provide more real life experiences with horses, people, and teaching.

2. Describe equine professionals' expectations for employment of graduates from an equine program.
    a. Students must realize the time and commitment in order to be successful in their careers.
    b. Students must have as much hands-on experience as possible in various areas of working with people and horses.
    c. Students must have a working knowledge of technology, education, and business management practices.
    d. Students must be able to communicate to others clearly and precisely.

3. Determine critical competencies needed by equine program graduates to gain employment in the industry
    a. Students must have more hands-on experiences with people and horses.
    b. Students need more business, education, and technology classes.
    c. Students must develop strong business, people, and life skills
    d. Students must be able to teach others.

Conclusions, Recommendations, and Implications

All programs at universities and colleges across the nation have to be willing to change and adapt curricula based on student needs and workforce readiness. To do so, academic programs must look towards alumni, current students, other academic programs and industry professionals for recommendations on how to better prepare students to enter the work force. The conclusion of this qualitative study shows that there were particular needs identified by the three groups of participants that must be met in the courses required in the developing educational instruction degree specialization. The four primary needs identified across all participants for students in the educational specialization degree program would be unique hands-on experiences, educational coursework on teaching and learning strategies, business management knowledge, and proficient technology skills.

All groups of participants stated the critical need for students to gain as much hands-on experiences with horses and people in order to better prepare them for employment. The majority of participants mentioned that students are coming from different backgrounds and experiences and may or may not have the practical knowledge of horsemanship. This supports Anderson's (2009) study that described the shift in students from rural backgrounds to more urban and suburban backgrounds. This also justifies the importance for all academic programs, including equine, to conduct needs assessments with students, industry representatives, alumni, and other academic professionals. As Denniston and Russell (2007, p. 2) stated, "To best prepare our graduates for a successful future, educational programs must be current in industry technology, trends, and needs." Many colleges of agriculture are seeing this shift in student demographics and this necessitates the need to adjust degree programs and include practical experiences in the curricula (Anderson, 2009).

Quality internships were considered a great beginning for students to get a start in the industry. Participants understood that real world experience is difficult to obtain, but classes and internships should be organized to partner with industries. The degree specialization must offer courses that incorporate more hands-on experiences with horses and teach basic level horsemanship and safety including halter breaking young horses, starting colts, and ranch horsemanship skills. Participants agreed that a variety of experiences during the program would help students have a higher chance of success in their internships and careers. By partnering with high quality equine operations, students can develop technical, networking, and life skills. Strong business skills, work ethic, a good attitude, and relationship building were all considered necessary to get a job and build a successful business. This confirms Antilley et al's (2010, p. 7) findings stating, "Those participating in horse-related activities can experience beneficial improvement in self-motivation, responsibility, confidence, and self-esteem."

With the emphasis on educational instruction, students must gain a comprehensive understanding of how to teach others. Specialized educational instruction internships would help students gain real world experience and network in the industry by making connections. A key point mentioned by all participants was that experience develops knowledge. Different situations require different teaching methods; therefore, students must learn a range of teaching methods applicable to horses and people through educational coursework. The specialization must also include opportunities for students to study learning styles, learn instructional strategies, and instruct horsemanship lessons with applications to different learning environments and audiences. This develops a new opportunity for agricultural educators to partner with equine programs to offer teaching methods instruction, experiences, and coursework. It should be further explored how to include equine students at the start of their program of study in non-formal educational courses and experiences.

Participants in the study unanimously stressed that technology is always changing and the equine industry is no different. It is important that graduates have an understanding of how to use different types of multimedia as this is critical for advertising and communicating with changing clientele. These technological trends must be taught in courses by using software programs to create sale catalogs, advertisements and other marketing media. Agricultural communications courses offer a perfect venue to develop these skills and should be marketed more frequently to equine students and beyond in the college. Additionally, equine graduates must learn to develop both communication strategies and marketing techniques to promote the business. Knowledge of technologies to develop financial spreadsheets and manage a business must be learned in business courses. Knowing the fundamentals of starting and operating a business is a key factor for its success and longevity. These findings support Bormann and Slough's (2011) emphasis on developing technical application skills, "College-wide experiential learning programs aid students in gaining technical skills, being able to apply coursework to practical situations, and in developing research skills" (p. 59).

Regardless of the discipline of agriculture, these findings support critical competencies and employment expectations for all students. It is the responsibility of university educators to be aware and knowledgeable of current industry trends in order to better prepare students to be workforce ready. These fundamental experiences of experiential learning, teaching, life skill development, communication, and working with people apply across all fields. Agricultural education programs must continue to market their expertise in these areas to attract new, diverse students and expand their impact. Future research should examine the development of this specialization and how it integrates the findings of this research. A longitudinal study of students in this specialization should be conducted to track skill development, satisfaction, internship, and job placement. A follow up study with equine professionals on observed changes in students' knowledge and skills should be investigated. Finally, this research approach can be used to assess current trends and needs of any educational program to ensure it is properly preparing graduates with the necessary skills and knowledge.

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Developmental Evaluation of an International Experience Program for Louisiana 4-H Members

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Abstract

In recent years, The U.S Cooperative Extension Program (CEP) has worked to develop international exchange programs (IEPs) for 4-H members in some states. However, no such program currently exists in Louisiana. As such, the purpose of this descriptive study was to identify the IEP participation preferences held by 4-H members in Louisiana, in order to inform future IEP development and implementation. 4-H members in this study preferred to participate in a short-term IEP during the summer of the 11th grade. Thus, it is recommended that IEP recruitment be geared toward students in the 9th and 10th grades. 4-H members preferred to participate in an IEP located in Europe or Australia/New Zealand. Future research should examine which characteristics of these locations appeal to 4-H members in order to broaden appeal of IEPs in other locations. Career related courses and hands-on experience were perceived by 4-H members as important activities to include in the IEP design, whereas staying with a host family was not. Future research should assess whether this finding is specific to members in this study or representative of a national trend that warrants reexamination of the overall design of 4-H IEPs employed by the U.S. CEP.

Keywords: 4-H members, international experience program (IEP), developmental evaluation

Introduction

The forces of globalization have entwined local and global realities (Baker & LeTendre, 2005; Lechner & Boli, 2015). While globalization may not directly nor exclusively determine local circumstance, local and global realities have become entwined and world societies will continue to integrate as individuals become conscious of their participation in global networks and how those networks are influenced by global forces (Lechner & Boli, 2015). Regardless of whether or not national members are aware of the larger structures in place, “their everyday lives are nevertheless embedded in a global culture that transcends their village, town or country, and that becomes part of individual and collective identities” (Lechner & Boli, 2015, p. 2). Reflective of this common knowledge and collective identities across regions is the emergence of international institutions in all areas of human activity (Lechner & Boli, 2015). While education may be viewed by some as being solely a national undertaking, Baker and LeTendre (2005) maintained that this perception is largely inaccurate. In reality, globalization has altered the fabric of education and demanded the integration of a global aspect into the curricula (Baker & LeTendre, 2005; USDE, 2012).

As the U.S agriculture sector is currently more globally interdependent than ever before (Lewis & Gibson, 2008), agricultural and Extension education must be modeled to meet the demands of a globalized world and prepare clientele for participating as members of a global society (Akpan & Martin, 1996; Ludwig & McGirr, 2003). Regarding the role of The U.S Cooperative Extension Program (CEP), Ludwig (2001) noted that Extension's mission will continue to be influenced by internationalization. Additionally, Etling, Reaman and Sawi (1993) maintained Extension faculty and personnel must be cognizant of the relationship between Extension's mission and the international issues at hand. The National Association of State Universities and Land Grant Colleges (NASULGC) also put forth the rationale for including international awareness as an integral component of appropriate Extension outreach services and activities (NASULGC, 2004). As such, Extension educators need not only recognize the role of Extension in the international arena, but they must put forth significant effort to incorporate an international component into programming (Bates, 2006; Ludwig, 1995).

International cooperation has been largely considered a facilitator of internationalization among institutions and organizations (Arnold, Davis, & Corliss, 2014; Boyd et al., 2001; Odell, Williams, Lawrence, Gartin, & Smith, 2002; USDE, 2012). Thus, The U.S. CEP has worked to internationalize programming by way of establishing partnerships with international organizations to conduct development projects abroad, employ 4-H youth outbound exchange programs, and host international guests through special programs (Ludwig & McGirr, 2003; Major & Miller, 2012). International experience programs (IEPs), such as the International 4-H Youth Exchange Program (IFYE) and States' 4-H International Exchange Program, have been established in some states as a means of developing a global perspective among 4-H members early on in their educational experience (Boyd et al., 2001; Ingram, Smith-Hollins, & Radhakrishna, 2009; Odell et al., 2002).

Findings in prior research lend support to the induction of IEPs as a means of facilitating efforts to internationalize Extension outreach and services. In prior studies, 4-H members who participated in an IEP demonstrated (a) a more developed global perspective and awareness of world issues, (b) greater levels of self-confidence and awareness of self-purpose, (c) increased willingness and ease immersing themselves in another culture, (d) greater interest in pursuing an internationally focused career, and (e) continued interest in international travel following their initial IEP participation (Arnold et al., 2014; Boyd et al., 2001; Ingram et al., 2009; Odell et al., 2002). Additionally, youth have been acknowledged as having the ability to evoke change within their surrounding community (Major & Miller, 2012; Olberding & Olberding, 2010). Therefore, researchers have posited that enhancing youth's global perspective could produce a ripple effect of international awareness and acceptance among family, friends, and community (Boyd et al., 2001; Olberding & Olberding, 2010). In a study conducted by Boyd et al. (2001), 4-H youth who participated in an IEP perceived that their family and friends were more globally awarene as a result of their participation in the program. Boyd et al. (2001) also conducted a survey with the family and friends of the IEP participants and found that the close persons of the 4-H IEP participants not only perceived the IEP as being beneficial to the 4-H member, but also perceived it as being indirectly beneficial to them personally. Similarly, Olberding and Olberding (2010) found the impact of a youth exchange program extended beyond direct participants to indirect participants, such as host families, chaperones, and other students and faculty. As suggested by these findings, youth may provide an accessible population through which global awareness can be introduced within the larger community.

If such programs are to be successful, they must appeal to the targeted participants (Ivy, 2008). Much of the existing body of literature on 4-H exchange programs is comprised of studies to examine the outcomes and benefits of IEPs for 4-H members, whereas little research has been conducted to examine 4-H members' IEP perceptions and participation preferences. In a study conducted to examine IEP destination choices as part of a marketing strategy, Kavakas (2013) found the IEP itself and the skills and experiences gained while participating were important marketing components. In addition, the attractiveness of a country was among the most important elements influencing students' IEP destination choice (Kavakas, 2013). As such, identifying which countries and activities are most appealing and important to Louisiana 4-H members can aid Extension personnel in developing marketable IEPs for 4-H members. Lastly, the logistical considerations associated with an IEP can influence students' participation. Logistical considerations include factors such as time of year to participate, duration of program, and academic level for participating. Prior studies to examine these preferences have been conducted among college student populations (Bunch, Blackburn, Danjean, Stair, Blanchard, 2015; Danjean, Bunch, & Blackburn, 2015), but not among 4-H members.

As no IEP for 4-H members currently exists in Louisiana, developmental evaluation is a necessary first step toward designing and implementing such a program. According to Gamble (2008), developmental evaluation involves inquiry for development and is particularly suited for the early stages of an innovation. Moreover, in contrast to traditional evaluations aimed at producing generalizable findings across populations and settings, developmental evaluation aims to produce context-specific understanding that informs future innovation processes (Gamble, 2008). Therefore, this study was conducted to gather preliminary data necessary for designing and implementing an IEP for 4-H members in Louisiana.

Purpose and Objectives

This study was conducted as part of a larger study. The purpose of this descriptive study was to examine the perceptions and preferences held by 4-H members toward participation in an international experience program, in order to inform future practice and research regarding the development and implementation of an IEP for Louisiana 4-H members. The following objectives guided this study:

1. Describe 4-H members' perceptions of the importance of participating in an IEP.
2. Describe 4-H members' IEP logistical preferences including time of year to participate, program length, and academic level during which to participate in an IEP.
3. Describe 4-H members' preference of location(s) as destinations for an IEP.
4. Describe 4-H members' IEP design preferences in terms of perceived importance regarding selected activities to be included in an IEP.

Methods

Population and Sample

The target population for this study (*N* = 789) consisted of all 4-H members who attended a three-day summer conference at Louisiana State University. Completed instruments were collected from 628 of the 789 4-H members in attendance, which yielded an 80% response rate. Most of the 4-H respondents were white (*f* = 485; 77.2%) females (*f* = 389; 61.9%) with a mean age of 15 (*SD* = 1.54) and an academic grade level ranging from 7 to 12. Additionally, more 4-H respondents reported growing up on a farm or in a rural area (*f* = 269; 42.8%), and most were not fluent in a language other than English (*f* = 552; 87.9%).

Instrumentation

Items were modified from questionnaires by Bunch, Lamm, Israel, and Edwards (2013) and Reiger (n.d) to develop an instrument to assess 4-H members' IEP participation preferences (Blinded authors, in press). To ensure face and content validity, an expert panel with collective proficiencies in 4-H youth development, international program development, and instrument development reviewed the questionnaire. The panel deemed the instrument acceptable.

For the purpose of this study, five sections of the instrument were used. The first section of the instrument was designed to measure 4-H members' perceived level of importance concerning participation in an IEP. In this section, responses were measured using a four-point Likert-type scale (1 = *not at all important*, 2 = *not very important*, 3 = *somewhat important*, and 4 = *very important*). The second section of the instrument was designed to measure 4-H youth members' logistical preferences for participating in an IEP, including (a) time of year to participate, (b) program length, and (c) academic level during which to participate (see table 2 for response categories). The third section was used to identify 4-H youth members' preference of select location(s) as possible destinations for an an IEP. In this section, participants were asked to rate the appeal of nine locations on a four-point Likert-scale (1 = *not at all appealing*, 2 = *somewhat unappealing*, 3 = *somewhat appealing*, 4 = *very appealing*). The fourth section of the instrument was utilized to identify 4-H members' IEP design preferences. In this section, participants were asked to indicate the importance of the inclusion of select activities as part of an IEP (i.e., in-field lectures/labs, participating in field research, acquiring hands-on experience and skills, etc.). Responses were measured using a four-point Likert-type scale (1 = *not at all important*, 2 = *somewhat unimportant*, 3 = *somewhat important*, and 4 = *very important*). Lastly, demographic items were used to describe the personal and educational characteristics of the population sample.

Data Collection

The 4-H youth educators were given a data collection packet that included (a) data collection protocol, (b) hard copy instruments, (c) participants right to refuse protocol, (d) instructions on returning instruments to the researchers, and (e) a distribution checklist. The 4-H youth educators distributed hard copy questionnaires to 4-H youth participants during the final evening of the three-day summer conference and returned the completed instruments to the researchers. Parental consent for participation in this study was collected as part of the program enrollment process.

Data Analysis

Data were analyzed using descriptive statistics. Nominal and ordinal data were analyzed using frequencies and percentages for objective two, while interval level data were computed using means and standard deviations for objectives one, three, and four.

Findings

Objective 1: Perceived importance of participating in an IEP

Objective one sought to describe 4-H members' perceived importance of participating in an IEP. More than 75% of the 4-H members perceived participating in an IEP as *somewhat important* (*f* = 287; 45.7%) or *very important* (*f* = 230; 36.6%). The remaining participants perceived participating in an IEP as *not very important* (*f* = 58; 9.2%) or *not important* (*f* = 53; 8.4%).

Objective 2: IEP logistical preferences

Objective two sought to describe 4-H members' preferences pertaining to the logistical factors associated with participating in an IEP. The specific factors examined included (a) preferred academic level during which to participate in an IEP, (b) time of year, and (c) program length. More 4-H members identified the 11th grade (*f* = 139; 22.7%) or post high school/in college (*f* = 118; 19.3%) as the most suitable academic level during which to participate in an IEP, while fewer preferred to participate in an IEP during the 12th grade (*f* = 77; 12.6%) or 8th grade (*f* = 65; 10.4). Regarding time of year, more 4-H members (*f* = 246; 39.7%) identified summer as the preferred time of year to participate in an IEP. As far as duration, most 4-H members identified 1-2 weeks (*f* = 219; 35.2%) or 3-4 weeks (*f* = 209; 33.6%) as the preferred length of an IEP, while the fewest 4-H members (*f* = 110; 17.7%) preferred to participate in a 5-6 weeklong IEP. Lastly, some 4-H members (*f* = 84; 13.5%) selected *none* as the ideal duration of an IEP (see Table 1).

Table 1.

4-H Youth Members' Logistical Preferences for Participating in an IEP (N = 628)

Variable	*f*	%
Participation Preference: Academic Level[a]		
11th grade	139	22.7
Post high school/in college	118	19.3
9th grade	111	18.1
10th grade	102	16.7
12th grade	77	12.6
8th grade	65	10.6
Participation Preference: Time of Year[b]		
Summer	246	39.7

Fall semester	202	32.6
Spring semester	171	27.6
Participation Preference: Length of Program[c]		
1-2 weeks	219	35.2
3-4 weeks	209	33.6
5-6 weeks	110	17.7
None	84	13.5

Note.
[a] Responses missing from 16 study participants for this item
[b] Responses missing from 9 study participants for this item
[c] Responses missing from 6 study participants for this item

Objective 3: IEP location preferences

Objective three was established to identify 4-H members' preferred location(s) as destinations for participation in an IEP. In all, seven of the select locations were perceived by 4-H members as *somewhat appealing*, and three were perceived as *somewhat unappealing.* The locations with the highest means were (a) Europe (*M* = 3.32; *SD* = .99) and (b) Australia or New Zealand (*M* = 3.20; *SD* = 1.04). The locations with the lowest means were (a) Asia (mainland) (*M* = 2.43; *SD* = 1.07), (b) Southeast Asia (*M* = 2.39; *SD* = 1.09), and (c) Africa (*M* = 2.28; *SD* = 1.14; See Table 2).

Table 2.

4-H Members' Perception of Appeal for Select IEP Locations

Locations	*N*	*M*	*SD*	Interpretation
Europe	617	3.32	.99	Somewhat appealing
Australia or New Zealand	612	3.20	1.04	Somewhat appealing
North America	610	2.88	`1.14	Somewhat appealing
South America	613	2.84	1.07	Somewhat appealing
South Pacific	618	2.79	1.07	Somewhat appealing
Central America	606	2.76	1.09	Somewhat appealing
India	596	2.60	1.12	Somewhat appealing
Asia (mainland)	612	2.43	1.07	Somewhat unappealing
Southeast Asia	614	2.39	1.09	Somewhat unappealing
Africa	618	2.28	1.14	Somewhat unappealing

Note. Real Limits – 1.00 to 1.49 = *Not at all appealing*; 1.50 to 2.49 = *Somewhat unappealing*; 2.50 to 3.49 = *Somewhat appealing*; and 3.50 to 4.00 = *Very Appealing*.

Objective 4: IEP design preferences

Objective four sought to describe 4-H members' IEP design preferences in terms of the importance of inclusion of select activities and experiences while participating in an IEP. All activities were perceived by 4-H members as being *somewhat important* components to include in an IEP. The activities with the highest means were (a) taking courses related to your career interests (*M* = 3.40; *SD* = .89), (b) acquiring hands-on experience and skills (*M* = 3.37; *SD* =

.89), (c) learning about a different culture (*M* = 3.27; *SD* = .91), and (d) free time to do what you want (*M* = 3.27; *SD* .93). The activities with the lowest means were (a) staying with a host family (*M* = 2.86; *SD* = .1.00), (b) in-field lectures and labs (*M* = 2.78; *SD* = 1.03), and (c) attending non-credit courses at foreign universities (*M* = 2.56; *SD* = .95; see Table 3).

Table 3.

4-H Members' Perception of Importance for IEP Design Components

Activities	*N*	*M*	*SD*	Interpretation
Taking courses related to your career interests	612	3.40	.89	Somewhat important
Acquiring hands-on experience and skills	618	3.37	.89	Somewhat important
Learning about a different culture	621	3.27	.91	Somewhat important
Free time to do what you want	617	3.27	.93	Somewhat important
Traveling in a country	620	3.24	.92	Somewhat important
Sightseeing	619	3.23	.94	Somewhat important
Socializing with citizens of host country	618	3.22	.96	Somewhat important
Working one-on-one with professors and students	618	3.15	.97	Somewhat important
Speaking and learning host country language	614	3.15	.92	Somewhat important
Participating in field research	614	3.09	.94	Somewhat important
Staying with a host family	617	2.86	1.00	Somewhat important
In-field lectures and labs	620	2.78	1.03	Somewhat important
Attending non-credit courses at foreign universities	608	2.56	.95	Somewhat important

Note. Real Limits: 1.00 to 1.49 = *Not at all important;* 1.50 to 2.49 = *Somewhat unimportant;* 2.50 to 3.49 = *Somewhat important;* 3.50 to 4.00 = *Very important.*

Conclusions

More than three-fourths of the Louisiana 4-H members who participated in this study perceived IEPs as at least somewhat important. If 4-H members were to participate in an IEP, they prefer to participate in a short-term IEP held during the summer of the 11th grade or post high school/in college. Additionally, they prefer the IEP to be located in either Europe or Australia/New Zealand. Regarding important activities to include in the design of an IEP, 4-H members perceive all activities as at least somewhat important. The activities 4-H members perceive as most important were those that allow them to take courses related to their career interest, acquire hands-on experience and skills, learn about a different culture, and have free time to do what they want (i.e., sight-seeing and tourism). The IEP components 4-H members consider least important were staying with a host family, engaging in in-field lectures and labs, and attending non-credit courses at a foreign university.

As a census survey design was employed in this study, the results cannot be generalized beyond the scope of the population of the study. However, when considered alongside the prior literature, the findings of this study provide directions for future practice and research for agricultural and Extension faculty and personnel in Louisiana. Moreover, the trends observed in this study contribute to the limited body of literature pertaining to the appropriate design of international programming for 4-H members. Discussion of key conclusions, as well as recommendations for future research and practice, are provided in the following section.

Discussion and Recommendations

Based on the findings of this study, IEPs designed for 4-H members in Louisiana should be short-term programs (duration of no more than four weeks) held during the summer. This recommendation is further supported by findings in prior research conducted with other student populations. Bunch et al. (2015) and Danjean et al. (2015) examined the IEP participation preferences of College of Agriculture students and found that the majority of students preferred to participate in a short-term IEP held during the summer. Additionally, a nation-wide study conducted by the Institute of International Education (2015) revealed that more students participated in short-term IEPs in the 2013-2014 academic year than traditional, long-term programs. While most of the 4-H members preferr to participate in a short-term IEP, it should be noted that some selected “none” as the ideal length of an IEP. This finding may indicate that some 4-H members in this study lack interest in participating in an IEP, regardless of the attributes of the program. As such, future research should be conducted to identify other variables that may influence 4-H members interest in participating in an IEP.

When designing IEPs for 4-H members, Extension personnel should also consider the location of the program. In a study conducted with College of Agriculture students, Van Hoof and Verbeeten (2005) found students were more motivated to participate in an IEP when they perceived the location to be appealing. Based on the findings of this study, IEPs designed for 4-H members in Louisiana should be located in either Europe or Australia/New Zealand. Prior studies conducted with other student populations have also identified these locations as the IEP destinations most appealing to students (Bunch et al., 2015; Danjean et al., 2015; IEE, 2015). However, considering the wide array of alternative IEP destinations, it could be beneficial to conduct future research to identify characteristics of Europe and Australia/New Zealand 4-H members find appealing. A study of this nature may aid Extension personnel in attracting 4-H members to IEPs in other locations that share similar characteristics.

Regarding the design of an IEP, Louisiana 4-H members perceive taking courses related to their career interests and gaining hands on experience as the most important activities to include in the design of an IEP. This finding is consistent with prior studies conducted with other student populations, in which students reported being more motivated to participate in an IEP if they perceived the IEP as being beneficial and relevant to their future careers (Briers, Shinn, & Nguyen, 2010; Van Hoof & Verbeeten, 2005). As such, it could be beneficial to conduct research to examine the career interests of 4-H members prior to designing an IEP. In practice, IEP information distributed to 4-H members should highlight the career benefits and opportunities for hands-on experience. As most Louisiana 4-H members identified the 11th grade as the most suitable academic level for participating in an IEP, this information should be distributed to 4-H members as early as the 9th and 10th grade. Introducing 4-H members to IEPs prior to the 11th grade may increase the likelihood they will actually participate later in their high school careers. Moreover, it could be beneficial to introduce 9th and 10th grade 4-H members and their families to opportunities to host international exchange students. Arnold et al.

(2014) conducted a qualitative study with 4-H international participants, in which seven of ten participants reported having hosted an international exchange student prior to their own international experience. Moreover, participants who hosted an international student reported that hosting an international student influenced their desire to participate in an IEP, profoundly (Arnold et al., 2014). Additionally, as post high school/in college was the second most favorable academic level for participating in an IEP, it could be beneficial for Louisiana Extension personnel to partner with local universities in their internationalization efforts.

Lastly, future research should be conducted to examine why 4-H members perceive staying with a host family as the least important activity to include in the design of an IEP. Traditionally, international 4-H programs employed by U.S. CEP have been designed to send 4-H members to live with foreign host families. In a study conducted by Arnold et al. (2014), 4-H IEP participants reported that being exposed to the culture and daily rituals of the host family was the most important component of their exchange experience. Living with a host family allowed greater immersion into the culture, which resulted in a deeper reflection among participants regarding the limitations of their own global perspective (Arnold et al., 2014). However, the findings of this study indicate that a host family design may not be best suited for 4-H members in Louisiana. Thus, future research should be conducted with 4-H members in other states to assess whether this finding is specific to the population of this study, or if this finding represents a national trend among 4-H members that warrants reexamination of the overall design of international 4-H programs employed by the U.S CEP.

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Understanding Why Family Units Become Involved in the Livestock Exhibition Industry: A Collective Instrumental Case Study

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Abstract

The purpose of this collective instrumental case study was to understand the motivational factors that support families' decisions to become involved in livestock exhibitions. The expectancy value theory served as the theoretical lens, and a review of literature led to four issues necessary for exploration. Four typical family cases were identified for the study, and interviews were conducted to understand the phenomenon. Based on the data, five In-Vivo themes emerged: (a) showing is a family tradition*, (b)* bonds us together*, (c)* on the job training for life*, (d)* joys and discomforts of agricultural life*, and (e)* the show industry*. It was concluded that families value tradition, family togetherness, the agricultural community, work ethic, and the development of life skills critical for the success of their children. Winning, as traditionally defined in the show ring, was not the expectancy. Rather, families expected to grow together, enjoy their time, and be competitive. The perceived family utility outweighed the noted costs. It was recommended that all stakeholders in the livestock exhibition community identify ways to enhance family involvement and work to reward ethical behaviors.*

The Journey Toward the Purple Banner

(Opening vignette) Approximately 7,000 students and their families crowded onto the Oklahoma State Fairgrounds last week in hopes of taking home a purple ribbon. Exhibiting livestock seems to be woven into the tradition of rural families in our communities and schools, but have we created a monster that cannot be tamed? Many of the students that crowd into various barns across the nation each year are students in agricultural education programs – publicly funded, school-based programs intending to build career skills in agriculture. Teachers are required to leave their classrooms behind in pursuit of that famous purple banner. It was announced recently that millions of dollars are spent on these projects statewide. Is this investment yielding the results that were intended? I spent some time with one of these show moms *at a recent Oklahoma junior livestock show and asked why she was so invested when research indicated students were not gaining the agricultural career or STEM skills so important to the program. I was surprised by her answer. "That is not the primary reason we show at all! Though I hope those skills are developed, we show for a very different reason."*

This opening vignette begs the question of interest to this study, "Why do families choose to become involved in livestock exhibitions?" Research over the last thirty years (Davis, Keith, Williams, & Fraze, 2000; Randell, Arrington, & Cheek, 1993; Rusk, Machemes, Talbert, & Balschweid, 2003; Wooten & Rayfield, 2013) has identified a number of benefits of livestock exhibition, including skill development, STEM integration, family cohesiveness, life skill development, social relations, and financial support for education. However, which of these, if any, serve as the primary motivation for *family* engagement in exhibiting livestock?

Development of Issues: Review of Literature

Family dynamics have changed drastically over the past 50 years because families no longer have to rely as heavily on each other and do not spend as much time together as they once did (Bureau of Labor Statistics, 2015; Hareven, 1977). Because of the limited amount of time families spend together, they are not as unified as those of yesteryear (Bureau of Labor Statistics, 2015). This trend has implications for public education. "The evidence is consistent, positive, and convincing: families have a major influence on their children's achievement in school and through life" (Henderson & Mapp, 2002, p. 7).

Researchers have concluded that a family's culture is developed through active engagement with each other (Pai, Adler, & Shadiow, 2006; Roy, 2012). Thus, the more time a family spends together, the better defined the unit becomes. Because of its emphasis on leadership development, agricultural education has long been known as a medium for building relationships through ". . . a love and understanding for agriculture, educating students and adults as to its importance, and the promotion of literacy throughout educational and community systems" (Dailey, Conroy, & Shelley-Tolbert, 2001, p. 19).

It is possible that families who participate in the livestock show community do so, intentionally or otherwise, as a means to improve or cultivate their family's culture (Davis, et al., 2000). Families of the past relied on each other to survive (Hareven, 1977). Each member had a specific role within the family (Hareven, 1977). Often, roles were identified and defined according to sex and age (Hareven, 1977). Each family unit knew its values and beliefs, and decisions were made together (Hareven, 1977). *Togetherness* was valued and served as the driving force behind the unity and cohesiveness of the family (Hareven, 1977; Pai et al., 2006).

Families today do not share the same dynamics (Roy, 2012). According to the Bureau of Labor Statistics (2012), the average American family spends only 2 hours together per day. The lack of time parents spend with their children is due in large part to the upward trend of mothers entering the workforce. With both parents engaged in employment, parents are less accessible to their children today than ever before (Sayer, Bianchi, & Robinson, 2004). This lack of *togetherness* is causing family culture to suffer (Roy, 2012), having a negative effect on the "knowledge, beliefs, values, skills, behaviors and traditions" (Pai et al., 2006, p. 4) of the family unit.

Historically, exhibiting livestock has been considered a *family project* (Davis et al., 2000) that allows students to earn prizes for the quality of their project, as well as their work ethic (Rusk, Summerlot-Early, Machtmes, Talbert & Balschweid, 2006). Livestock exhibitions can serve as a motivator for students who wish to raise livestock projects (Bird, Martin, & Simonsen, 2013). Over the past several years, livestock shows have witnessed an increase in participation (Oklahoma Youth Expo, 2016; Rusk, et al., 2006). Specifically, students in Oklahoma participate in multiple livestock expositions, such as the Oklahoma and Tulsa State Fairs and the Oklahoma Youth Expo (Peck, 2016). Despite the decline of rural communities, Oklahoma has seen an increase in livestock show projects with over 7,000 students competing in the 2016 Oklahoma

Youth Expo alone (Oklahoma Youth Expo, 2016). Because the number of youth in Oklahoma who are involved in livestock exhibitions continue to escalate, it is important to understand the phenomena behind why families choose to invest time, energy, and money into this experience.

Researchers have determined numerous benefits to exhibiting livestock. Chief among them are the development of important skills necessary for life and employment. Specifically, junior livestock projects have been shown to improve students' science, technology, engineering and mathematics (STEM) competencies (Wooten, Rayfield, & Moore, 2013). In addition, livestock exhibition projects help students develop personal skills, such as self-confidence, decision-making, problem solving, and sportsmanship (Davis et al., 2000; Rusk et al., 2006).

Unfortunately, due to the competitiveness of livestock exhibitions, all that glitters is not gold. Research has acknowledged that unethical practices occur at youth livestock exhibitions and are often a direct result of adult involvement (Connors & Dever, 2005). Therefore, if the intent of exhibiting livestock is to increase the knowledge of youth and develop their personal skills (Rusk et al., 2006), it is imperative to understand why entire family units choose to become involved in livestock exhibition projects in Oklahoma.

Theoretical Lens

Our research team viewed each of the cases through the lens of the expectancy-value theory proposed by Eccles, et al. (1983). Through this lens, theorists argue that, "an individual's choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity" (Wigfield & Eccles, 2000, p. 68). Expectancies for success are defined as "children's beliefs about how well they will do in an upcoming task" (Wigfield, 1994, p. 52). Expectancy has been described further as a product of both task difficulty and domain specific self-concept (Eccles et al., 1983). Task value has been conceptualized as a construct built on four major components: (a) attainment value, (b) intrinsic value or interest, (c) utility value, and (d) cost (Eccles, 1987). Attainment value is the importance of doing well on a given task. Intrinsic value is the enjoyment one finds in completing a task. Utility, or usefulness, refers to how well a task fits into an individual's future plans. The first three components are often referred to as the elements of a task that effect the "positive valence" of a task (Eccles & Wigfield, 1995, p. 216). The fourth and final component – cost – refers to what is lost, suffered, or sacrificed to complete a task, and is described as the negative valence of a task (Eccles & Wigfield, 1995). Reflection on the model prior to case entry spurred a number of curiosities that ultimately guided issue development.

Focus of the Case through Issues Identification

The use of *issues* "draws attention to problems and concerns" (Stake, 1995, p. 16). Further, in an instrumental case study it is essential to utilize the case, defined by Stake as Θ, to focus fully on each of the issues, noted as ϑ, which are the central focus (Stake, 1995). Issue questions force attention to "complexity and contextuality" (p. 16). For this instrumental, collective, case study four issue questions guided the study.

ϑ_1: What values drive a family's decision to exhibit livestock?
ϑ_2: What are the task expectancies that provide the motivation to participate?

ϑ_3: What are the most significant family costs associated with the decision to exhibit livestock?
ϑ_4: Is the perceived utility greater than the perceived cost?

A Search for Understanding: Methods

A qualitative design was selected to describe the role of family in exhibiting livestock. This approach allowed for meaning to be found from observations in a natural setting (Creswell, 2013). Previous studies conducted in this area have been successful using a qualitative approach (Davis, 1998; Rusk, Summerlot-Early, Machtmes, Talbert, & Balschweid, 2006; Williams, 1998); however, they have not used a lens that focuses on family culture. A case study approach provided an in-depth analysis of typical Oklahoma livestock show families (Stake, 1995). The use of methodological triangulation provided insight into the case, and a semi-structured interview format allowed for exploration of concepts arising during the interview (Stake, 1995).

The study utilized the ontology of realism and a constructionism epistemology. Realism asserts that reality exists outside of the mind (Crotty, 2003). For realists, entities of the outside world are real, but are interpreted differently based on an individual's experience. The ontology of realism is compatible with constructionism in that something is socially constructed but exists because of the already set expectations of the interaction or experience. However, those set expectations can change. In a constructionism epistemology, meaning is constructed through the interaction between the participant and the experience (Denzin & Lincoln, 2000). In this study, meaning is co-constructed through the interactions of researchers and participants (Denzin & Lincoln, 2000). The interaction and engagement between the two parties in this study allowed us to explore the multiple ways participants made meaning in the experience of exhibiting livestock. The ontology of realism and the epistemology of constructionism informed the theoretical lens of Expectancy-Value (Wigfield & Eccles, 2000).

Typical case selection was used to identify four families to participate in the study. A typical case was defined as an Oklahoma family that has at least two children raising livestock for exhibition purposes and who would not be considered an elite legacy show family. An elite legacy show family is a family who has for generations competed in livestock shows. Since a typical case selection was used, an elite legacy show family would not be an accurate depiction of a typical Oklahoma show family. Experts identified families who fit the criteria. Four families of at least four members were selected to participate. Each case consisted of immediate family members participating in the livestock projects. Using a focus group format for the interview was advantageous to examining the case as a whole (Creswell, 2013). Collective observations allowed for observation of the entire case in its natural setting (Stake, 1995).

Individuals were invited to participate over the phone. Three different collection methods were used to achieve triangulation. First, a one-hour, semi-structured interview was conducted in a focus group format and included all immediate family members. Questions focused on the family's involvement in raising their livestock show projects. The focus group interviews lasted between 30 minutes to an hour. Observations were recorded during the interview and while touring the families livestock facilities. Field notes were be taken in detail and were guided by the research questions. Finally, families were also be asked to share artifacts that may provide further insight. Artifacts included photographs, awards or audiovisual material.

Each interview was transcribed and field notes and artifacts were complied. Each line of the interview was numbered to help facilitate the coding process. In-Vivo coding was used for the first cycle coding method as described by Saldaña (2013). Codes used the participant's direct words to allow for reflection on their true meaning (Saldaña, 2013). This method of coding was ideal for a group that included younger children because it allowed for the use of their own words rather than the researcher's interpretation of their words. Once initial coding was complete, a secondary cycle coding method was used to metasynthesize data. Pattern coding was used to discern relationships between codes and determine emergent themes (Saldaña, 2013).

In this study, we used Tracy's (2010) criteria to build quality into the study. Sincerity and ethical procedure were achieved through transparency throughout the data collection and analysis processes. Additionally, through in-vivo coding, we stayed true to the participants' observations. We reached out to a representative from each family and requested permission for their family to participate voluntarily. Participants also were informed we intended to publish the findings and were advised of confidentiality through the consent form. Pseudonyms were assigned during transcription for confidentiality. Credibility established dependability of the findings provided by thick description, and context in field notes. Crystallization was chosen as a measure of credibility as we gathered data through various methods and frameworks to bring truth to the larger picture. Through the use of data, field notes, collection of artifacts, and previous research, multiple accounts of the same story were given (Tracy, 2010).

Reflexivity is important to any qualitative study to understand the researchers' background with the area they are studying and any bias they may bring to the study (Creswell, 2013). The four researchers involved in the study included two teacher educators, one instructor, and one graduate student – all with a background in agricultural education. The teacher educators taught agricultural education in the public school system and are involved in preparing preservice teachers at Oklahoma State University. All four researchers were active in their respective livestock show communities growing up, and two of the researchers are currently active as livestock show families. Therefore, as researchers, we are familiar with the dynamics of the livestock show community and, thus, the need to be aware of and avoid existing bias (Tracy, 2010). To become self-aware of biases and experiences and ensure that the participants' voices were heard, bracketing was achieved through memo-ing (Tracy, 2010).

Description of Cases

Most homes are adorned with family photos. These homes were no different, except their family photos were set at fairs and county shows, with a large group of *extent family* surrounding their livestock projects. Interviews occurred at kitchen tables and in living rooms. As we walked through their barns, they shared the details of their projects like most people would describe their kid's honor status or touchdown record. With each case examined, it was increasingly more evident that this was a large part of their family identity.

The first family to participate was the Roberts family. The Roberts' bleed blue and gold. Both parents, Ronald (father) and Deborah (mother), were active in FFA when they were in high school and they knew that they wanted their three girls, Leslie, Kayla, and Hazel, to follow suit. They have been raising show cattle actively for the last five years, and spend 10 plus hours per week in the barn. The second case examined was the Johnson family. The Johnson's have three kids, two older daughters, Emma and Olivia, and a young son, Logan, who were motivated to exhibit sheep because of their father's active involvement in the livestock show community. For the past seven years, the Johnson kids spend most of their afternoons at the barn together working their combined 20 plus sheep. Their parents, James (father) and Abigail (mother), provide support, expertise and help when needed, but believe that at the end of the day that it is their kids' responsibility to care for their projects. The third case studied was the Wagner family. Greg (father) showed livestock growing up and served as an agricultural education instructor for ten years, and he and his wife, Eliza, have always wanted their kids to show as well. Their daughter, Jamie, started exhibiting swine and goats when she entered the eighth grade. Even though she has since graduated, their son, Thomas, has continued and expanded their project program. The Wagner's keep their projects at the school farm and spend every evening together caring for them. The final case was the Burns family. Their daughter, Alyssa, and son, Noah, have shown cattle and goats but their main project is showing sheep they have raised themselves. Their barn is directly across the street from their residence, and they spend countless hours each day caring for their animals.

Assertions and Conclusions

From four focus group interviews, two of the four researchers extracted 165 and 164 process codes from the data. The research team negotiated 55 focused codes (secondary codes), which were compressed into 28 tertiary codes or categories. The categories were deduced into five themes; *Showing is a Family Tradition*, *Bonds us Together*, *On the Job Training for Life*, *The Joys and Discomforts of Agricultural Life*, and *The Show Industry*.

Theme 1: Showing is Our Family Tradition

In this category, families discussed how they got started as a family unit in showing, being in agriculture, the shared traditions, showing as a family and the investment of showing. The first subtheme under "showing is our family tradition" (3:755) was the importance of "we're around agriculture." Families discussed why they got involved in exhibiting livestock. For all four families, at least one of the parents showed or was involved in agriculture and were "rooted" (4:273) in the industry. When discussing why families started exhibiting livestock, parents would often observe how it was when "I did it in high school and you know, it was a good experiences and I wanted my kids to be able to do it" (4:6-7). When the children in the family discussed showing they stated; "it was never was a question, it was something we were going to do" (3:42-43) and "It's kinda the way we've been growing up" (1:679).

As a show family, traditions have been adopted around the raising and showing of livestock and the reflection and celebration of the show year. Families stated "we've never really taken vacations anywhere and so its really one of those places that we, went somewhere together, it was probably the stock shows" (3:507-509). One participant stated,

> Some people play golf . . . . This is something [exhibiting livestock] that we've chosen to do. We enjoy it. This is our family activity. We get home in the afternoon and we change clothes and we go up there and spend some time together and that's just kind of our thing that we like to do as a family (3:119-123).

When asked, "What are your traditions?," all four families stated, "Spring Break is OYE" (4:220, 2:405, 1:697, 3:218). James Johnson stated, "After the show is over, we sit down and talk about what went well, what didn't, and what we could do better, how we could improve" (2:414-415). Within traditions, participants showed family ownership of experiences by the use of the word, "we," or the indication that showing is a family event. Instead of referring to the youth's projects, both parents and their kids referred to activities as something "we do." For example, when starting a project program, Leslie Roberts stated, "So we kind made that decision together" (1:32). Moreover, it was reported that showing is worth the investment because it is something they do as a family. Families stated the importance of not only having "fun" (3:13), but also having "fun together as a family" (1:616). For example, "you can have memories from a cruise but you won't have memories like you have from the livestock show" (3:126). Families participated "for the enjoyment" (3:115). Since it was done as a family, "it was worth the investment" (2:38).

Previous literature by Bird et al. (2013) indicated that SAE projects created from intrinsic motivation are more sustainable and lead to greater outcomes. Internal motivators are more effective than external motivators and agricultural education should focus its efforts on helping students find internal motivation (Bird et al., 2013). Families in our study listed numerous internal motivators as reasons for participation such as family identity, continuing tradition, and enjoyment. Enjoyment as a motivator is consistent amongst both our study and Bird et al. (2013).

Them 2: Bonds Us Together

The second theme to emerge was, "Bonds Us Together." Although immediate family was the core of the study, the results found that family also includes the bigger showing community. Within the large community, families discussed community, support, friendships, and mentoring. Within the immediate family, subthemes included stronger bonds, gender roles, and working together.

When asked about the larger showing community, participants identified them as "extended family" (3:607), "tight-knit" (3:582) and a "big community" (2:495). When talking about the extended family, parents stated that other families "took us under their wing" (1:639) and were "incredibly welcoming" (1:633). Students reported that through exhibiting livestock, they "have a lot of unrelated brothers" (4:756) and "have a lot of friends because of [showing]" (4:31). Mentoring was also an important component of the community as indicated by, "Ronald has been mentored by a lot of men in the show barns and those tables have turned really quickly as he's mentored a lot of people" (1:646-647). Additionally, participants acknowledged the shared values within the community in statements such as, "I think it's that fraternity of being around people that, have the same values and the same principles that you do" (3:646-651). One of the participants stated “That’s why I love agricultural education and FFA so much, the values of what the program was designed for really aligns well with how people raise their kids” (4:522).

Working with livestock projects and showing has turned into “required family time” (1:269) that has brought the participants “closer as a family” (1:613) and created a “strong bond” (2:146). Showing is viewed as “our family activity” (3:121) and “gives opportunity to spend some time together” (3:122). Additionally, families “work through and learn through all kinds of relationship issues” (1:606-607). When discussing building a stronger bond, one participant stated, “It’s helped us as parents learn a lot about the girls and their behaviors. Hopefully the girls have learned a little bit about our strengths and weakness and what makes us tick” (1:606-613).

Roles of each family member were discussed throughout the focus groups. Interestingly, when asked, family members identified roles consistently among gender. Mothers identified themselves as, “behind the scenes person” (2:222), “encourager” (1:618), and “in charge of food for the humans” (1:534); whereas fathers were identified, “this is the money bags (pointing at father)” (3:403), “I support them financially” (4:305). Roles in the families were also identified in terms of jobs related to taking care of livestock. “Everyone has a role” and families “share the load” (1:253). Work was usually done “on a rotation” (1:497) so the workload was shared as “the more hand you have on deck, the faster it goes” (1:510). “If there’s a task at hand that we need to accomplish as a family then we can probably get it done” (2:304).

Davis et al. (2000, p. 122) also found that livestock shows are an opportunity for families to “travel as a family unit that is working toward a common goal.” Consistent with what we found, they learned that emotions play a role in the family learning about each other and open up the opportunity for family bonding (Davis et al., 2000). Families in both studies also identified that raising livestock has taught them to work together to get the job done (Davis et al., 2000).

Theme 3: On the Job Training for Life

All four families felt that raising and showing livestock was “on the job training for life” (1: 663). This theme emerged as the participating families felt that through showing livestock they had the opportunity to learn a variety of “great life lessons” and learn “skills that employers want” (1: 361-362). Eliza Wagner stated, “We’re choosing to invest this in our kids and in the invaluable lessons” (4:770-772). Life lessons these families felt they were learning through their livestock experience included “how to take care of something other than themselves” (3:28), “to be humble and to… accept winning with dignity, but also accept defeat” (2:380-381), and “hard work doesn’t always get rewarded but it always pays off” (4: 537).

Families also attributed learning important career skills from their livestock projects. All families felt that showing livestock “instilled tremendous work ethic” (2:91). They compared their childrens’ work ethic to their peers. Ronald Roberts stated, “I’m very impressed by our girls and their ability to work and their willingness to work because there’s a lot of kids who don’t” (1:246-247). Along with hard work, they all felt that “the responsibilities of just taking care of animals” (3:197) could translate to the work place. Something as simple as the ability to “show up to work on time” (3:273) could put them at an advantage in future. Some of the parents felt that their children were responsible for their own projects and their role was really just to assist. James Johnson stated that his kids “really do it themselves” and he is “just sort of an oversight and making sure things are going okay and assisting with problem solving” (2:214-216). Noah explained that when he was younger his dad used to help a lot more “but as we got older, it kind of declined and now me and my sister pretty much do everything” (4:311-312). Finally they felt that their children were learning time management through having to balance school, their livestock projects, homework and other activities. Raising livestock projects helped turn their children into workers further employers could “depend on” (3: 266-269). James Johnson stated, “I feel pretty comfortable that when they come to a college campus and they start pursuing that higher level academic degree, they're going to be prepared to time manage and balance the academic requirements” (2:93-94). Families value the opportunity for personal growth and ‘take advantage . . . of teaching them through those times” (1:361-363).

These findings align with previous literature stating that students are learning skills related to personal development (Davis et al., 2000). They also found that students are learning responsibility and work ethic. Davis et al. (2000) further confirmed our findings that parents want to play an active role in helping their students learn from their livestock projects. They claimed that parents take on a teaching and modeling role to help students learn desirable character traits (Davis et al., 2000). Participants in a study done by Dailey et al. (2001) identified that character traits were more desirable outcomes for their students then academics.

Theme 4: Joys and Discomforts of Agricultural Life

“In the creed it says for I know the joys and discomforts of agricultural life” (1:330-332). This theme emerged from two tertiary themes: “Realize that you’re part of feeding the world” and “Learn a lot about sacrifice.” These two subthemes truly convey the reoccurring idea from all four families of seeing both the enjoyable and challenging parts of agriculture. Each family mentioned that there are many joys associated with raising livestock. The Burns family found a purpose in their projects. Mia stated:

> I don’t think a lot of kids that are not involved in agriculture or even FFA understand where their food comes from and just that aspect of it. To realize that you’re part of feeding the world, you know. I think that that, I mean, is pretty remarkable to know, that, you know, you’re part of people being able to eat. (4:131-134)

Showing livestock allows these families to feel like they are “contributing to our county, our state, the agricultural world” (4:772). The Wagner family found purpose in an opportunity to donate their animal to a local food bank. Noah stated he chose to donate his pig not for the recognition but “because I want to do it” (3:225-226).

On the other side, these families see of the discomforts agriculture. Three of the four families shared animal death or disease related experiences. Kayla Roberts recounted losing her heifer and the negative effects it had on her. She reflected,

> It was really hard on me and I avoided going to the barn and I don’t know it’s just really upset me .. I was going through this time where I hated showing. I didn’t want to do it and it was the last thing I wanted to talk about. (1: 319-325)

The Wagner family learned that death and disease is a part of the learning process and they have come to except the reality that "if you don't want something to happen [to livestock projects], don't own 'em" (3:542).

These families have also discovered that through this process "you learn a lot about sacrifice". All four identified three areas of sacrifice: time, money and opportunities. The Johnson family described their daily time commitment:

> When we're in showing season, we get up and go feed in the morning. And then after school we will be at the barn for at least three hours every night. Just working sheep, getting sheep ready for shows, yeah it's a lot of time commitment (2:50-52).

Each family expressed that they "just don't have a lot of free time" (2-130). The all of the participating students stated that they "don't have much time after school to do very much" (3: 323-324) because they are having to invest so much time in their projects.

All participants also identified money as a large sacrifice. They saw their livestock projects as a "big financial commitment" (1: 348) and realized "it takes a long time to develop a program that money starts coming back around" (1: 349). The Johnson family acknowledged "the financial stress" showing livestock puts on their family. Finally the sacrifice of opportunities such as other activities and time for friends was identified by each family. The student participants shared their experiences of having to set priorities and give up other activities to show livestock. Emma Johnson stated:

> We both (Emma and Olivia) used to be involved in sports. And we were both girl scouts when we were little, we both took piano lessons, but as time goes on we really started to prioritize and figure out… this is what I want to do, this is what I'm committed to and some of the other stuff we were just kind of like- it's just kind of taken time that we would rather spend doing what we love. (2:116-120)

Noah Burns also recounted missing "a lot of football practices" and social events due to having to care for his animals. Sacrificing time with friends was also mentioned in all four interviews. Although most students are available to hang out on the weekends, the participants often have to tell their friends "they can't do that this weekend because they've got a show coming up" (2: 124-125). The students especially saw this as a challenging sacrifice stating it required them to make "adjustments with friends" (1: 375).

Davis's et al. (2000) also found students developed their character through the high points and struggles they were exposed to while showing livestock. In support of our findings, they also found families experience both the highs and lows together, leading to learning opportunities (Davis et al., 2000). These similarities provide reassurance however we have found that our livestock families have deeper struggles than losing or dealing with the reality of selling their animal at the end of the show (Davis et al., 2000).

Theme 5: The Showing Industry

Eccles and Wigfield (1995) described cost as the negative valence that would draw one away from an activity. Though there were a number of sacrifices and challenges noted in each of the cases, the true cost was most often connected to what Greg called "the showing industry" (4:161). Greg explained,

> The showing industry for me has changed a lot over the years. When I was involved in it, you didn't have so many of the livestock jocks and now I think it's . . . it's turned into a business for a lot of people. Um, I don't want to say the program's completely gotten away from what we're trying to do here, but I think a lot of it, you know, to be successful and to be honest in doing it, is really hard (4: 161-165).

In analyzing each of the cases, it was apparent these families perceive that exhibiting livestock has become more of an adult game, requiring greater financial resources, and riddled with those who do not go about the process honestly.

The financial burden was a sub theme that emerged. William shared that, "one of the things that I struggle with the most is we've gotten the show program to such an investment level that it's hard for the average person to get into it" (3:288-290). "I wish there was a way to get the skills that you gain through it but not have such an investment responsibility" (3:296-297). The need for increased financial investments was a result of the increased rigor of the activity. "Today you've got, gosh, feed costs that are so much now. . . and keeping them [show swine] in warm places, keeping wood chips, the facilities. Twenty years ago, it just wasn't that way" (3:298-300). "There's a lot of people that spend a lot of money in the livestock industry and we're not in that category" (2:175). Closely tied to the financial burden of remaining competitive in the show industry was the time and effort required. One case shared that "dad lives in the barn" (1:174). In describing the routine of the family one father shared, "we have a guy that comes and works with the girls once every two weeks. He'll work with them at shows, run over stuff. They are always being trained" (1:464-466). The burden and effort to remain competitive seemed to be approaching the limit in respect to perceived utility.

The final subtheme that emerged was a frustration with cheating. One father explained that, "We don't cheat. We will do it honest or we will not win. We raise our own animals. My kids don't show up to the show and grab a halter and go into the ring. They've earned it" (4:507-509). Eliza shared, "When you go in a show ring and [someone] beats you because. . . someone else has done the work for them – It's hard for our kids to understand how that is fair (4: 171-184). Though there have been numerous frustrating moments, as shared by Abigail, her children have learned that when they leave a show they know they have maintained their family's moral code (2:183). Inherently, this implies not everyone has done the same. Though families shared that showing has become more unethical, the discussions in all four cases support the top unethical practices in livestock exhibition reported by Nestor (2000) and Connors and Dever (2005): (a) paying extreme prices for animals to improve chances of winning, (b) parents or teachers preparing animals for show rather than youth, and (c) the grooming of show animals by professionals rather than youth. This is tied to the general idea of this theme – that exhibiting livestock can, and has, shifted to more of an adult industry rather than a child's learning experience. Table 1 summarizes the resolution of each of the four issue questions.

Table 1
Key Issues and Resolution

Issue Question	Resolution
ϑ_1: What task values drive the decision to exhibit?	Family's attainment value is grounded in their self-identity as a show family. Honesty, work ethic, tradition, family unity, and agricultural community typify this identity.

ϑ_2: What expectancies for success do families have?	Winning is not operationalized as a child's final place in a class. Rather, success seems to be tied to the children's' life skill development and family enjoyment of the activity.
ϑ_3: What are the family costs?	Costs include unrealistic financial pressures, a growing trend of *cheating* through professional assistance, and time commitments that actually prevent families from spending time together.
ϑ_4: Is utility greater than cost?	Families see the utility as far greater than the costs. Many of the costs actually become lessons for the children exhibiting livestock.

Discussion and Praxis

"The real business of case study is particularization, not generalization. We take a particular case and come to know it well" (Stake, 1995, p. 8). In that spirit, there is a great deal to learn from these four cases. First, the exhibition of livestock as a family activity was effective in building family relations in all four of these cases, which is consistent with the findings of Rusk et al. (2003) and Davis et al. (2000). Henderson and Mapp (2002) present overwhelming evidence that engaged families lead to better school performance, and suggest that all families could benefit from special efforts to engage families. Could livestock exhibition be that special effort? Regardless of where animals are housed, livestock exhibition should be a family event. Relieving parents of the responsibilities associated with livestock exhibition is detrimental to, not only the youth leaders assisting students, but also the families that are missing this opportunity for engagement. Strengthening family structures should not be overlooked as an important rationale for livestock exhibition.

Second, it was interesting that the development of job specific skills related to raising livestock were not often mentioned. Rather, families found it important for their children to be immersed in the agricultural community and develop an appreciation for the industry. Wooten et al. (2013) suggested that agricultural education teachers should work with those teaching *core* courses to standardize and deliver STEM concepts, implying that this activity would improve school performance. Based on overwhelming evidence that family engagement is one of the best predictors of school performance, would it not make sense to focus on getting more families involved instead? In these cases, families do not perceive academic performance as an expectancy or value associated with livestock exhibition. Family engagement could be the most valuable product of junior livestock exhibition.

Finally, it is essential that livestock exhibition maintain a realistic balance. Currently, each family found the utility to outweigh the costs. However, it did appear that the perceived costs were steadily growing, and the growing financial, ethical, and temporal demands were taxing at times. Are we creating a monster that cannot be controlled? What structures are in place to support the culture of community, love of agriculture, ethical behavior, and the value of hard work? The unethical activities noted by Connors and Dever (2005) have only become more prominent and are taking a toll on families' motivation to participate in livestock exhibition.

(Closing vignette) The show mom *wasted no time sharing why her family makes the enormous investment in junior livestock exhibition. "Our family shows because it is a family tradition. We show because a family that shows together stays together. Our children will know the joys and*

discomforts of an industry that means so much to us. . . and the world. We put our money into this activity because it trains our children for life. There are costs, but for us, the benefits are invaluable. We are a show family!

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CDE evaluation, equity, and cultural strength in agricultural education

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As the U.S. population grows and diversifies at a rapid rate, the number and importance of agricultural problems increase to unprecedented volumes. As a discipline charged with developing the leaders, thinkers, and educators in the agricultural sector, we propose agricultural education must consider adjusting the modes of agricultural education to reflect the changes in the agricultural sector and U.S. population demographics. This research uses the intimate relationship between agricultural education and the FFA organization as an entry point for evaluation of equity in agricultural education. Using a quantitative measure called RAS, we determine if FFA's Career Development Events (CDEs) are the most equitable way for students to competitively engage in learning agriculture. Comparisons of RAS among states and regions show that particular regions can be up 3 times more likely to achieve top CDE placements, specific states are as much as 60 times more likely to achieve top placements, and state contest scheduling can affect the likelihood placement in national CDE competition. These findings suggest inequity among states in CDE competitions which impact student success. This work concludes with a philosophical discussion of the impact inequity has for the growing population of agricultural programs, with an emphasis on urban programs.

Introduction and Review of Literature

As the U.S population grows and its demographics quickly become more pluralistic, agricultural industries and researchers are simultaneously responding through comparable pluralism in agricultural inquiries. These inquires can be found within the context of climate change, fisheries and wildlife, economic responses to global population density, and various other global agriculture issues that are more pressing now than at any time in history (Gadiraju, Patel, Gaziano, & Djoussé, 2015; Le Heron & others, 1993; Maunder & Piner, 2015; Reisch, Lucia; Eberle, Ulrike; Lorek, 2013). To avoid an anachronistic existence, agricultural education must embrace demographically- and ethnographically-heterogeneous groups of students and educators, whose diverse perspectives and training contribute solutions to these pressing topics in agriculture related science, business and finance, and social sciences. This current study will explore one aspect of agricultural education's adaptive capacity by looking further at the way in which CDE competitions are evaluated, as well as the equity of competition among states and geographic regions. A relatively simple method has been developed for the purposes of making robust comparisons of states with varying FFA populations and reporting performance variations among states and regions. Utilizing performance data, this study explores the implications for creating equitable programming, with a particular emphasis on new, urban, or underperforming agricultural education programs.

Career Development Events (CDEs) are integral to the mode of secondary agricultural education praxis that is widely accepted today. Secondary agricultural education takes place in accredited high schools throughout the United States, and for decades has relied upon the Agricultural Education Three Component Model as a representative theoretical definition (D. B.

Croom, 2008; Phipps & Osborne, 1988) although other models exist (Hughes, Matthew; Barrick, 1993). This model defines secondary agricultural education as the intra-curricular intersection of three components: (1) Classroom instruction, (2) Supervised Agriculture Experiences (SAEs), and (3) A student leadership organization known as the FFA; these three components serve to develop students, both personally and academically (Dailey, Conroy, & Shelley-Tolbert, 2001; Phipps & Osborne, 1988).

The model's primary goal is to embed comprehensive and holistic educational experiences in agricultural education pedagogy (B. Croom, Vaughn, Talbert, & Lee, 2013; National Research Council, 1988). It is questionable whether a uniform balance between the three components is regularly achieved in practice and it is common and encouraged for teacher to readily adapt their programs to the needs of their students. Evidence for a lack of uniform balance among the components is the difference in numbers of students who participate in agricultural education and those that are active FFA members and complete SAE projects (B. Croom, Vaughn, Talbert, & Lee, 2013; Dyer & Williams, 1997). Despite these gaps, the FFA component is has been a thriving cornerstone of both secondary and post-secondary agricultural education since its inception in 1928 (D. B. Croom, 2008). This organization provides students with opportunities to attend local and national leadership conferences, accelerate their personal development, and hone their professional and vocational agriculture skillsets at CDEs. The FFA is typically of high value to agriculture students and teachers, as well as key stakeholders throughout the agricultural education community (Talbert & Balschweid, 2004).

CDE competitions provide an opportunity for students to compete locally, regionally, and nationally to develop and display real-world skills related to the agriculture industry. CDE victories are rewarded with physical keepsakes such as plaques, and monetarily through scholarships which can be applied toward post-secondary education (Franklin & Armbruster, 2012). CDE state competition structures are currently decentralized and autonomous, resulting in a variety of associated administrative structures. A state-by-state comparison of the qualifications process for national or state CDE competitions shows that decentralization has become a highly important theme due to the many different versions of this process. Some states aim to mimic national competition structures to best prepare their students. Top success in CDEs is directly linked with exposure, networking, and recognition with industry professionals who are FFA stakeholders. As a result, CDEs serve as not only student development vehicles, but also largely determine the trajectory of a student's path in their post-secondary vocation as well as in higher education.

The application of insights gained through CDE evaluation can translate into improvement of agricultural education programs for students nationwide through more equal access to opportunities gained by who experience success at the National CDE level. Beyond that, widespread deviation among state-level competition procedures can lead to programmatic differences at the local level. While previous studies have explored and evaluated CDE administration practices, they have largely been limited to an evaluation of a single contest or a broad evaluation on the CDE needs. (Franklin & Armbruster, 2012; Herren, 1984; Johnson, 1993; Smith, Mack W.; Kahler, 1987) . Other researchers have looked at the implications and efficacy of the three component model, but often without critical consideration of its history, development, and cultural limitations. For example, one study developed quality indicators for the FFA and SAEs, but uses a three component model and its subscribers as a define of quality rather than offering a critique that considers models not currently in place (Cordell & Iii, 2008; Jenkins & Kitchel, 2009). Evaluation of the model's components may be regarded as a circular process, one that stems from the assumption that it is a theoretical and objective pedagogical tool. Such evaluations are common in agricultural education, as stakeholders commonly perceive the model as a sound theoretical foundation upon which to build upon, rather than a flexible informational tool infused with tradition and subjectivity.

Methodologically, this research extends our previous exploration of the most accurate way to evaluate CDE competitions and compare CDE scores. In particular, this work utilizes the Relative Achievement Score (RAS) framework to explore if CDE scores are equitable across National FFA CDE Competitions spanning from 2009 – 2015, and to make inferences on and draw conclusions about effective overall CDE implementation. We question philosophically if inequity in CDEs warrants systematic changes in agricultural education, or if individual programs could create an agricultural pedagogy that circumvents CDE competition with the intention of drawing upon students' resources, strengths, and sources of capital. This leads to the following question: Should new, urban, and underperforming programs adopt the CDE sub-component of the three component model when learning outcomes, such as understanding irrigation and production in cities, can best be attained using other pedagogical resources?

Theoretical Framework

This study is driven by two key principles: the Social Cognitive Career Theory (SCCT) (Lent, Brown, & Hackett, 1994) and the Social Structure of Competition (SSC) (Burt, 1992). The SCCT explains the social dynamics that mediate a student's "career-relevant interests, academic and career choice options, and performance and persistence in academic pursuits" (Lent et al., 1994). Moreover, the SSC proposes three forms of capital (financial, human, and social) that are the primary contributors to competition performance. This principle focuses on economic competition, but has been modified and adapted to the situational context of CDEs. In our adapted model, the main sources of capital are environmental, human, and social. Environmental capital refers to non-renewable resources in a student community; human capital has to do with a student competitor's set of unique natural abilities and individual traits; and social capital relates to access to people-resources which heighten a student's learning and competition abilities.

When applied to the overall scheme of CDEs, these theories can be used in conjunction to support the evaluation of both CDE and students' post-secondary success and involvement in agriculture. In particular, a quantitative comparison can be performed to identify loci of privilege that may lead to student advantages in state-level CDE competitions and deter students outside of these loci from competitions, and ultimately studies in agriculture. If we can identify factors that contribute to disproportionate success rates, we can then uncover practices for arranging and preparing for CDEs in the most uniform and equitable manner. Lastly, these theories allow us to re-imagine agricultural education pedagogy that increases students' sources of capital, but may deviate from the accepted definitions of agricultural education.

Our adaption of the theories presented by Burt (1992) and Lent et. al (1994) posits that student competitors bring environmental capital, human capital, and social capital to CDE competitions. The sum-total of capital available to a student through access to environmental, human, and social capital will be referred to as ‘pooled capital’. From our perspective, pooled capital produces a competitive edge that allows students to realize the full potential of their abilities and develop positive outcome expectancies. SCCT can be used to predict positive outcome expectancies which direct students’ interests, goals, and performance, and is represented in the model by CDE wins and heightened opportunities in post-secondary agricultural careers and studies.

Objectives

This research aims to explore the following:

1. How geographic trends contribute to CDE achievement capacity?
2. How we can utilize RAS for evaluation of CDE score distributions throughout individual states.
3. How we can utilize RAS for evaluation of varying contest schedules i.e those that utilize a single annual window of competition and those that utilize competition throughout the academic year.
4. Philosophically discuss how inequity can impact agricultural education students of tomorrow.

Methods

Data Collection

The findings in the following sections are based on data from the National FFA archives. The archived data provided winners of all national CDE competitions in the form of new releases for each competition during the seven-year span of 2009 through 2015. Top ranking teams (1st through 10th place) for each competition were extracted, coded, and entered into spreadsheets delineated by state. Point values were then assigned for each earned win.

Raw and RAS Calculations

Raw scores for each state were calculated by taking a weighted sum of every contest won per state for the specific time period under evaluation. The RAS was subsequently calculated for each state by normalizing state placements with respect to its population constituency in the FFA organization (i.e. proportion of 1st placements/national membership), creating an expected normalized achievement score of 1. Descriptive data was compiled for individual states, and the cumulative number of wins in each contest was then tallied and compared to the leading industries in each state. To justify the usage of RAS as a primary tool for comparison, correlations were determined by evaluating state FFA populations and the number of wins among the middle 100%, 75%, and 47% of scoring states using a simple linear regression model.

Table 1

Point Values for Weighted Score Calculations for Placing One through Ten

Placement	First Place	Second Place	Third Place	Fourth Place	Fifth Place	Sixth Place	Seventh Place	Eighth Place	Ninth Place	Tenth Place
Point Value	1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1

Statistical analysis.

The study was designed to determine trends of CDE wins across all states. For the data collection process, all data were recorded using SPSS for Windows. The following data points served as inputs for the statistical analysis: CDE competition rank and raw score; central tendency and correlational relationship trends among these variables were further analyzed also using the SPSS statistical analysis software suite. ANOVA was then run to account for regional differences between RAW and RAS scores. Finally, turkey test post-hoc analyses were performed when associated ANOVA produced significant differences in mean values

Results

Based on this study, raw calculations were shown to be less reliable and less resilient than RAS as an evaluation method due to their lack of resistance to population variations. Utilizing RAS as an evaluative tool demonstrates problems with achieving an equitable distribution of CDE placements throughout US states. Variations in RAS among states are not directly driven by geographic trends; rather, the values show that competition structures are a determining factor in RAS.

Correlations between Raw Scores and Size of Student FFA Pool

Raw score is shown to be in direct correlation with the size of the FFA student pool in each state while RAS show no correlation. A simple linear regression depicts a strong correlation of raw score (y) as a function of population size (x) of the middle 50% of state scores (R^2 = 0.90).

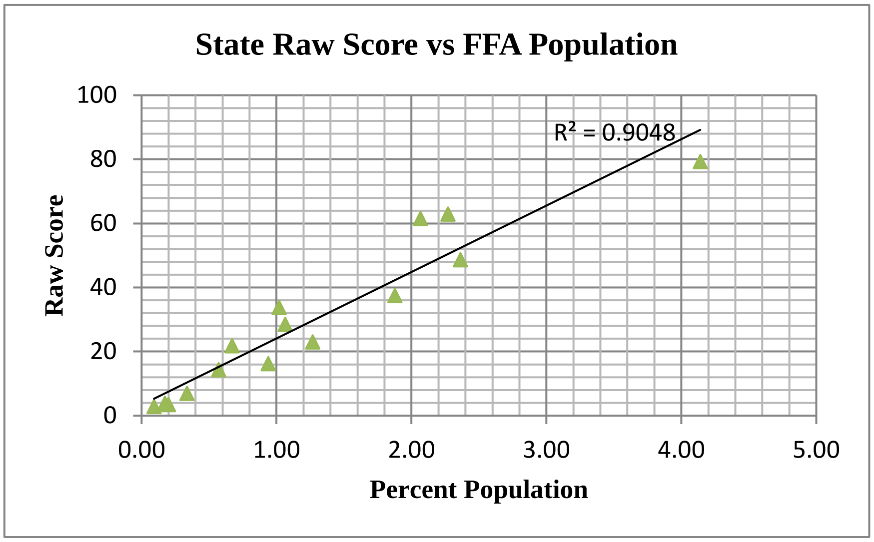

Figure 2. Graph of correlations between state populations and raw accumulations for the middle 50% of scores in National CDE placements

Regional Rankings

The percentage of raw wins and an average RAS were calculated for each region. The average raw score was 17% with a standard deviation of 7%. The average RAS among all regions equaled 1.96 with a standard deviation of 0.88.The values in Table 2 demonstrate some level of variation when considering average win values and standard deviation. However, a one-way single factor ANOVA reports that there is no statistically significant effect present among geographical regions where RAS or Raw scores at $p<0.05$ [F_{Raw} (5, 44) = 2.2; p = 0.068 and F_{RAS} (5, 44) = 0.47; p = 0.79]. Moreover, an alpha (α) = .05 cannot reject the null hypothesis that regions have equal mean values among raw scores and RAS. However, at α = .1, regional variations in raw scores are in fact statistically significant but RAS remain statistically insignificant.

Table 2
Regional Averages of Raw and RAS Scores

	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6
% of Total Raw Wins	16%	24%	18%	25%	13%	6%
Mean RAS	3.23	1.1	1.61	1.83	.96	3.03

State Distribution of RAS Scores

The data is separated into quintiles by their RAS scores. Quintile 1 contains the highest scores and quintile 5 the lowest. The data in Table 3 uses only RAS to evaluate the equitable distribution of CDE placements throughout states. The distribution of scores throughout the 50 states has a mean value of 1.3, standard deviation of 1.3, and range of 17. When grouped by descending RAS, there is a clear, linear decline in scores from the top to the lowest placing states. Arithmetic means for each quintile is displayed below the chart.

Table 3
Mean RAS for States Grouped into Quintiles

	Quint. 1	Quint. 2	Quint. 3	Quint. 4	Quint. 5
Mean RAS	m = 4.9	m = 1.7	m = 0.89	m = 0.57	m = 0.08

A one-way single factor ANOVA reports a statistically significant difference among the RAS scores of the quintiles [F (4, 45) =8.5; p=0.000033]. Post-hoc, pair-wise analyses showed that quintile 1 outscored every other quintile. Furthermore, quintile 2 averaged a significantly higher RAS than quintile 5. Noteworthy differences are present even between the closest scoring quintiles. Although the statistical analysis does not allow for the rejection of the notion that quintiles 3, 4, and 5 have even distributions of RAS, there is notable variation in the respective scores. For example, the quintile 3 score was ten times higher than that of quintile 5. This purports that a student in a state in quintile 3 (e.g. Pennsylvania) is ten times more likely to experience success than one in quintile 5 (e.g. South Carolina). The mean RAS for each quintile are detailed in Table 3 (a complete breakdown of RAS by state is detailed in the Appendix).

Below, table 4 shows RAS by contest schedule for states in the middle-scoring 75%. A consolidated schedule is defined as any state that holds 80% of more of its state competitions in a single window of time (e.g. a competition weekend) and does not allow students to compete in multiple competitions. A dispersed schedule denotes states that holds 20% or more of its contests in two or more windows of time throughout a given contest year. RAS consolidated is 2.4 and dispersed 1.6 for the middle 75% of states. At alpha = 0.05 we can reject the null hypothesis that consolidated and dispersed schedules have equal RAS scores [F (1, 17) = 6.7; p = 0.02].

Table 4
Scores for States with Normal to Moderately High RAS Scores Grouped by Contest Type

Contest Type	State Score										Mean
Consolidated Schedule	0.91	1.16	1.88	1.88	2.14	2.16	2.61	2.99	3.13	3.24	2.24
Dispersed Schedule	0.98	0.99	1.02	1.12	1.51	1.65	1.65	1.82	2.1	2.83	1.57

Conclusions and Implications

Understanding the interplay between culture and equity in CDE as it relates to agricultural education will allow the design of future programs which fit the needs of students yet do not necessarily conform to traditional program designs. This knowledge can guide pedagogical strategies in urban agricultural and other classroom that are underperforming for cultural disconnectedness reasons. Moreover, agricultural education is no longer best suited for rural populations, as our cities expand and become centers of production, policy generation, and agricultural tourism.

A past study "demonstrate[d] the utility of contest score evaluation and the need for further evaluation…not only in the area of significant differences in contestants' scores, but also in the area of score prediction and trend analysis" (Buriak, et al., 1986). This analysis, is only a stepping stone to ongoing evaluation suggested by Buriak, Harper, and Gliem's 1986 study, but highlights the current inequities in CDEs, which we suggest are mediated in part by cultural factors. Further studies from our research group utilize the methods presented here to perform a more detailed exploration of systemic factors that may contribute to states' achievement levels and analyze trends in efforts to predict how changes in structure and methods of preparation can heighten winning potentials.

As CDEs become culturally relevant for a student body, a program can strengthen the effectiveness and benefit to students through conventional CDE preparatory methods like after school practice. However, when CDE participation is not culturally aligned with student strengths and interests, it may be a disservice to force an alignment rather than foregoing CDE competition in exchange for practices and activities that meet their geographic, ethnic, and cultural interests. Incorporating a strengths-approach to learning in agricultural education will increase its influence and ability to reach larger expanses of student populations. The current model of agriculture education, in many ways, does not comport with the principles of strengths-based and culturally relevant learning, due to insistence on components of the model that may be outside of cultural relations in student sub-populations. This requires that multiple modalities of praxis be recognized and embraced within agricultural education. Now that agrarian culture is declining, it is needed that CDE programming reflect the pluralism of potential agricultural education students or become an optional portion of the agricultural education model

Under the current model of agricultural education, achieving placements and awards in national CDE competitions are of utmost interest for urban programs and developing agriculturalists in more metropolitan areas. As the number of programs in urban areas increase and agricultural education programs throughout the nation seek to improve, they can look to particular systems in effective states model the design of their programs after. In doing so, multiple questions arise, including: (1) Should an instructor look at California, which has high overall numbers, but mediocre rates of winning? (2) Conversely, should we study Connecticut, which takes home wins in a high proportion to its student population? (3) Is the standard of success a state that has both high frequencies of competition success and high rates of winning, although this eliminates a large majority of states as influences? These are questions that both state FFA program specialists and individual teachers and will need to answer as they model emerging and growing programs after existing AGED programs and according to individual state administrative guidelines. The following sections aim to discuss how teachers can make decisions to build their programs based on key findings from CDE scores.

Raw, RAS, CDE Evaluation and Program Development

In our previous study we demonstrated the utility and weaknesses of raw and RAS scoring as evaluative tools ([authors omitted], 2016). It was highlighted that together the evaluative scores can be used to gain insights about CDE competitions results, including the identification of states, regions, and other categorical divisions that have heightened past successes in CDEs. The 2016 manuscript also highlights that raw CDE scores directly coincide with a state's FFA population percentages. This direct correlation can mean that an effective strategy for increasing the frequency of CDE success, and potentially RAS, could be to increase population pools of students participating in FFA CDE competitions within individual states. Therefore, if increasing earnings of CDE wins is important to a program, recruitment of student members could be placed as a priority. This research is interested in building quality programs that are equitable, and does not subscribe to the ideal that higher raw earning accumulations is a primary indicator of program quality. Therefore, recruitment is likely only recommended if a program is well-equipped and prepared to comprehensively serve the students it recruits.

CDE Equity and Program Development

Regional as well as state by state comparisons paint a grim picture for the reality of all students having equal prospects of CDE success. Unlike previous reports which demonstrate a single Midwestern region outperforming others (Franklin & Armbruster, 2012) in a specific CDE, our regional comparisons of all CDE scores did not report any single region with a significantly higher score. However, to assume that equity exists among regions based on these findings would be a mistake. We can only deduce from these numbers that inequity is not mediated by geographic factors. Descriptive statistics in each region reveals significant variation between scores within each group, with overall standard deviations being relatively high (table 2). Upon closer inspection, it becomes evident that each region has an anchor state or states with significantly larger RAS or raw scores that balances out the averages and variation within each group. For an individual student in any given region, if they are not a member of the elite state or two, then the likelihood of their chances to succeed in National CDE competition is subpar.

This inequity is best displayed in our respective quintile groupings. While we cannot fully identify the drivers, re-organization of the same data makes it clear that equity is not evenly distributed across the states. For example, if a student is not in the one of the 20 states in the upper two quintiles, his or her chances of having successful CDE competition is very low. For equity to be demonstrated, there should be equal distribution no matter which groupings, organizations, or analyses of state scores are utilized. The significant difference between the upper and lower quartiles is likely impeding the success of the agricultural education and by extension the agriculture sectors. It is important that the entire population of agriculture students is being prepared for future work, regardless of class, race, urbanity, or geographic background. This raises an issue regarding practices and systems occurring in Quintile 1 which facilitates the ability to consistently outscore the 40 other states. Addressing the root cause of this issue is of heavy concern as the emphasis on urban agriculture and associated education programs grows (Brown & Kelsey, 2013). Due to only recently defined aims of establishing AGED in cities, most urban agricultural education programs will be limited in resources and expertise, will have been newly established within the last 5 - 10 years, and will need access to guidance in program development and information about how to identify successful programs.

Challenging Social Norms of CDEs – Toward a Decolonized Agricultural Education

The notions that all programs model themselves after one another and maintain loyalty to the espoused three component model for agricultural education are most likely founded upon social conventions. These rigid practices could be a hindrance to program development, especially in urban and non-conventional programs. It is important to note that new and developing programs may choose to not participate in CDEs and FFA at all. This decision would be a sweeping deviation from tradition (D. B. Croom, 2008), but not an overt pedagogical detriment. A wide variety of factors including limited ability of teachers or students to connect culturally to FFA, excessive preparation time, and agriculture teacher burnout rates may impose barriers for student participation in CDEs (Henry, Talbert, & Morris, 2014; M. J. Martin & Kitchel, 2014, 2015) and may encourage the choice to substitute CDEs in an educator's praxis. Therefore, it is important that this work does not suggest directly mimicking any state identified to have strengths; rather, finding strengths of an identified state or program and tying them to strengths, resources, and needs of the programs at hand would be consider a more powerful suggestion.

CDEs and FFA awards are not inherent pedagogical metrics of success nor considered , rather traditional ideas of success infused with cultural value (D. B. Croom, 2008; M. Martin & Kitchel, 2013) and limited (but useful) pedagogical merit. Therefore, they are not the only avenues for students to realize success. Teachers in some programs may need to deviate from the traditional three component model, an action that is allowable though not culturally popular in agricultural education. One strength of the three component model is that it affords the agricultural education community an underlying and unifying set of basic assumptions from which to build a common network/community to draw support from. These foundational assumptions, however, may not fully represent the realities of the growing demographic and needs of agricultural education; moreover, the networks, due to the potential disconnection between the foundational assumptions and urban programs, may not be of optimal utility.

Philosophically, it is possible, and arguably necessary in light of current programming deficits, to build agriculture education pedagogy founded on epistemologies similar to those of current programming, but designed with features that offset deficits in equitable CDE programming. However, a program that disconnects from CDEs could easily jeopardize students' pre-existing opportunities to access agriculture networks established by FFA. Additionally, construction of new agricultural education models could be costly, and the reality of a completely resituated agricultural education model is both unrealistic and untimely. In many cases, there is no need to expend energy and resources required to attain the learning outcomes of agricultural education in non-rural settings. Instead, we suggest as a first remedy that systems at the national, state, and local levels reinvent themselves to ensure implementation of equitable practices in CDE administration and increase all dimensions of student capital. At the same time, when such systematic changes are not effective, deviation from and re-creation of the current model are highly reasonable outcomes.

Agri-Cultural Education, Effective Pedagogy, and Social Norms

Many assessments on engaging students in FFA and the agricultural education model have been undertaken. Behind the preoccupation with such assessments is the common assumption that an agriculture education student's level of involvement in FFA determines the degree to which a student is engaged in their agriculture studies. Many studies attempt to measure engagement by determining whether or not students are FFA members. Talbert and Balschweid (2004) expressed concern that over one-half of agriculture education students do not participate in FFA and concluded that the half that participates in FFA is "more engaged in their agricultural education classes as evidenced by their participation in activities through membership in the National FFA Organization" (Talbert & Balschweid, 2004, pg 39). Notwithstanding, the study also reports benefits of FFA as only long *perceived* by secondary agricultural education teachers and these perceived benefits are largely gained by "the core of traditional agriculture students" (Talbert & Balschweid, 2004, pg 38). Therefore, some level of incoherence is evident in the idea that participating in FFA equates to student engagement in agricultural education as well as the notion that non-traditional students need the FFA and its activities for meaningful engagement inclusion in agriculture education.

Engagement is often described as a multi-dimensional construct, arguably requiring behavioral, affective, and cognitive dimensions (Appleton, 2008; Fredricks, Blumenfeld, & Paris, 2004; Marks, 2000) that effectively actualize students' connectedness to classroom content. There has been only anecdotal and philosophical support that FFA participation inherently affords student engagement, although many students display benefits of varying degrees through their participation. Engagement in FFA activities, particularly CDEs, must be achieved not by figuring out how to coax participation of disinterested participants, rather by development of activities (whether internal or external to FFA) that meet the same learning outcomes of CDEs. Previous efforts and recommendations surrounding student engagement have been established to "convince non-members of the value of their agricultural education classes, so they will find those classes more challenging, interesting, exciting, and of more importance as well" (Talbert & Balschweid, 2004, pg 39).

It is known that creating connections between students' cultural values and instructional design facilitates learning and cognition, and guides teachers' abilities to create optimal instructional sessions and engagement frameworks (Annahatak, 2016; Ladson-Billings, 2014; Paris, 2012). It is our belief that CDE and FFA, have been particularly effective in engaging rural students due in part to these activities ability to draw upon cultural strengths of rural students. A undergoing analysis in our research group shows a positive correlation between rurality and CDE scores (data not shown), supporting the idea that cultural strengths mediate agricultural education engagement. The social implications is that if urbanity is a predictor of how well students perform in current modes of secondary agricultural education, current programmatic and pedagogical designs may not directly impact or reflect student cognition and learning.

More detailed evaluations in the future may determine programmatic instances of inequity in order to best align culture and agriculture education pedagogy, which may in turn alter CDE preparation strategies or lead to the substitution of CDE competition for activities that draw more directly upon students' cultural strengths and resources to meet the learning outcomes.

Involvement theory shows that student involvement in activities associated with academic outcomes enhances their achievement (Astin, 1999); this implies flexibility in choice of activities and a number of solutions as we strategize how to best serve students in equitable ways that rely on cultural strengths of sub-populations within agricultural education. Although TCM and its traditional activities are a great foundation, we are not limited to it or the cultural inflexibility it imposes.

Responding to Indicators of Inequity

Utilizing pieces of rural culture as a primary value and tool of FFA and CDE competition is neither a fault nor a weakness; however, it imposes boundary limitations on the influence of secondary agricultural education. Similar limitations are apparent in various disciplines which have responded by undertaking the task of re-centering their foci on non-conventional and conventional epistemologies, methodologies, and activities. A notable example is that of anthropologist Faye V. Harrison. She successfully worked to reposition previously erased, ignored, and marginalized perspectives in anthropology, a field that much like agricultural education, trains students to conceptualize and solve contemporary issues of humanity. Her multidimensional approach emphasizes that it is "important to interrogate the models and methodologies utilized" in praxis (Harrison, 2008) and serves as a skeleton for transdisciplinary endeavors, such as those in which this research aims to conduct in the future. Other dimensions of Harrison's re-centering framework included the revisiting and rethinking the history of the field, rethinking theory and theorist, and revising the implications of intra- and inter-disciplinarity. A complete reworking of agricultural education exists outside of the scope of this paper, however, we embraced the interrogation of CDE assessment and subsequently call for a multiaxial approach to agricultural education practices that allows for flexibility and fluidity in the frameworks that define its pedagogy.

Further work will need to be implemented to learn about the specific features of effective programs and state structures that are most useful. State assessments of each individual contest would be effective as well in compiling a holistic assessment for each contest and would make our understanding of the mediators of inequity more complete. The basic prediction model developed in this study can aid in the design of both new and developing programs, but will need to be readily adapted as new research-based evidence (not merely agricultural education beliefs) about the features of effective state CDE programming, administration and individual program management surfaces. Currently, it holds great utility in determining how to strengthen programming despite a limited number of variables.

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Appendix

Table A1

States Grouped into Quintiles by Descending RAS Scores

Quint. 1 m = 4.9		Quint. 2 m = 1.7		Quint. 3 m = 0.89		Quint. 4 m = 0.57		Quint. 5 m = 0.08	
State	RAS	State	RAS	State	RAS	State	RAS	State	RAS
VA	17	NH	2.2	GA	1.1	OK	0.69	LA	0.37
CT	6.6	NV	2.0	NC	1.0	TX	0.67	WV	0.26
MO	5.3	MN	1.9	AR	1.0	FL	0.66	SC	0.06
ND	3.1	KY	1.9	MT	0.90	CO	0.61	VT	0.04
WY	3.1	CA	1.8	DE	0.89	SD	0.60	MS	0.03
AL	3.0	OR	1.7	IL	0.87	NF	0.58	NY	0.01
WA	2.8	MA	1.7	AZ	0.86	UT	0.52	AK	0.00
KS	2.6	WI	1.6	OH	0.80	MI	0.49	HI	0.00
ID	2.5	IA	1.2	IN	0.80	NE	0.44	ME	0.00
MD	2.4	NM	1.2	PA	0.74	TN	0.41	RI	0.00

A Motivational View of Preparing Successful Career Development Event Teams

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Due to the competitive nature of Career Development Events (CDEs), teachers must utilize various instructional and motivational strategies to engage students and encourage student participation. This qualitative intrinsic case study analyzed the motivational practices utilized by a previously successful agriculture education teacher to determine the motivational strategies and the underlining motivational theories utilized during the CDE preparation process. Field observations and interviews were conducted during CDE practices. The teacher employed numerous motivational strategies, which were utilized to progress the motivation and preparation of the CDE teams. The motivational strategies were aligned to the motivational theories of: Self Determination Theory, Expectancy-Value Theory, Goal Setting, and Mastery Goal Orientation. Through this analysis a model was developed to align the progress of motivation and preparation, theories, related strategies, and subsequent student outcomes. Teachers should use the model to reflect on their current CDE motivational practices, determine how their strategies align with the model, and develop a set of motivational strategies to achieve the desired student outcomes within the CDE preparation process. More research should be conducted to better understand the use of motivational strategies and theories within the CDE preparation process.

Introduction

Facilitating and preparing CDE teams has been noted as a trademark of effective agriculture teachers as Roberts and Dyer (2004) stated, "…[an effective agriculture teacher] has sound knowledge of FFA, actively advises the FFA chapter, and effectively prepares students for Career Development Events" (p. 89). Although the primary responsibility of school-based agriculture (SBAE) teachers is to teach content, CDEs involve learning content and competing either individually or on teams, thus the teacher must focus on the motivational aspects related to preparing CDE teams. Since CDEs are a combination of classroom learning and competitions, teachers need to employ motivational strategies while preparing CDE teams. Previous research indicates teachers utilize the following to motivate students and shape team success: tradition and success of the chapter, providing opportunities for students to compete, developing life skills, providing opportunities for students to have fun, actively recruiting members who show potential to do well, and making CDEs an integral part of the curriculum (Russell, Robinson, & Kelsey, 2009). Additionally, Phipps, Osborne, Dyer, and Ball (2008) states, "the competition of a CDE makes learning fun…and…when students are having fun, yet experiencing a felt need to learn, motivation to learn increases and leadership skills develop" (p. 407). Motivational strategies need to be utilized when preparing CDE teams to increase student performance.

Teachers utilize a wide range of CDE specific strategies when preparing teams from social support and situational consideration (Falk, Masser, & Palmer, 2014), to expectations, goals, support, and a positive environment (Voight, Talbert, McKinley, & Brady, 2013), and to alertness, friendship, intentness, competitive greatness, cooperation, and initiative (Bowling & Torres, 2010). Further investigations need to be conducted related to the use of motivational strategies and the underlying motivation theories due to the lack of breath and depth of identified motivational CDE preparation strategies.

Empirically supported theories are developed through scholarly research and it is undeniable that educational strategies are deeply rooted in theory. Rarely though are these theories in the forefront of the teachers' minds when they select and utilize their strategies. Thus, a disconnect is developed between the teachers' practices and the research trying to influence their practices. Agriculture teachers and the CDE preparation process are not immune to this disconnect between practice and theory. By developing a model of motivational theory usage related to CDE preparation, teachers can better see where their current strategies lie and what gaps are present in their current preparation practices. Although the theory to practice gap cannot be fully closed, this model helps to bridge the CDE motivational practices closer to the research supported theories.

Conceptual Framework/Philosophical Assumptions

Motivation is a phenomenon that can be applied to numerous areas of social science including education. Contemporary theories of motivation utilized within education share many common themes: (a) motivation involves cognitions, behaviors, and affects, (b) learners construct their motivational beliefs, (c) motivation is reciprocally connected to learning, achievement, and self-regulation, (d) motivation contains personal, social, and contextual variables, (e) motivation changes as the individual develops, and (f) motivation reflects differences among individuals, groups, and cultures (Schunk, Meece, & Pintrich, 2014). The common themes of motivation help to frame the notion that motivation underlines human behavior (Schunk et al., 2014). The shared themes and the influence motivational processes have on human behavior served as the conceptual framework for this study. The conceptual framework guided the data collection process and served as a lens for data analysis. Additionally, a constructivist philosophical approach was utilized to allow for complete emergence of the CDE preparation motivational strategies and the associated motivational theories. Further, the constructivist approach positioned the researchers within the context of the study and allowed for meaning to emerge from the participants.

Purpose

The purpose of this study was to identify the motivational strategies utilized when preparing CDE teams. Additionally, this study sought to identify the underlined motivational theories and outcomes which align with the motivational strategies. This study directly aligns with Priority 5: Efficient and Effective Agricultural Education Programs of the Agricultural Education's National Research Agenda for 2016-2020 (Roberts, Harder, & Brashears, 2016). This investigation was driven by the following question:

1. What motivational strategies do SBAE teachers utilize when preparing CDE teams?

2. How do the emerging motivational strategies align with empirically supported motivations theories and potential student outcomes?

Methods

This study utilized a qualitative intrinsic case design (Stake, 1995). The intrinsic case was a teacher with a previous exemplary track record of winning multiple state and national CDEs. Within this intrinsic case, the teacher was observed for 16 weeks while preparing 12 students who comprised two CDE teams. Two researchers collected data through 46 on-site student interviews. Additionally, three teacher interviews and one administrator interview were conducted. All interviews were audio recorded and transcribed verbatim. Additionally, the researchers logged 36 hours of field observations. The field observations focused on identifying strategies utilized by the SBAE teacher throughout the CDE preparation process. CDE artifacts such as study materials, motivational materials (former championship jackets, awards, posted goals, etc.), and online statistical scoring system were also analyzed. Finally, the researchers conducted reflective observations of the student teams during the state level CDEs. The constant comparative method was utilized for data analysis (Glaser & Strauss, 1967). The total data analysis process included four rounds of analysis: transforming data into codes, categories, themes, and subthemes. The research questions guided the open coding phase. Through the analysis process the researchers allowed the data to emerge from the case. To allow for complete emergence, the data were open coded for motivational strategies. The motivational strategy codes were then categorized and themes were allowed to emerge. The themes of student recruitment, fostering motivation within the beginning stages of preparation, and intrinsic motivational shift with mastery preparation focus emerged and the data were reanalyzed to develop the sub themes. From the emerging themes and subthemes, a visual model was developed were subsequent motivational theories were aligned with the identified motivational strategies.

Within the study the researchers operated under an interpretivist epistemology and a constructivist philosophical approach. The researchers were prior SBAE teachers and previously studied motivational theories, and the researchers acknowledged the need to set aside biases. Within the study dependability and conformability were upheld through triangulation of data sources, comparison of emerging themes and subthemes, and maintaining a continuous coding audit trail (Lincoln & Guba, 1985). Transferability was upheld through the use of thick, rich descriptions (Lincoln & Guba, 1985). Credibility was established through peer debriefing and investigator triangulation at various stages in the research (Lincoln & Guba, 1985).

The case of interest was a Midwestern, suburban mutli-teacher SBAE program. The SBAE program is housed within various high schools within the town. The program roster maintains approximately 500 students and 100 FFA members. The agricultural courses offered within the program are stand alone and semester based, which allows for students to move in and out of the program. The program courses offered center around traditional agricultural curriculum within the areas of animal science, plant science, conservation, and agricultural mechanics. The particular teacher investigated has over 25 years of teaching experience and has prepared 31 state and national championship teams. He prepares approximately three to five CDE teams a year, while encompassing a wide range of CDE content areas.

Findings

Within the case several motivational strategies emerged. The findings are reported as themes within the progression of motivation and preparation which emerged within the case. The progression of motivation and preparation included three themes and seven subthemes. Additionally, a model was developed to display the connection of the motivational progression, theories, strategies, and potential outcomes.

Theme 1: Student Recruitment

Within the case, it emerging that the teacher utilized specific and calculated recruitment strategies to construct his various CDE teams. In order to recruit potentially successful students, the teacher expressed his high expectations of the students, sought out students who valued the CDE content, valued competition, and utilized extrinsic motivators to encourage student participation.

Sub Theme 1: Identifying Expectations and Valuing of Content and Competition

Before CDE practices started, the teacher sought out students who he believed would be successful and placed them on particular teams. Ever so often, the teacher reminded the students that he sought them out because he believed they would be successful. Cory stated regarding being recruited, "It makes you feel pretty special whenever one of the teachers comes up to you and asks you if you want to be a part of the team because they know your ability or your potential to do well." Through this purposeful recruitment the teacher sought out students who possessed a high task value of the CDE content material and also valued competition to a degree. The teacher sought out students who enjoyed and were pushed by competition but not so driven by competition that they only focused on winning and not the learning process. The valuing of the content and competition helped to motivate and increase the students' expectations for success.

Sub Theme 2: External Drivers of Student CDE Participation

At the beginning of the CDE season the teacher recruited 6 to 8 individuals for each team but only four can compete. This large number of team members increased the competition among the team and increased the students’ external motivation to study and practice. Additionally, students were encouraged to participate in CDEs by their family, friends, and other agriculture teachers. These individuals served as additional external factors as students were recruited into CDE teams.

Theme 2: Fostering Motivation Within the Beginning Stages of Preparation

It emerged within the case that as the teacher and CDE teams began the preparation process, the teacher utilized specific motivational strategies to foster student motivation. To do so the teacher assisted in the development of student expectations and goals, utilized extrinsic motivation strategies, and supported the needs of students to begin the development of intrinsic motivation.

Sub Theme 1: Continued Development of Expectations and Goals

Following the recruitment of students, the teacher expressed his high expectations for the students and the teams. More importantly, he encouraged the students to develop their own expectations and goals. Additionally, both the teacher and students discuss the influence the rich tradition of success of the chapter's previous CDE teams had on their expectations. The rich tradition was displayed on the classroom wall represented by over 30 state and national plaques. Much like the teacher expectations, the tradition of success was not forced upon the students and they were allowed to develop their own expectations. During the preparation process the students' expectations for success was very evident. Numerous times the students were observed saying, "we expect to be good." Moreover, due to their expectations experiencing failure did not hinder the students. Whether it was failure at practice, during a practice contest, or at the actual competition the students did not get down but instead learned from the experience. Steve said regarding the failure of not making the team the previous year, "I mean it was a good learning experience and I'm actually kind of glad I didn't make the team, cause I came back and was quite successful." Even through failures and setbacks the students' expectation for success continued and pushed the students to work hard both in and out of practices. The student's high task value and expectations for success were evident throughout the CDE preparation process and the competitions.

At the beginning of the preparation process, the teacher had students develop team and individual goals related to their expected level of success, while stressing the importance of maintaining a written copy of their goals. The individual and team goals were never discussed amongst the group but the students kept the written goals with their study materials. The students used their study materials during practice at both home and school, so the goals were constantly visible. The developed goals would help the teacher determine how hard and how much the push the students. Steve said, "I think you know they make it our goal if we want to when then we gotta work to win...” Throughout the CDE preparation process if students were not meeting the level of expectations of the teacher and also their goals, the teacher would have the students revisit their goals. As a result, students would either reassess their goals if they were not willing to put in the study time needed to meet them or the students would keep their current goals or increase their performance to meet them. Goal setting was an important part of the CDE preparation process.

Sub Theme 2: Continued Utilization of External Motivators

Extrinsically driven motivational strategies were utilized heavily towards the beginning of the preparation process. As the students’ experience and knowledge progressed, extrinsic strategies were utilized progressively less. The teacher offered various external physical rewards for individual/team successes. Examples of such external physical rewards included: (a) members receiving an embroidered Carhartt jacket if the team won the state competition, (b) receiving food and drink for correct answers or good practices, (c) earning a $1000 scholarship if they place within the top five individuals at the state completion, and (d) earning a trip to the national competition at the National FFA Convention. Additionally, students were extrinsically motivated through others. Cory discussed since his brother went to nationals on a CDE team, he was motivated to participate and win. Steve stated, "So it's kind of a competition between us and it's kind of hard to beat him." The teacher also used peer teaching when preparing teams and through the peer teaching the team members motivated each other. Through the utilization of peer teaching the teacher created a team atmosphere where competition not only thrived between the team members but also created a collective form of competition that allowed the team members to push one another. Stacy said, "And since you have competition within your own team too, you want to go to practice and kind of prove yourself." Further, students were motivated through external emotional rewards. Students were motivated by the fun, caring environment created by the teacher. The teacher also used humor throughout the practices to motivate students. Additionally, the teacher gave high fives and fist bumps to encourage and motivate. Kyle stated, “He’s [teacher] always either ribbing us or telling us good job, giving us high fives and stuff.” Through the use of emotional rewards the teacher was able to enhance students' self-worth and ego.

Sub Theme 3: Supporting Student Needs to Foster Intrinsic Motivation

Within the case, the teacher utilized a variety of strategies to support the CDE participants’ needs of autonomy, relatedness and competence and foster intrinsic motivation. The need for autonomy was met through the use of self-selected work time provided by the teacher. During certain practices the teacher would allow students the freedom to choose what they wanted to/needed to study and theoretically this translates to meeting the autonomy needs of the students. The teacher would shift the locus of control from himself to the students and would have the students determine what would be taught during the CDE practices. During the early parts of the preparation process the teacher was the primary control focus as the expert who had to develop the information within the novice students. As the students became experts in their respected CDE areas the teacher relinquished his control and the students selected the content to study and they ways in which they wanted to study it. The process of shifting the locus of control increased student autonomy, thus fulfilling their psychological need for it. Additionally, students were encouraged but not forced to study CDE materials outside of practice hours. Cory said, "You can choose whether to do it or not to do it depending on if you have time commitments. But once you get started, it's hard to not do it." This quote illustrates the essential concept of choice in autonomy as a motivator in SDT.

The need for competence was met through students developing confidence related to their ability within their CDE area. Once the students made the cut to be on the team, they felt as if they had developed enough competence to succeed, "If I can make it on a team, it'd be a great accomplishment because Biltmore is really well-known...” When learning about and preparing for the CDE, students developed competence related to the specific practical and content knowledge associated with the CDE. Allen stated, "It's practical skills that you can use a lot later on in life." Furthermore, the students indicated that they could apply this knowledge to current jobs and future career areas, and that inherent knowledge made them feel like more competent future professionals. Additionally, the teacher constantly connected knowledge from the formal curriculum in the agricultural classes to the CDE content to engage their prior knowledge and increase competence.

The need for relatedness was met through the team atmosphere of CDEs. Students felt like they “fit in” within the agricultural education department and felt like they were a part of a team when they participated, "because you get really close to your teammates". Further, the students developed friendships while on the teams. Further, the students developed friendships while on the teams, "...I didn't really care that I didn't make the team necessarily because I got a lot of great experience just hanging out with my friends." Kate who at first identified herself as an outsider of the agricultural education department felt like a member of the group when she participated in CDEs. Students also felt being on a CDE team gave them social acceptance such as having a place within the high school they felt "at home" and/or a place they fit in with their peers. Additionally, the students were able to meet students from different schools at the various competitions. For example, the teacher discussed that their students formed friendships with other students from different schools in the area at local CDE competitions, which then later translated to connections in their future colleges. In many instances, the data revealed that the teacher specifically used strategies geared towards developing relatedness. Throughout the CDE practices the teacher would ask the students about their day and would have personal non-CDE related conversations with them. Teachers met an essential need for relatedness by forming personal connections with the students during CDE practices. Additionally, the teacher would openly discuss the importance of team cohesiveness and praised the team for that attribute. In this instance, the teacher continually referred to the teams as a family.

Theme 3: Intrinsic Motivational Shift with Mastery Preparation Focus

As the students began to engage deeper in the CDE content, the teacher encouraged a shift within the students' motivation from being extrinsically driven to being intrinsically driven. In order to achieve the motivation shift, the teacher emphasized the importance of mastering the content rather than winning and utilized intrinsically driven motivational strategies.

Sub Theme 1: Focusing Less on Winning and More on Mastery Level Learning

As the students progressed through the preparation process, the teacher emphasized the overall importance of the learning process. Kyle said regarding this process, "[We] just want to learn as much as we can." The students also discussed how learning increased their desire to succeed, "I try to get down to business and learn what you need to know so you can be successful in what you're doing." Additionally, the focus on learning was very evident through the questioning strategies utilized by the teacher. Through the teacher's utilization of higher order questioning the students focused more on the learning and thinking process rather than winning or beating others. During the practices the teacher would constantly ask the students to explain "why" the answers they provide are correct. This process helped to develop the students' understanding of CDE concepts and increased their learning performance. Additionally, the teacher would also structure his teaching based on the students' leave of mastery orientation, "[I] push them as hard as they want to be pushed". Furthermore, the students accepted and encouraged the academic challenges of the CDE competitions. Cory stated regarding wanting to compete at nationals, "It's pretty big because you're with the best competitors." Additionally, Kate stated regarding the challenge, "...just experience of a challenge, if you can beat everyone else, how good your skills are. You see if you learned enough." Beyond the challenge of the competitions, the students viewed the jackets they could receive for winning not as a symbol of victory but a symbol of their knowledge and skill development, "It [jacket] just shows your knowledge and your accomplishments." Allen stated, "Just knowing that all that knowledge is up there and that you're kind of diversifying yourself [with the jacket], and taking an investment in yourself and the knowledge that you know stuff."

The teacher further developed the students' mastery orientation by encouraging them to "never cheat". Beyond the rewards, due to the mastery orientation of the students, they viewed making the team as an accomplishment not as a besting of other individuals. Jake said, "But ultimately, in the end, with my competitive nature I'd rather see the four best move on. If I'm part of that, great. If I'm not, I want to see the best four we have move on." The teacher also utilized specific strategies to focus more on the learning process rather than the correct answers. For example, when the students gave a wrong answer the teacher would typically correct the wrong answers and try hard not to reprimand the students. Also when students gave a wrong verbal answer the teacher again tried not to reprimand them so he would not discourage them from answering questions out loud. This focused the attention and motivation towards the answer and learning process and not on being compared to their peers. The goal orientation of mastery was very evident throughout the CDE season.

Sub Theme 2: Motivated Through Intrinsic Drivers

As the students progressed and gained knowledge within their CDE content area, the teacher utilized more intrinsically based motivational strategies. The inherent structure of and the content within CDEs align with the students' self-schemas. Numerous CDE participants within this study identified themselves as individuals who enjoyed the outdoors and nature and the type of CDE they participated in fulfilled this enjoyment. Additionally, students stated they enjoyed "ag stuff" and CDE helped them continue their involvement in agriculture and develop agriculturally based skills. The skills students developed also connected to future career opportunities and future career self-schemas. Cory stated, "Like it's not just playing with a chicken, there are life lessons you can learn and career opportunities you can get out of it." The CDE content, environment, and skills directly aligned with the students' values, goals, and needs.

Within this intrinsic case the students were also motivated intrinsically by the competitive nature and their interest in CDEs. The teacher discussed the importance of competition with the teams and would tell them, "Competition will make you better". Amy stated regarding the competitive nature of CDEs, "I just want that competition." Within the preparation process the teacher identified the need to connect the students to the competitive nature and CDEs to develop their interest in it. Beyond the competition, the CDE content and environment internally motivated the students to participate. Allen said, "This stuff interests me. Stuff outside of school, I'd probably be doing this anyway if I wasn't at practice." As the CDE preparation process progressed the students began to internalize interest and enjoyment in both the competitive nature and CDE content. Through the CDE preparation process the students were motivated by several external and internal factors.

Discussion

From the results of this study, it was concluded the teacher utilized a wide range of motivational strategies when preparing CDE teams, those strategies are a phased process throughout the CDE preparation season, and the nature of motivation changed throughout the process (see Figure 1). This section will first define and unpack the motivational theories most closely aligned with teacher strategies, and secondly outline the major conclusion from the findings and describe the resulting model.

Operational definitions of the connected motivational theories are provided to best interpret the developed model. Related to EVT, Wigfield and Eccles (2002) state the two highest indicators of achievement motivation are expectations for success and subjective task value. Extrinsic motivation, intrinsic motivation, and the psychological needs were viewed through the lens of Self-Determination Theory (SDT); (Ryan & Deci, 2002). Extrinsic motivation is engaging in a task due to a stimulus completely outside of the task itself (Ryan & Deci, 2002). Intrinsic motivation is engaging in a task for the sheer enjoyment or interest in it (Ryan & Deci, 2002). The psychological needs of autonomy, relatedness, and competence are considered to be universal and innate needs, which all humans strive to meet and maintain (Ryan & Deci, 2002). The need for competence is not specifically skill attainment, but is rather the confidence one has to complete a specific task or goal successfully (Ryan & Deci, 2002). Relatedness is being cared for, caring for others, and having a sense of belonging (Ryan & Deci, 2002). Autonomy is the belief regarding the origin of one's actions or behaviors (Ryan & Deci, 2002). Goal setting is the specific process of developing and utilizing goals to achieve a set objective (Locke, 1996; Weinberg 2010). Mastery goal orientation is when an individual is driven to pursue challenges, learns to further develop their understanding, and strives to further develop their skills (Ames, 1992).

As outlined in figure 1, the integration of motivation began with the way in which students were recruited to join CDE teams, and how teams were initially formed, to fostering motivation as the teams began CDE preparation, and finally shifting the locus of motivation from external to an intrinsic mastery focus. As noted in figure 1, in the early stages of the CDE motivation process the motivational strategies connect with extrinsic motivation, and Expectancy Value Theory (EVT). As the CDE preparation process advanced, motivational strategies related to EVT, extrinsic motivation, goal setting, and the psychological needs of autonomy, relatedness, and competence. Nearing the end of the CDE season the motivational strategies connected more with intrinsic motivation and mastery goal orientation. Figure 1 further outlines specific examples of teacher strategies as well as the noted student reactions and benefits as the CDE preparation phases progressed and the motivational shifts occurred throughout the season.

Although not specifically diagramed out or written down by the teacher, the progression of motivation possessed motivational strategies, which connected to various motivational theories. While he specifically didn’t reference the theories directly, he knew and referenced “what worked” in practice. Further his practical knowledge allowed for his to utilize specific motivational strategies and related motivation theories to produce the sought after desired student outcomes. Through his years of preparing successful CDE teams, the teacher developed a specific progression of motivation and preparation, which transcended the variety of students on the CDE teams and the various CDE content areas prepared.

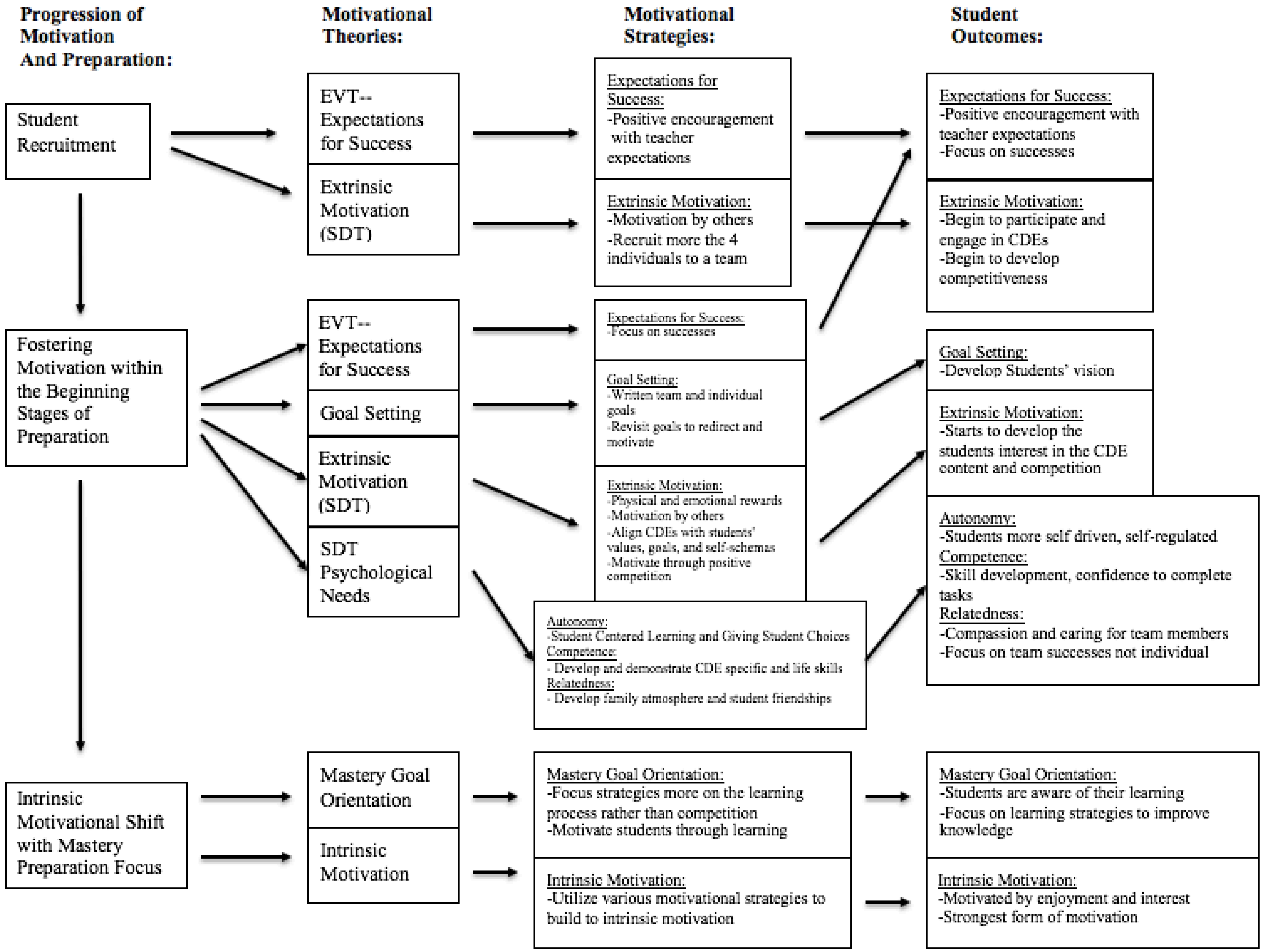

*Figure 1***.** Alignment of Motivational Strategies and Theories within the Progression of Motivation and Preparation

Implications and Recommendations

Through the developed model, empirically supported student outcomes were identified. The model helps to align practical motivational strategies and student outcomes through the connection of the emerging strategies to motivational theories. Within the model potential student outcomes include: developing expectations, focusing on successes, developing competitiveness, developing a vision, more self-regulated students, increased confidence and skill development, focusing on learning processes, and developing intrinsic motivation within CDE context. Teachers who knowingly utilize motivational strategies which are aligned to empirically supported theories, better recognize the potential student outcomes. Thus, they can utilize the appropriate strategies necessary in order to achieve the desired outcomes.

Beyond identifying empirically supported student outcomes, the developed model begins the process of bridging the theory to practice gap. By bridging this gap, SBAE teachers can more easily access successful motivational strategies which are empirically supported. Teachers rarely seek out and investigate theories on a daily basis to improve practice. The developed theory can help SBAE teachers easily identify aligned motivational theories, strategies, and potential student outcomes. Much like other human phenomenon, motivation can be highly influenced by the context within in which it is experienced. The developed model provides a map of how motivational theories and the aligned strategies can be utilized within the CDE context.

Due to the design it is important to address the limitations and lack of generalizability of the study. However, it is recommended that SBAE teachers reflect upon their current practices to determine how they align with the findings. It is also recommended that teachers reflect upon the developed model and construct a set of motivational strategies, which mirror the model presented. It is further recommended that teachers reflect upon the strategies they utilize and how they align with empirically supported motivational theories. To maximize student motivation within CDE preparation it is recommended that teachers develop recruitment strategies which focus on expectations and valuing of the CDE content.

Following the utilization of recruitment strategies, teachers should incorporate strategies that: (a) continue to develop high expectations for success, (b) develop written team and individual goals, (c) provide opportunities for student centered learning and student choice, (d) develop confidence related to CDE specific and life skills, (e) create a family atmosphere while fostering student friendships, and (f) utilize a variety of extrinsic motivators while shifting to more intrinsically based strategies to engage students and encourage participation while developing their want to focus on and improve their learning. By utilizing these strategies teachers can work towards and hopefully build to the students being intrinsically motivated and truly participating for the interest in and enjoyment of CDEs.

It is also recommended that professional development programs be developed, which focus on motivational strategies utilized within CDE preparation. The professional development should guide teacher reflections regarding their current motivational practices/strategies, and the perceived student outcomes. Following the reflections, the teachers should be immersed in the developed motivational model and the included strategies.

Further research is needed to better codify the specific motivational strategies utilized by agriculture teachers when preparing CDE teams. To begin, this study should be replicated with to determine if the identified strategies of the current study apply to more SBAE programs and teachers. Additionally, the identified motivational strategies need to be investigated through a theoretical lens to better understand their holistic connection and function within the process. Additionally, quantitative studies need to be developed which examine the relationship between the motivational strategies utilized and the perceived level of student motivation. Additionally, studies need to investigate the relationship between the motivational strategies utilized and the success of the CDE team.

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Influence of a Horsemanship Camp on Youth Leadership Life Skill Development

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Abstract

The purpose of this study was to investigate youth perceptions regarding development of their leadership life skills as a result of participating in a horsemanship camp. Descriptive survey methodology following a pretest-posttest design was used. The population was all (N = 60) youth enrolled in the program. Participants' self-perceived leadership life skills were assessed using a modified version of the Youth Leadership Life Skills Development instrument. Specific objectives were to describe and compare changes in self-perceived leadership life skills of 4-H and non-4-H youth in four constructs: (a) self-motivation, (b) responsibility, (c) leadership, and (d) problem solving and critical thinking. 4-H youth showed a significant increase in perceived knowledge of life skills and life skill development compared with non-4-H youth, who showed no significant increases. Significant differences between 4-H and non-4-H youth were present in all four constructs. These results confirm previous research indicating 4-H youth excel beyond their non-4-H peers in leadership life skills gains. This structured horsemanship camp was a valuable educational venue for leadership life skill development in 4-H youth, but further research should be conducted to assess how to create positive changes for non-4-H youth.

Introduction/Conceptual Framework

Life skill development is not a new concept; however, ideas for how to incorporate life skills into educational practices have increased not only in the United States, but also at the international level (United Nations International Children's Emergency Fund [UNICEF], 2012; World Health Organization [WHO], 1999; 2014). UNICEF, a global humanitarian and developmental agency advocating for children and family rights, stated that life skills education is "universally applicable" to all disciplines that seek personal changes in behavior, attitudes, skills and knowledge (2012, p. 1). UNICEF (2012) further defined life skills education as essential

> for young people to negotiate and mediate challenge and risks and enable productive participation in society… personal, interpersonal, and cognitive psychosocial skills that enable people to interact…manage… emotion… and make decisions and choices for an active, safe, and productive life. (p. 11)

With respect to the aforementioned definitions of life skills and life skills education, the importance of life skills in youth education can be described as follows:

> The goal of youth programming is to provide developmentally appropriate opportunities for young people to experience life skills, to practice them until they are learned, and be able to use them as necessary throughout a lifetime. Through the experiential learning process, youth internalize the knowledge and gain the ability to apply the skills appropriately. (Iowa 4-H, 2015, p. 1)

Showing continued dedication to the goal of the 1998 United Nations Inter-Agency meeting, the WHO Department of Mental Health (1999) identified five basic areas of cross-cultural life skills: (a) decision making and problem solving, (b) creative thinking and critical thinking, (c) communication and interpersonal skills, (d) self-awareness and empathy, and (e) coping with emotions and coping with stress. Furthermore, the WHO, UNICEF, and United Nations Educational, Scientific and Cultural Organization (UNESCO) created a life skill model which identified one's health, mental, emotional, and physical well-being as the four core life skill areas. Within each skill set, specific competencies were outlined that contribute to the overall development of the life skill area. Each of these core skills and their integration must be considered in the development of life skills educational programming focused on one's total well-being (WHO, 2003). The WHO (1997, 1999, 2003) also proposed success factors necessary for the development and evaluation of life skills educational programs: long-term programs, trained educators, a focus on both generic and specific skills, developmentally appropriate inputs, active student involvement, links to other subjects, user-friendly materials, and peer leadership components.

Recently, youth development research has increased focus on positive youth development theories and frameworks. The term, "positive youth development", can be conceptualized in many ways, but refers to "a focus on the developmental characteristics which lead to positive outcomes and behaviors among young people" (Hamilton, Hamilton, & Pittman, 2004; Heck & Subramaniam, 2009, p. 1). Common frameworks include Assets (Search Institute, 2007), The Four Essential Elements (Peterson et al., 2001), The Five C's (Carnegie Council on Adolescent Development, 1989), and the Community Action Framework for Youth Development (Connell, Gambone & Smith, 2000). Regardless of the context, goals of all youth development theories aim at developing shared outcomes in youth such as skill building, academic achievement, improving self-confidence and social competencies, leadership development, creating positive relationships, commitment to learning, community involvement, constructive use of time, and having a plan for the future (Heck & Subramaniam, 2009).

4-H, the Cooperative Extension System's youth development program, has been one of the leading youth organizations focused on building life skills. A wealth of research by youth development scholars has found that participation in 4-H is positively correlated to youth leadership life skill development (Boyd, Herring, & Briers, 1992; Fox, Schroder, & Lodl, 2003; Garton, Miltenberger, & Pruett, 2007; Goodwin et al., 2005; Radhakrishna & Sinasky, 2005; Seevers & Dormody, 1995). The largest-ever longitudinal research study to measure positive youth development in 4-H youth was completed in 2013 by Tufts University and the Institute for Applied Research in Youth Development. Findings from this study revealed that in comparison to their peers, 4-H youth excelled in several life skill areas and were more likely to make contributions to their communities, be civically active, make healthier choices, and participate in science, engineering, and computer technology programs (Lerner, Lerner, and Colleagues, 2013). A smaller-scale study on developing youth life skills (Boyd et al., 1992) reported similar results, namely that participation in 4-H was positively related to leadership life skill development. The level of leadership life skill development increased as the level of 4-H participation increased, and 4-H youth perceptions of their leadership life skill development were significantly higher than those of non-4-H youth (Boyd et al., 1992).

In 4-H, positive youth development focuses on developing life and leadership skills through educational programs (National 4-H, 2015). The 4-H Targeting Life Skills Model (Hendricks, 1998; Figure 1) offers a framework for organizing positive youth development experiences into skills within the four 4-H competency areas: (a) Head—thinking and managing, (b) Heart—relating and caring, (c) Hands—giving and working, and (d) Health—living and being (Hendricks, 1998; Norman & Jordan, 2006). Lamm and Harder's 2009 study examined the impacts of 4-H programming on youth development with positive economic outcomes in the areas of workforce preparation, volunteer training, and the 4-H SET initiative. A comparison study of several impact studies from Montana (Astroth & Haynes, 2002), Idaho (Goodwin et al., 2005), and Colorado (Goodwin, Carroll, & Oliver, 2005) offers detailed information regarding 4-H participant success. 4-H members had enhanced decision-making skills, higher scholastic achievement, improved relationships with adults, and a more positive outlook on life and the world around them than youth not enrolled in 4-H. 4-H youth were also more likely to demonstrate life skills than their peers (Goodwin et al., 2005).

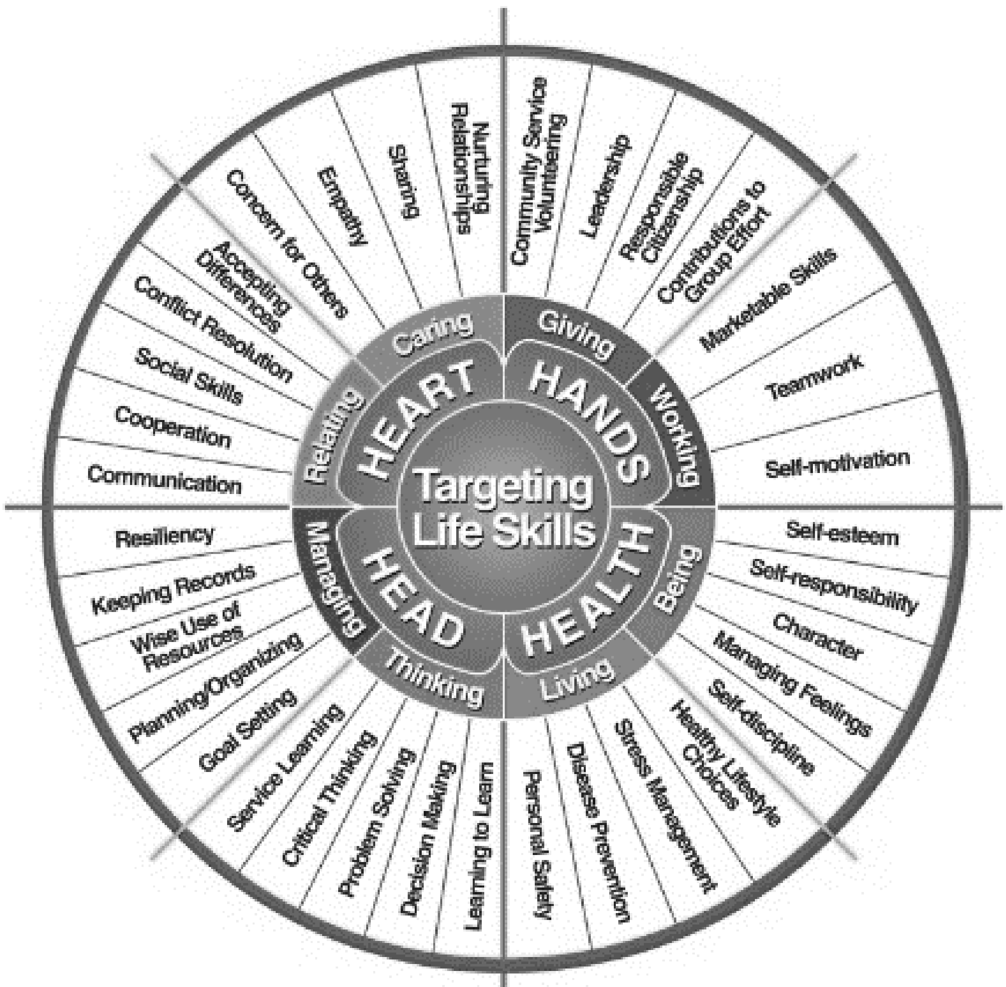

Figure 1. 4H Targeting Life Skills Model. From "*Developing Youth Curriculum Using the Targeting Life Skills Model: Incorporating Developmentally Appropriate Learning Opportunities to Assess Impact of Life Skill Development*," by P. Hendricks, 1998. Copyright 1998 by Iowa State University Extension. Reprinted with permission.

Research also suggests youth camps can positively impact leadership and life skills development. The American Camp Association (ACA, 2005) conducted the largest national research study of camper outcomes and concluded that camps are "unique educational institutions and a positive force in youth development" (p. 1). Significant growth in campers was reported in "self-esteem, social skills and comfort, peer relationships, leadership, independence, adventure and exploration, environmental awareness, values and decisions, and spiritual growth" (ACA, 2005, p. 1). The ACA discovered no differences in outcomes according to camp type or length. Similar to the ACA findings, Garst and Bruce (2003) found that 4-H campers improved numerous life skills as a result of camp participation, including independence, technical skill development, developing relationships, self-confidence, responsibility, leadership, and communication. Research has further shown that campers with previous experience in the content area have higher knowledge and attitude increases than those without experience (Kruse & Card, 2004).

Expanding on the foundation of camp research, Garton et al. (2007) found that experiential learning activities at 4-H camps can positively impact leadership life skill development. Experiential learning models have provided a framework used in various learning environments and programming. Kolb's (1984) model of experiential learning consists of a four-cycle process: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb believed that experiential learning was a "holistic integrative perspective on learning that combines experience, perception, cognition, and behavior" (p. 21) and could be applied to any educational setting.

With regard to innovative approaches in experiential learning, using horses as teaching tools has gained popularity in non-formal and academic educational settings in recent years. It has been documented that "working with horses can create positive changes in adolescents and possibly even improve basic life skills of young adults" (Antilley et al., 2010, p. 7). Horses have been used to promote life skill development not only in 4-H, but also in equine-assisted therapies for mentally and physically disabled individuals and educational programming (Evans, Jogan, Jack, Scott, & Cavinder, 2009; Gibbs, Potter, & Vogelsang, 2003; Saunders-Ferguson, Barnett, Culen, & TenBroeck, 2008; Smith, Swinker, Comerford, Radhakrishna, & Hoover, 2006). Mandrell (2006) identified the advantages of using horses in teaching as follows:

> The horse activities provide a visible metaphor for life experiences and relationships. These metaphors are used to teach people valuable tools for success in life. Participants learn about themselves and others through horse activities…to discuss related feelings, behaviors, and patterns. (p. 23)

Youth who work with horses not only gain the benefits of learning horsemanship and care of a large animal, but also develop important life skills that can be used in their day-to-day lives. As Antilley et al. (2010) reported, "Those participating in horse-related activities can experience beneficial improvement in self-motivation, responsibility, confidence, and self-esteem" (p. 7) that transcends to all life situations. Cavinder et al. (2010) evaluated the educational value of a summer horsemanship clinic over a period of three years and found that a high percentage of individuals expressed improved knowledge of horse awareness and training as well as greater thinking skills. A similar study by Slocum (2004) indicated that youth who participated in both riding and non-riding competitive horse events and activities scored significantly greater on the Youth Leadership Life Skills Development Scale than youth who competed in only one or the other. Smith et al. (2006) found a significant positive relationship between overall horsemanship and life skills gained by 4-H youth, the American Quarter Horse Youth Association, the United States Pony Clubs, and National High School Rodeo Association in an equine camp. Researchers concluded that “youth horse programs should continue to develop and support programs that focus on the development of horsemanship and life skills” (p. 92).

Evaluating impacts of youth programs continues to be important as funding tightens in all educational settings, including non-formal and public education. In particular, 4-H must justify the use of public funds and how it “contributes positively to the development of U.S. economy… by proving its worth and return on investment to stakeholders” (Lamm & Harder, 2009, p. 1). Through the documentation of life changes linked to educational programs, all youth organizations can provide unequivocal evidence for continued public and private support. Youth development programs exist in many environments; therefore, research on measurement, tools, and evaluation of outcomes must be conducted in these settings to determine effectiveness and practicality. Comparisons of 4-H youth and non-4-H youth are less common in the research, particularly in the development of life skills. Maass, Wilken, Jordan, Culen, and Place (2006) reported that 4-H alumni revealed that different youth organizations influenced the development of different life skills. Radhakrishna and Doamekpor (2009) found that 4-H was more helpful than other youth organizations in developing leadership and communication skills. Ratkos and Knollenberg (2015) found that 4-H alumni rated significantly higher in six life skills constructs than non-4-H alumni for college preparation and success. And Seevers, Hodnett, and Van Leeuwen (2011) reported that participation in 4-H made a positive difference in participants’ lives in many ways including academic performance, communication with parents, leadership, self-confidence, and positive identity.

Any educational experience that can assist youth in developing life skills to become productive, active citizens should be studied. Are 4-H youth excelling beyond their peers, and how can non-4-H youth be inspired to improve their life skills? Research on 4-H horsemanship camps is commonly reported because camps are a natural progression of horse projects; yet, research with non-4-H youth in horse camps is far less common (Cavinder et al., 2010). The educational value of horsemanship camps for all youth should be examined to create and improve meaningful opportunities for all participants. The present study is unique as it describes the impacts of a horsemanship camp on life skill development in both 4-H and non-4-H youth. This research contributes to the literature base on assessing the impacts of youth programs on leadership life skill development.

Purpose and Objectives

The purpose of this study was to investigate youth perceptions regarding development of their own leadership life skills as a result of participation in a one-week equine camp. This study aligns with the American Association for Agricultural Education’s National Research Agenda 2016-2020 Research Priority Area 4: Meaningful, Engaged Learning in All Environments

(Edgar, D., Retallick, M. & Jones, D., 2016; Roberts, T. G., Harder, A., & Brashears, M. T. (Eds), 2016) by addressing the following research objectives:

1. Describe changes in self-perceived leadership life skills of 4-H youth attending a one-week equine camp.
2. Describe changes in self-perceived leadership life skills of non-4-H youth attending a one-week equine camp.
3. Compare self-perceived leadership life skill development levels of 4-H and non-4-H youth attending a one-week equine camp.

Methods and Procedures

Descriptive survey methodology following a pretest-posttest design was used. The population for this study was all (N = 60) youth participants enrolled in a horsemanship summer camp program. The camp program is marketed to youth in Montana through community resources and local equine businesses. Demographic and horse experience information was gathered from participants' registration packets. At registration, parents signed an informed consent document for their child to participate in the research. The WHO Department of Mental Health Model (2003) and the 4-H Targeting Life Skills Model (Hendricks, 1998) were used to develop and guide camp activities. The camp was designed for youth of all ages and abilities from beginner to advanced. The camp philosophy emphasized life skill development and personal growth as an intricate component of the horsemanship program. Life skill development through the use of horses was taught in activities focused on responsibility, relationships, communication, leadership, and teamwork through horse safety and care; haltering, tying, and leading a horse; horse behavior observation and horse anatomy; and on-the-ground horsemanship. Each day, campers participated in horseback riding, on-the-ground horsemanship, equine craft activities, and daily journaling that integrated health, mental, physical, and emotional awareness. Basic life skills were explained to the youth in each of these areas. Camp experiences and activities were similar for all youth participants and emphasized building life skills associated with the 4-H model (Hendricks, 1998).

Use of a pretest-posttest design to evaluate perceived self-growth is common among similar populations (Henderson, Whitaker, Bialeschki, Scanlin, & Thurber, 2007; Kruse & Card, 2004; Readdick & Schaller, 2005). A matched-pairs pretest-posttest design was created for this study. Participants' self-perceived leadership and life skills were assessed using the Youth Leadership Life Skills Development Scale (YLLSDS), which has previously been used in a similar manner among youth agricultural organizations (Anderson, Bruce, Jones, & Flowers, 2015). The YLLSDS was developed by Dormody, Seevers, and Clason (1993) to evaluate leadership life skills gained from a particular activity or conference. As such, this instrument was considered appropriate to measure changes in youth leadership life skills from a one-week camp. The 30-question YLLSDS instrument uses a four-point Likert scale from 0 (*no gain*) to three (*a lot of gain*) and has a reported Cronbach's alpha of 0.98. The instrument was modified by asking participants to rate their abilities before and after camp using a four-point Likert scale that ranged from 1 (*poor*) to 4 (*excellent*). The instrument was also modified by used only 42 of the 68 indicator questions that related to the four constructs of the WHO model's basic life skill areas: problem solving and critical thinking, responsibility, self-motivation, and leadership.

Following Gall, Gall, and Borg's (1996) recommendations for determining the internal consistency of the modified YYLSDS instrument, Cronbach's alpha coefficients were calculated post-hoc for each of the four constructs: problem solving and critical thinking ($\alpha = 0.64$), responsibility ($\alpha = 0.74$), self-motivation ($\alpha = 0.65$), and leadership ($\alpha = 0.87$). These construct reliabilities were lower than the more commonly accepted value of $\alpha = 0.80$; however, according to Ary, Jacobs, Razavieh, and Sorenson (2006), "reliability of personality variables can be difficult to obtain, thus these measures typically have only moderate reliability (.60-.70)" (p. 267). This limitation could be addressed in the future by using a pilot test to achieve a higher measure of internal consistency by eliminating items that are poorly correlated and adding more highly reliable items to the scale (Ary et al., 2006). The modified YYLSDS was administered on the first and last days of the one week-equine camp. After removing incomplete matched-pairs, 44 non-4-H and 13 4-H youth participants' YLLSDS pairs were deemed usable. This yielded a response rate of 95.0% ($N = 57$).

Statistical significance was set a priori at $p < .05$, per typical educational research (Gall et al., 1996). Because of the small sample size, the *t* distribution was used to determine the level of statistical significance of an observed difference between sample means (Gall et al., 1996). To address the first two objectives, paired-samples *t* tests were used to determine if participation in a one-week equine camp statistically influenced self-perceived leadership and life skills according to our modified YLLSDS. To address the third objective, an independent-samples *t* test using the differences between pretests and posttests of the 4-H and non-4-H groups was conducted to explore perceived influences among the groups. Effect sizes quantifying group differences were interpreted using Cohen's (1992) criteria, wherein 0.02 is considered small, 0.15 is considered medium, and 0.35 is considered large. The one-week time period between the pretest and posttest was a concern due to response-shift bias on self-reported measures of change (Drennan & Hyde, 2008). However, the ACA (2005) found no differences in outcomes according to camp type or length, and found that the pretest was a useful indicator of initial deficiencies in youth skills and knowledge. The differences in sample sizes was also a concern and limitation in the present study. However, the comparison groups were self-selected based on 4-H enrollment, so we did not adjust the sample sizes. Caution should be used in generalizing these convenience sample results to larger audiences (Ary et al., 2005).

Results/Findings

The average 4-H youth participant ($n = 13$) was an 11-year-old female with approximately three and a half years of equine riding experience. Similarly, the average non-4-H youth participant ($n = 44$) was an 11-year-old female with approximately three years of equine riding experience. Independent samples *t* tests revealed no statistical difference between the two groups according to age ($p = 0.46$), gender ($p = 0.89$), or years of equine riding experience ($p = 0.38$).

The first research objective was to describe changes in self-perceived leadership life skills of 4-H youth. Significant increases ($p < .05$) from pretest to posttest were present in all four constructs of the modified YLLSDS instrument (Table 1). Although likely inflated due to the small sample size (Ary et al., 2005), corresponding effect sizes were very large.

Table 1
Paired Samples t Test for 4-H Participants (n = 13)

	Pretest		Posttest						
Construct	*M*	*SD*	*M*	*SD*	Diff.[a]	*t*	*Df*	*p*[b]	ES[c]
Responsibility	3.14	0.42	3.71	0.33	0.57	5.76	12	0.00*	1.54
Self-motivation	3.17	0.44	3.73	0.26	0.56	5.49	12	0.00*	1.63
Leadership	3.19	0.43	3.73	0.24	0.54	5.53	12	0.00*	1.63
Problem-solving/critical thinking	3.08	0.42	3.62	0.26	0.54	4.63	12	0.00*	1.58

[a]Posttest minus pretest; [b]Probability of difference; [c]Mean difference divided by pooled group *SD* (0.02 = small; 0.3 – 0.15 = moderate; > 0.35 = large).
*$p < .05$.

The second research objective was to describe changes in self-perceived leadership life skills of non-4-H youth. No significant increases ($p > .05$) from pretest to posttest were present in any of the four constructs of the modified YLLSDS instrument (Table 2). Three of the four constructs (leadership, problem solving and critical thinking, and responsibility) displayed either no change or a negative change between pretest and posttest.

Table 2
Paired Samples t Test for Non-4-H Participants (n = 44)

	Pretest		Posttest						
Construct	*M*	*SD*	*M*	*SD*	Diff.[a]	*t*	*Df*	*p*[b]	ES[c]
Self-motivation	3.16	0.43	3.25	0.47	0.09	1.19	43	0.24	0.20
Leadership	3.22	0.36	3.22	0.43	0.00	0.07	43	0.95	0.01
Problem-solving/critical thinking	3.23	0.38	3.23	0.41	0.00	0.03	43	0.98	0.00
Responsibility	3.25	0.40	3.21	0.41	-0.04	0.64	43	0.52	0.09

[a]Posttest minus pretest; [b]Probability of difference; [c]Mean difference divided by pooled group *SD* (0.02 = small; 0.3 – 0.15 = moderate; > 0.35 = large).
*$p < .05$.

The third research objective was to compare self-perceived leadership life skill development levels of 4-H and non-4-H youth. Significant differences ($p < .05$) between 4-H and non-4-H youth were present in all four constructs of the modified YLLSDS instrument (Table 3). The largest difference was growth in perceived responsibility (0.61); the smallest difference was in perceived self-motivation (0.47).

Table 3
Independent Samples t Test for all Participants (n = 57)

	Non-4-H difference[a]		4-H difference[a]						
Construct	*M*	*SD*	*M*	*SD*	Diff.[b]	*t*	*Df*	*p*[c]	ES[d]
Responsibility	-0.04	0.57	0.57	0.36	0.61	5.15	55	0.00*	1.65
Leadership	0.00	0.34	0.54	0.35	0.54	5.02	55	0.00*	1.56
Problem-solving/critical thinking	0.00	0.40	0.54	0.42	0.54	4.27	55	0.00*	1.33
Self-motivation	0.09	0.51	0.56	0.37	0.47	3.12	55	0.00*	1.08

[a]Posttest minus pretest; [b]4-H difference minus non-4-H difference; [c]Probability of difference; [d]Mean difference divided by pooled group *SD* (0.02 = small; 0.3 – 0.15 = moderate; > 0.35 = large).
*$p < .05$.

Conclusions

The context of this study was a one-week horsemanship camp that specifically focused on leadership life skill development for 57 youth (13 4-H and 44 non-4-H). Similar to previous studies (Boyd et al., 1992; Fox et al., 2003; Garton et al., 2007; Goodwin et al., 2005; Radhakrishna & Sinasky, 2005; Seevers & Dormody, 1995), this research found significant changes in 4-H youth participants' life skill development. 4-H youth had significant increases in all four life skill constructs measured (responsibility, self-motivation, problem solving/critical thinking, and leadership), while non-4-H youth had no significant increases. There were also significant differences between the two groups. The largest difference was growth in responsibility, and the smallest was in self-motivation. The significant increases confirm previous research that indicates 4-H youth excel beyond their non-4-H peers in leadership life skills gains due to continuous 4-H participation and higher self-perceptions of skill development (Boyd et al., 1992; Lerner et al., 2013).

Discussion, Recommendations, and Implications

Findings support previous research (Antilley et al., 2010; Boyd et al., 1992; Cavinder et al., 2010; Lerner et al., 2013) that states a structured horsemanship camp can be a valuable educational venue for leadership life skill development in 4-H youth. However, further research should be conducted to assess how to create positive changes for non-4-H youth in this setting as well. Why did 4-H youth excel beyond their peers in this camp? Previous studies have shown that 4-H members have enhanced decision making skills, a more positive outlook on life, and are more likely to demonstrate life skills than youth not enrolled in 4-H (Astroth & Haynes, 2002; Goodwin et al., 2005; Goodwin et al., 2005). It is possible that 4-H youth participants in this camp were more likely to show life skill changes than non-4-H youth due to their positive outlook and perceptions. However, Maass et al. (2006) reported that different youth organizations influence the development of different life skills. This study measured only four life skill constructs: responsibility, self-motivation, problem solving/critical thinking, and leadership. Perhaps non-4-H youth developed different life skills not measured in this study, or maybe they do not understand what life skills are if they have had less exposure to the concepts. Because 4-H experiences are structured around the 4-H Targeting Life Skills Model (Hendricks, 1998), 4-H youth may be more inclined than non-4-H youth to show social desirability bias to the instruments. Social desirability bias is when respondents give "socially acceptable responses that they would not necessarily give on an anonymous questionnaire" (Ary et al., 2006, p. 382). Yet it is important to consider how to best design educational experiences that benefit all youth involved. Horsemanship camps have been shown to improve life skills for 4-H youth, so educators must discover how to improve perceptions and skills for non-4-H youth, too. Follow-up interviews and focus groups with youth participants would be valuable to discover their definitions of life skills, self-perceptions and understanding of life skills, beliefs on how to improve these skills, and how life skills can relate to horses. As a result, educational experiences and activities can be integrated into the horsemanship camp to accommodate specific learner needs and desires.

Re-Designing the Teaching Approach with Focus on Experiential Learning

Camps are commonly used to teach youth life skills with particular emphasis on experiential learning opportunities (ACA, 2005; Cavinder et al., 2010; Garst & Bruce, 2003; Garton et al., 2007; Kolb, 1984). Campers have shown significant growth in “self-esteem, social skills and comfort, peer relationships, leadership, independence, adventure and exploration, environmental awareness, values and decisions, and spiritual growth” (ACA, 2005, p. 1). Science, engineering, and computer technology programs also offer ideal venues to attract youth, particularly those who have shown keen interest in these subject areas (Lerner et al., 2013). Horsemanship camps offer a perfect venue to combine social, interpersonal, life, and technical skills for youth. Including equine science and technology activities in the areas of horsemanship, training, and resource management can add to the overall camp experience. Life skills can then be consciously integrated into the activities to create greater awareness and understanding. Discussions of human-horse connections, leadership principles, problem solving, business management, critical thinking, and overall responsibilities of horse ownership can assist in building many skills. However, for this approach to be effective, educators must explain basic life skills to youth, and have youth reflect upon these throughout the camp. Experiential activities such as journaling, leadership and team-building scenarios, field experiences, independent study projects, problem-based learning, and competitions can target specific life skills each day. These learning opportunities must be structured to include practice of life skills, reflection on learning, conceptualization of skills, and application of skills in different contexts, such as working with horses, at home, in the community, and at school (Kolb, 1984). Time should be allocated for individual and group discussion and reflection of how the life skills emerged in activities. Research has shown no difference in life skill outcomes based on camp type or length (ACA, 2005); therefore, camp settings can be adjusted to meet various time, content, and resource constraints while still producing positive leadership life skill development in youth.

Although non-4-H youth in this study did not show any significant increases in life skill development, it is critical to continue to emphasize application of life skills in learning experiences. In this horsemanship camp, life skills were deliberately integrated into the activities from the instructor’s point of view; however, discussion and reflection of these life skills with youth during and after the activities was not emphasized. Kolb (1984) stated that immediate experiences are the basis for observation and reflection from which concepts are assimilated and then actively tested. For future camps, it is essential to complete the entire learning cycle with youth to achieve the complete experiential learning experience. A reflective discussion of how the experience affected one’s health, mental, emotional, and physical well-being (WHO, 2003) and what life skills on the 4-H model were targeted (Hendricks, 1998) should be included in the camp design. Youth should be allowed time to apply the concepts discussed with active experimentation (Kolb, 1984).

Incorporating Life Skills Education into Camp Content

Another possible explanation for the lack of significant increases is that non-4-H youth may lack understanding of life skills, have less previous experience and knowledge of life skill concepts, or have lower levels of involvement in youth organizations. Previous research has shown that 4-H youth with previous experience in the content area have higher knowledge and attitude increases (Kruse & Card, 2004), 4-H youth have higher perceptions of their leadership life skills, and the level of life skill development increases as 4-H participation increases (Boyd et al., 1992). As a result, when facilitating non-4-H programs, educators must deliberately incorporate life skill discussion and reflection into activities. By increasing youth participants' understanding of what life skills are, how they look in action, and how they can be applied in various situations, educators can assist youth in seeing the connections to their lives. Because the 4-H program is built upon the acquisition of life skills and centered around the 4-H Targeting Life Skills Model (Hendricks, 1998), 4-H youth are potentially more familiar with life skills than non-4-H youth. Yet non-4-H youth can successfully achieve life skills, as practiced by many other youth organizations. Regardless of participants' prior experience, programs should be intentionally designed to include life skills. Camp coordinators must consider the range of life skills and carefully design programs to reach different skills with various experiences (Maass, 2006). WHO (2003) proposed certain factors of success for life skills programs. For example, a longer camp, focus on generic and specific life skills, links to other subjects, and peer leadership components could be added into the horsemanship camp to better focus on youth participants' total well-being (WHO, 2003). Non-4-H youth may also have different areas of strength in life skills, and including both audiences in programming could enhance both groups' skills. In this study, 4-H and non-4-H horsemanship camps were separate. Future camps could combine the audiences, identify life skill and horse knowledge strengths, and pair up youth based on these criteria. Finally, all youth organizations should seek collaborations to enhance their overall impacts. Partnerships with Boy Scouts, Girl Scouts, YMCA, afterschool programs, youth leadership programs, and other community-based services can broaden the scope of the 4-H programs and improve funding support.

Recommendations for Camp Educators

Recommendations for camp educators include using the 4-H Targeting Life Skills Model and the WHO Life Skills Model as a guide for developing programs (Hendricks, 1998; WHO, 2003). Camp educators can integrate components from each model—Head, Heart, Hands, and Health (4-H) and Health, Mental, Emotional, and Physical (WHO)—into the total program design. In addition, the factors of success for life skills educational programs, as defined by WHO (1997, 1999, 2003), can be used as a framework for program activities. Educators can combine specific life skills into content, provide active learning opportunities, make connections to life situations, and use peer leadership to maximize effectiveness. Within a horsemanship camp setting, educators can use horses as a metaphor for discussion of a challenging experience, the positive and negative effects of the experience, how participants managed the challenge, and how this experience contributed to development of overall life skills. As this study revealed, using horses as a metaphor for learning can be valuable for participants to develop critical thinking skills, responsibility, self-motivation, and leadership qualities. This process reinforces the significance of providing structured opportunities for youth to reflect on life experiences, learn about themselves, improve relationships, and apply skills to all aspects of life in a way consistent with experiential learning theory (Kolb, 1984; Mandrell, 2006). This approach is unique in that the personal benefits are often immediate, measurable, and have long-lasting results (WHO, 2003). Using horses has helped youth of all ages make positive life changes and healthier life choices. As Mandrell (2006) explained, "Results show attainment of basic skills competency and work maturity skills. Results have indicated an increase in productive and positive relations…participants increase the amount of involvement with school, work, and community activities while using creativity in a positive manner" (p. 37).

Future Research Needs

4-H and non-4-H organizations can use findings from this study to develop and improve youth programs. The impacts of life skills education are difficult to measure and quantify, but continue to be an essential topic for positive youth development research (Lerner et al., 2013; WHO, 1997, 1999, 2003). This study proposed one method of how to assess the impacts of a specific type of youth program (horsemanship camp) on leadership life skill development. Research should continue to identify new opportunities to evaluate youth life skills in non-formal and formal educational settings in order to continually improve positive youth development. As revealed in this study, 4-H youth are self-motivated, responsible leaders capable of problem solving and critical thinking when provided with strategic learning experiences. Although non-4-H youth in this study did not show significant life skill increases, all youth can learn these life skills and become community leaders and make positive life choices (Lerner et al., 2013). Therefore, educators and community leaders should purposefully include all youth in programs as resources, volunteers, and mentors as they are skilled, interested, and eager to learn.

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Student Perceptions of Soft Skills and Career Decision Self-Efficacy Attained Through Participation in SAE Programs

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Abstract

This study sought to assess student perceptions of soft skills and career decision self-efficacy attained through participation in Supervised Agriculture Experience programs. This study attempted to describe the demographics of the selected sample, describe the career decision self-efficacy and perceived soft skill attainment of high school agricultural education students, and describe the relationship between SAE and career decision self-efficacy and perceived soft skill development. This study found no significant difference in career decision self-efficacy or perceived soft skill attainment between those who participated in SAE and those who did not. A positive significant impact was noted for career decision self-efficacy and perceived soft skill attainment between those who had placement and exploratory SAEs apart from problem solving. This would suggest that students participating in programs that require greater investment and student input are receiving greater perceived skill attainment and efficacy through their experience.

Introduction

To make instruction in school-based agricultural education (SBAE) relevant and meaningful, Supervised Agricultural Experience (SAE) programs allow students to apply and further classroom skills through real-life activities (Phipps, Osborne, Dyer, & Ball, 2008). This can take the form of a program, lasting the duration of the high school experience, or a project, lasting less than a year. Per Phipps et al. (2008), "SAE programs consist of planned, sequential agricultural activities of educational value conducted by students outside of class and laboratory instruction for which systematic instruction and supervision are provided (p. 438)." Ideally, SAE is comprised of three main components: planned out-of-class activities, documentation of project activities, and supervision by a teacher who assigns credit for the experience. The four main SAE areas include exploratory, research, placement, and entrepreneurship (AET, 2014). SAE projects in any area lead to SAE programs, and potential employment in an area of agriculture (Phipps et al., 2008).

Within agricultural education, the benefits of SAE participation are oftentimes anecdotally broadcast. Dyer and Williams (1997) noted significant SAE benefits perceived by teachers, but fewer benefits perceived by other stakeholders. Besides an apparent lack of perceived long-term, intangible, and invaluable benefits outside of agricultural education, students and teachers have little to draw upon to validate student participation in SAEs. While intrinsic value has been determined as a motivating factor (Bird et al., 2013), little empirical exploration has given name and measure to those benefits. If teachers are to motivate students based on a myriad of benefits, beyond FFA awards, teachers must have a better understanding of what those benefits entail to be able to tailor a program to students' value derivation (Bird et al., 2013). Therefore, what skills do students acquire from participation in SAE and do students recognize their own skill levels?

Review of Literature

Full participation in Supervised Agriculture Experience programs appears to have eluded most local programs for many reasons. Over time, an increasing gap between the number of students enrolled in agricultural education courses and those who take full advantage of the SAE component of the program has developed. Nearly 78% of Agricultural Education students had SAEs in 1991 compared to 55% by 2005 (Retallick & Martin, 2008). Talbert and Balschweid (2004) reported over one third of their participants did not actively engage in an SAE. Certainly, a multitude of factors contributed to this reduction in SAE participation including finding reasons why SAE is relevant to everyone. Camp, Clark, and Fallon (2000) encouraged the integration of SAE within the total program to be more flexible for teachers, more valuable to students, and more usable for the near future of agriculture. A major effort is necessary to identify the mission of SAE and assist teachers in the successful integration of SAE into their classroom (Dyer & Osborne, 1995). Cheek, Arrington, Carter, and Randell (1993) called for further research to explain and clarify the role of SAE and FFA in student achievement within the program of agricultural education. Further, Talbert and Balschweid (2004) inquired into student engagement in each component of the agriculture program and suggested further research be conducted to determine levels of interest and motivators for students participating in agricultural education. Related to those motivators, Myers et al. (2004) lamented the loss of focus on experiential learning through SAE and suggested SAEs have become mere avenues for awards. Educators cannot continue to equate SAE programs with recordkeeping and awards, and must rather begin to emphasize their value to experiential and practical learning (Dyer & Osborne, 1995).

Benefits of SAE Participation

Stakeholders tend to recognize SAEs as beneficial to students, but the benefits reported tend to be general in nature, qualitatively and anecdotally derived, and occasionally conflicting (Dyer & Williams, 1997). Through each program component (classroom, FFA, and SAE); Dailey, Conroy, and Shelley-Tolbert (2001) concluded the agricultural education program produces effective community members with adequate social skills who are prepared for higher education. Ramsey and Edwards (2011) examined specific pathways and found SAE participation provides for the development of pathway specific skills and soft career skills. Based on various correlations, skill attainment through SAEs may better prepare students for entry-level positions in the industry of agriculture through cognitive conflict and social interaction (Ramsey & Edwards, 2011). While the connection of SAE to career skills has been established in a few studies, further quantifying those connections and describing the skills will allow better implementation of programming to benefit students and ultimately employers.

Soft Skill Attainment

Connecting the classroom to the industry is a constant cry in today's career and technical education environment. Along with trade skills, basic soft skills dominate the needs of today's workplace including interpersonal and intrapersonal knowledge, ethics, organization, work habits, time management, teamwork, communication, anger management, reasoning, problem solving, trust, confidence, empathy, adaptability, self-control, and managing one's learning (McNamara, 2009; Caudron, 1999). Trustworthiness, adaptability, and collaboration were noted in a study of 121 companies worldwide as skills vital for individual success in the workplace

(Caudron, 1999). Characteristics most indicative of such success include assertiveness, empathy, happiness, problem-solving skills, optimism, and interpersonal relations (Caudron, 1999). In addition, higher-order cognitive functions such as metacognition, problem solving, critical thinking, and idea evaluation are not only desired by today's employers, but lacking in today's job candidates (McNamara, 2009). Employers are asking for future-ready workers from a system that hasn't caught up to the present (Hyslop, 2008). The future is a moving target of innovation and adaptation (McNamara, 2009), and CTE programs play critical roles in the growth of a future ready workforce (Hyslop, 2008). According to Heckman and Kautz (2012), "soft skills predict success in life…produce that success, and programs that enhance soft skills have an important place in an effective portfolio (p. 451)." Devadason et al. (2010) cite the Ministry of Higher Education in Malaysia soft skill competencies in relation to soft-skills acquired through classroom instruction. Acquisition of soft skills can lead to greater self-efficacy, influencing job performance, and what is done with the skills individuals possess. Further, based on the findings of Dailey et al (2001), Robinson & Haynes (2011), and Ramsey & Edwards (2004), SAE could be instrumental in developing the soft skills employers seek with increasing regularity.

Research thus far is insufficient to determine the contribution of Supervised Agricultural Experience toward the development of soft skills employers seek with increasing regularity. Despite a list of benefits credited to Supervised Agricultural Experience, Croom notes declines in student participation, lack of direction, and limited teacher time for implementation often leave SAE a weak component of agricultural programming (2008). As fewer students participate in the comprehensive agricultural education model, fewer experiential learning opportunities are afforded (Retallick & Martin, 2008). SAE programs struggle as the demographics of agricultural programs shift from rural to urban, bringing a different societal attitude about farming and ag-related work (Retallick, 2010). Therefore, additional context is needed to describe student outcomes related to SAE, beyond the carrots of financial reward and FFA-related outcomes.

Theoretical Framework

Lent and Hackett (1987) concluded that acquisition of career skills can lead to greater self-efficacy, which can be gained through enactive attainment (performance accomplishments); such as those acquired through Supervised Agricultural Experience. Self-efficacy has also been significantly implicated in career indecision (Lent & Hackett, 1987), indicating a need to develop self-efficacy through student learning experiences. Lent, Brown, and Hackett (1994) present a social cognitive framework for understanding career-relevant interests, selection of career options, and performance in occupational pursuits. This model highlights self-efficacy, outcome expectations, interest link, values, and attitudes (Figure 1). In quoting Bandura (1986), Lent et al. noted that interests are fostered by outcome expectations, particularly self-evaluative outcomes (1994). They further speculate that *favorable* outcome expectations are necessary for self-efficacy. In this way, the outcome expectations serve as the intrinsic reward and driving force motivating self-efficacy in students participating in an experience (Lent et al., 1994).

In each experience, a person will bring with them the inputs of predispositions, gender, race, health status, background, and contextual affordances (Lent et al., 1994). These play into the learning experience, thus determining the self-efficacy and outcome expectations perceived. Performance domains and attainments are then achieved through reciprocal relationships between interest, choice goals, and choice actions (Lent et al., 1994).

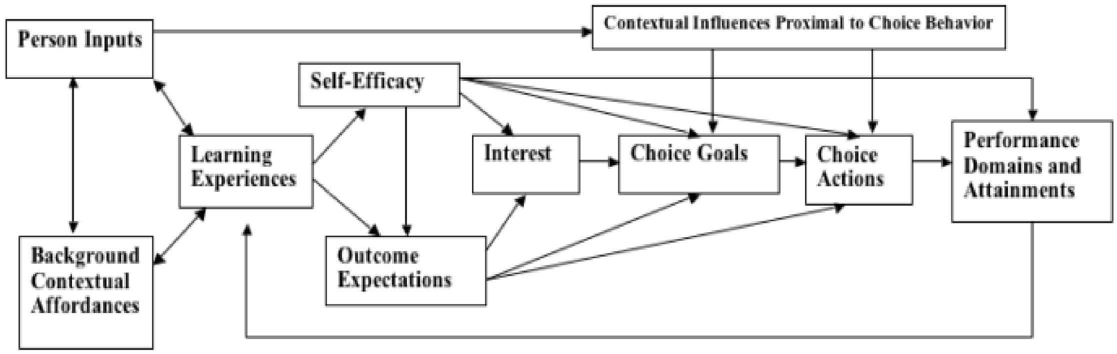

Figure 1. Model of personal, contextual, and experiential factors affecting career-related choice behavior (Lent, Brown, & Hackett, 1994)

In this study, Supervised Agricultural Experience is the learning experience meant to drive self-efficacy and outcome expectations (student performance and attainment). This study proposes that the soft-skills and self-efficacy attained will not only shape future Supervised Agricultural Experiences, but enhance the ability of youth of make career decisions, drive student attainment, and refine soft-skill development.

Purpose and Objectives

The purpose of this study is to explore the perceptions of soft skills gained by students participating in SAE programs to better understand SAE's role in developing career readiness. Given this need for examination into SAE considering the plethora of skills SAE could potentially offer, this study seeks to quantify the soft skill attainment perceived by individuals participating in an SAE program. The American Association for Agricultural Education's National Research Agenda Priority Four, Meaningful, Engaged Learning in All Environments was addressed through this study (Roberts, Harder, & Brashears, 2016). The research objectives are as follows:

1. Describe student demographics.
2. Describe the career decision self-efficacy of students.
3. Describe students' perceptions of soft skill development through SAE programs.
4. Describe the relationship between SAE involvement and career decision self-efficacy.
5. Describe the relationship between SAE involvement and perceptions of soft skill development.

Methods

This descriptive relational study utilized student responses regarding their perceptions of soft skill attainment and career decision self-efficacy through self-reported participation in their own SAE. The present study used quantitative methods in the form of a survey utilizing closed ended questionnaire items with a Likert-type scale matrix.

Population and Sample

Eight high school agricultural education programs affiliated with the Minnesota FFA Association were offered the opportunity to elect into this study and each participated. Agriculture programs at these schools were purposefully selected by the researcher and selected based on their geographical proximity to the researcher, perceived quality of agricultural education program, and representation of the eight regions of the Minnesota FFA Association.

Instrumentation

Tenth, eleventh, and twelfth grade high school students completed a survey rating their perceptions of their present level of soft skills. Soft skill item construction was based on questions outlined by Devadason et al. (2010) in the skill areas of communication, critical thinking and problem solving, teamwork, lifelong learning and information management, entrepreneurial, moral and professional ethics, and leadership. Students also completed the twenty-five-question short form of the Career Decision Self-Efficacy (CDSE-SF) assessment (Betz et al., 2006).

Career Decision Self Efficacy-Short Form

The Career Decision Self Efficacy (CDSE) Short Form was created through the work of Betz and Taylor (2006). This scale measures the degree of belief to which an individual feels they can take the necessary actions to make career decisions based on five subscales including: 1) accurate self-appraisal; 2) gathering occupational information; 3) goal selection; 4) planning their future, and 5) problem solving (Betz & Taylor, 2006). The CDSE-SF is highly reliable with an internal consistency coefficient of 0.97 (Betz & Taylor, 2006). The 25-item short form abbreviates each of the five initial subscales to five questions each rather than ten. The CDSE-SF uses a Likert-type scale ranging from one to five with statements as follows: 1 (no confidence at all), 2 (very little confidence), 3 (moderate confidence), 4 (much confidence), and 5 (complete confidence).

Soft Skill Assessment

The Soft Skill Assessment was developed by the researchers from objectives and indicators established by the Malaysian Ministry of Higher Education as utilized by Devadason, Subramaniam, and Daniel (2010). The established soft skill attainment indicators were developed into “I can” statements and put into a five point Likert-type matrix. The Likert-type scale ranges include 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree). For this study, scores of two through four were considered a moderate perceived skill level. Anything above four was considered a high skill level. Students were asked to identify their perception of development regarding soft-skills in six constructs. The soft skill assessment addressed 44 indicators of work place competency to gauge student perception of their ability to demonstrate various soft skills.

Face and content validity were established for the soft-skill instrument through a panel of experts (N = 3) consisting of faculty in education at North Dakota State University. Internal reliability was established via pilot study with a similar group (n = 32) of high school juniors and seniors enrolled in a school-based agricultural education program. Working within each of the constructs outlined in Devadason et al. (2010), a Cronbach’s Alpha coefficient of stability threshold was established at .70, *a priori* per the recommendations of Ary, Jacobs, Razavieh, and Sorensen (2006). Ultimately, five constructs were identified that matched closely with the initial framework; Communication (n=10; α=0.90), Problem Solving (n=9; α=0.91), Lifelong Learning (n=3; α=0.81), Professional Ethics (n=10; α=0.91), and Leadership (n=12; α=0.94). No total soft skill score was determined as the instrument measures individual constructs rather than deriving a composite score for soft skill development.

Data Collection

Student survey administration took place during spring 2016. While the entire sample was comprised of students in agricultural education, students were not required to be enrolled in FFA to participate in the study as students could have been required to complete SAE hours as part of their coursework. Surveys were available in paper format, and administered by the researcher or agriculture instructors at each respective high school. Students were sampled through convenience sampling methods. Students were selected for participation based on the opt-in of their advisor and willingness to participate based on student assent. Within the present study, 214 (N) students provided completed instruments. A useable response rate of 71.3% was calculated between all potential respondents. Analysis and interpretation of the findings is based upon and limited to the accepting sample. Appropriate IRB protocols were approved and followed for work with adolescents at the researcher's institution.

Data Analysis

The dependent variables for this study are students' perceived Career Decision Self-Efficacy and Soft Skill Attainment. The independent variables for this study were SAE involvement and SAE type. Student surveys were evaluated and categorized by nominal data provided by demographic questions. The student demographic section asked students to denote their participation in SAE programs to give a comparative sample of SAE participants vs non-SAE participants. This was used to determine program type and SAE involvement to allow comparative analysis across degrees of participation. Student surveys were further evaluated based on ordinal data collected regarding agreeance with Likert-type scale questions related to soft skill perception and career decision self-efficacy. Descriptive statistics were utilized to analyze Career Decision Self-Efficacy, Soft Skill Attainment, and student demographic items. Data were analyzed using the Statistical Package for Social Sciences (SPSS Version 21). The data analysis included descriptive measures for each variable at each level of measurement. Analysis of Variance (ANOVA) was implemented between 1) SAE and each Soft Skills Attainment construct, 2) SAE, Career Decision Self-Efficacy and Soft Skill Attainment, and 3) SAE and Career Decision Self-Efficacy. Individually, the variables of SAE participation and type defined SAE program involvement for the purposes of this study.

Findings

Research Objective One

Research objective one was to describe selected demographics of high school agricultural education students enrolled at participating schools. The greatest number of respondents were of junior standing (47.7%, n=102) whereas the fewest represented were sophomore students (13.10%, n=28). The distribution of sexes for the sample favored males (64.8%, n=138) over females (35.2%, n=75). Mean FFA membership was two years; approximately one third of respondents (n= 70, 32.7%) had never participated in FFA, while 66.6% (n= 142) reported membership of at least one year. Of the members who had participated in FFA, 80.9% (n=115) received an FFA degree. The largest number of students received their chapter degree (27.1%, *n*=58). Of the 214 students sampled, 49.1% (*n*=108) reported having a Supervised Agricultural Experience. The SAE area reported most commonly was placement (20.60%, *n*=44). Approximately one quarter of students participating were enrolled in work-based learning programs (26.6%, *n*=57). Work-based learning programs in Minnesota are collaborative efforts between students, parents, a business, and the school to engage students in supervised work experience. Most the population sampled reported plans to attend a post-secondary institution (72.40%, *n*=155).

Research Objective Two

Table 1
Student Perceptions of Career Decision Self-Efficacy

	N	*M*	*SD*
Career Decision Self-Efficacy	214	3.34	0.71
Self-Appraisal		3.80	0.75
Occupational Information		3.75	0.80
Goal Selection		3.67	0.82
Planning		3.52	0.78
Problem Solving		3.47	0.77

Research objective two was to describe the career decision self-efficacy of high school agricultural education students (Table 1). Overall, students reported a perception of moderate confidence (*M* = 3.64) in their career decision abilities. Within each construct of career decision self-efficacy, students reported mean scores (*M*) as follows: Self-Appraisal, 3.80; Problem Solving, 3.47; Planning, 3.52; Occupational Information, 3.75; and Goal Selection, 3.67.

Research Objective Three

Table 2
Student Perceptions of Soft-Skill Development

	N	*M*	*SD*
Soft Skill Development	213		
Leadership	214	4.05	0.71
Lifelong Learning	214	3.84	0.77
Problem Solving	214	3.79	0.72
Professional Ethics	214	3.77	0.75
Communication	213	3.67	0.74

Describing perceptions of soft skill development of high school agricultural education students was research objective three (Table 2). Soft skill scores are reported by construct and levels were defined on a five-point scale. Students reported a moderately-high confidence level across constructs, with leadership abilities reported at the highest confidence level. Within each construct of soft-skill development, students reported construct means (*M*) as follows: Communication = 3.67; Problem Solving = 3.79; Lifelong Learning = 3.84; Professional Ethics = 3.77; and the highest mean with Leadership = 4.05.

Research Objective Four

Table 3
The Impact of SAE Involvement on Career Decision Self-Efficacy

Construct		SS_x	*Df*	*F*	*MS*	*p*	*MD***
CDSE	Between	6.97	5, 204	3.06	1.43	0.01*	.62*
	Within	90.59					

Note: *Significance measured at p<.05. **Mean Difference between Exploratory and Placement SAE types.

Research objective four sought to describe the relationship between SAE involvement and career decision self-efficacy for high school agricultural education students. Student data was interpreted using a One-Way Analysis of Variance (ANOVA) model (*n* = 204) for CDSE among students with and without SAE. Within those who reported to have an SAE, it was further divided as: exploratory, research, placement, entrepreneurship, and combined program. A significant ANOVA model ($p < .01$) was rendered for CDSE and the SAE types (F (5, 204) 3.06). Upon analysis of the post hoc multiple comparison tests, the Mean Difference (MD = .62) between Exploratory SAE and Placement SAE was the sole contributor to the significant model ($p < .009$). No other independent variables for SAE type contributed significantly ($p<.05$) to the overall ANOVA model for CDSE. Further, the model revealed there was no difference between those who reported having and not having an SAE within the sample. The significant contribution to the model came from within those who reported having an SAE (Table 3).

Research Objective Five

Student data was interpreted using a One-Way Analysis of Variance (ANOVA) model (*n* = 204) for soft skills among students with and without SAE (Table 4). The model was loaded identically to the analysis for objective four. A significant ANOVA model ($p < .05$) was rendered for all Soft Skill Constructs and the SAE types, excluding Critical Thinking/Problem Solving F (5, 204) 1.70 ($p = 0.14$). Similar to Objective Four, analysis of the post hoc multiple comparison tests revealed the Mean Difference between Exploratory SAE and Placement SAE was the sole contributor to the significant model. Similarly to CDSE, no other independent variables for SAE type contributed significantly ($p<.05$) to the overall ANOVA model for soft skill acquisition. Further, the model revealed there was no difference between those who reported having and not having an SAE within the sample. Again, the significant contribution to the model came from within those who reported having an SAE.

Table 4
The Impact of SAE Involvement on Student Soft Skill Abilities Perceptions

Construct	SS_x		*Df*	*F*	*MS*	*p*	*MD***
Communication Skills	Between	6.23	5, 203	2.589	1.33	0.03*	0.60*
	Within	101.39					
Critical Thinking/ Problem Solving Skills	Between	4.14	5, 204	1.70	0.82	0.14	0.39
	Within	96.98					
Lifelong Learning/ Info Management Skills	Between	11.10	5, 204	4.20	2.22	0.001*	0.68*
	Within	105.42					
Professional/ Ethical Decision Skills	Between	9.37	5, 204	3.69	1.87	.003*	0.70*
	Within	101.18					
Team and Leadership Skills	Between	8.03	5, 204	3.62	1.61	.004*	0.66*
	Within	88.40					

Note: *Significance measured at $p<.05$. **Mean Difference between Exploratory and Placement SAE types.

Conclusions/Recommendations/Implications

In this study, the researcher described the soft-skill attainment and career decision self-efficacy of high school students in agricultural education programs. The influence of each area of Supervised Agricultural Experience was explored, and the soft skill attainment and career decision self-efficacy of high school students was confirmed. There was a significant positive impact between students participating in Placement SAEs compared to Exploratory SAEs for both career decision self-efficacy and soft skill attainment, apart from problem solving. Several interpretive limitations exist with the results of this study. Due to research design, the sample only includes agricultural education students, thus the results cannot be generalized specifically to SAE or beyond an agricultural education sample.

Research objective one sought to describe selected demographics of high school agricultural education students enrolled in secondary agricultural education programs. Sixty-seven percent of students in the agricultural education programs surveyed had participated in FFA for at least one year. Furthermore, of the students participating in FFA, 80% had received an FFA degree; potentially indicating that most the students in FFA participated in a wide variety of the programing offered. Participation in Supervised Agricultural Experience programs was claimed by 49.1% of the sample with the most common area being the placement area (19.3%). This aligns with a decreasing trend noted by Retallick & Martin, noting 40% of students with SAEs holding a placement project. This potentially suggests a need for monetary gain on the part of the student that may preclude or incentivize participation in SAE programming (2008).

Research objective two was to describe the career decision self-efficacy of students enrolled in high school agricultural education programming. Students reported a perception of moderate confidence (M = 3.64). By individual construct, students reported the highest confidence in self-appraisal (M = 3.80), and the lowest confidence in problem solving (M =

3.47). Self-appraisal is the metacognitive ability of students to identify their ability to make career decisions. These findings are similar to recent work in agricultural education assessing CDSE (Marx, Simonsen, & Kitchel, 2014). Students consistently possess less confidence in their abilities to solve problems in relation to career decision-making. Although these differences were not analyzed for significance, the consistency of this finding is worth consideration. Why do students feel less confident in their abilities to problem-solve career related activities? Is this a result of few experiences and/or guidance doing so? Further, what happens when students encounter obstacles searching for and retaining work? They may feel confident they can find information related to work which interests them, but can they weather inevitable storms related to their work?

Objective three sought to describe high school agricultural education students' perceptions of soft skill development. Students reported a moderately high perception of soft-skill development across constructs. The entire sample was comprised of students participating in agricultural education programming, thus moderately high confidence over the whole sample in the areas of career decision self-efficacy and soft skill development constructs could suggest that students are gaining career decision skills through participation in some component of an agricultural education program, as suggested by Dailey et al. (2001).

Objective four sought to describe the relationship between SAE involvement and career decision self-efficacy for high school agricultural education students. There was no significant effect on CDSE ($p = 0.43$) between students who identified having an SAE and those who did not. This could indicate an integrated program; meaning that one component (classroom, FFA, SAE) does not stand out significantly from the other in terms of developing CDSE. This may also be an indication that students are receiving CDSE through other components of the agricultural education program or elsewhere in their lives and education. A significant impact on CDSE ($p = 0.008$) was noted across constructs, with the exception of problem solving, between students who identified as having an exploratory SAE compared to those having a placement SAE. The significant impact between exploratory SAE and placement SAE would suggest a higher level of student input correlates to greater levels of career decision self-efficacy attained by students participating in programs at higher levels. Further research may seek to analyze a difference in perception of career decision self-efficacy relative to a non-agricultural education or non-career and technical education population. Consideration of the inputs of time, energy, and money in addition to the outcomes of money for time, interpersonal communication, and potential leadership abilities pose an interesting contrast in what students may perceive they can gain from one type of SAE over another.

Objective five sought to describe the relationship between SAE involvement and perceptions of soft skill development in high school agricultural education students. There was no significant difference in perceived soft skills among students who had an SAE and those who did not. This would suggest that students have opportunities in addition to those afforded by Supervised Agriculture Experience programming that allow for the development of communication, problem solving, lifelong learning, professional ethics, and leadership. A significant impact on soft skills was noted, except for problem solving across constructs among students who identified as having a placement SAE compared to those with an exploratory SAE. Dyer and Williams also reported limited benefits in the development of communication skills, problem solving skills, and agricultural knowledge through SAE (1997). The gap in commitment, purposeful reflection, and responsibility between these two SAE types could contribute to the significant difference in perceived soft skill abilities. This also corroborates suggestions by Dailey et al. (2001), Robinson & Haynes (2011), and Ramsey & Edwards (2004) regarding SAEs role in the development of the soft-skills sought by employers in today's marketplace. Along with trade skills, basic soft skills dominate the needs of today's workplace including interpersonal and intrapersonal knowledge, ethics, organization, work habits, time management, teamwork, communication, anger management, reasoning, problem solving, trust, confidence, empathy, adaptability, self-control, and managing one's learning (McNamara, 2009; Caudron, 1999).

Considering what makes an SAE experience valuable is a necessary step in determining what additional requirements or changes may be necessary for the current SAE model. Per this data, having no SAE seems to be as beneficial as having an exploratory SAE. If this is the case, agricultural education is failing both the students who aren't partaking at all in this necessary component of agricultural education, but also those who are participating in feeble attempts to implement SAE into a total agricultural education program. What can be done to intentionally incorporate the three-circle model without losing the benefits of quality programming that require time and resources that no one seems to have available?

An unfortunate deficit across this sample was noted in the continuing decline in Supervised Agricultural Experience participation. One of the initial goals of this study was to determine a rationale for student participation in SAE programming. However, students won't be motivated by the skills they are told to attain from a given experience. Students are motivated when the appropriate help and support is in place to aid them in success. When goals are set a plan of action is created, and follow through ensures completion and success within those goals. Students perceive lower skill attainment when they do not have the support necessary to make the connections between the daily grind and the broader picture of skills used across employment settings. In relation to the theoretical framework for this study, Lent et al. proposed a model that was evident in this sample. Positive learning experiences result in outcome expectations that yield skill development. Additional research may seek to determine the connection of soft skills attained through placement SAEs to interest, choice goals, and choice actions to determine additional motivating factors for student participation in SAE programming.

Within the confines of this instrument and study, further examination may be necessary to explain the low significance of critical thinking and problem solving skills relative to career decision self-efficacy and soft skill attainment within the SAE program model. Additional work could also identify the areas in which programs are lacking regarding development within this construct. A student in a placement SAE necessarily makes decisions regarding their daily duties, yet perceives the lowest confidence in problem solving in both soft-skill attainment and CDSE. If students are not making the connection between their daily work and the perception of attainment in the problem-solving area, additional consideration should be given to how advisors implement and evaluate SAEs. Attention should be given to address the skills that are perceived more highly in those with placement, entrepreneurship, or combined SAE programs. Regarding the facilitation of SAE programs, additional modification may be needed to address the short comings in the perceived outcomes of exploratory and research SAEs.

Identification of teacher perceptions regarding their programs may give indications regarding program quality and direction regarding skill attainment. According to Lewis et al. (2012), available facilities, teacher encouragement, and frequency of help are essential to students' perceptions of success through their SAE, but analysis of student SAE knowledge and perceptions would add to the scope of understanding regarding SAE participation. This holds true in the current study as well. The frequency of visits, teacher encouragement, and parental involvement play a key role in whether a student perceives success in each area of their project. The lower perception of attainment in problem solving ability could be as much a result of teacher and parent involvement as it is a difference in SAE area.

Finally, an analysis of the impact on perceived soft skill attainment relative to career decision self-efficacy would give an indication to practicing agricultural educators regarding the development of skills within the integrated program. Identifying the relationship between the outcomes of this study may better allow practitioners to plan intentional and directed SAE programming, thus providing students with opportunities to receive the highest potential for perceived benefits. Additionally, understanding the relationship between soft-skill attainment and career decision self-efficacy within the SAE program model will better allow supervisors (teachers, parents, and employers) to prepare students for being employable communicators, problem solvers, learners, leaders, planners, self-evaluators, occupational researchers, and goal setters.

Regarding the integrated agricultural education program, soft skill attainment, and career decision self-efficacy, the following recommendations are offered to provide direction for the practicing agriculture instructor. First, intrinsic motivators have been shown to be a driving factor for success in agricultural education programming (Bird et al., 2013). Thus, the present soft skills instrument should be further validated for use in the classroom, FFA programming, and Supervised Agricultural Experience. This would allow practitioners to evaluate the strengths of their own programs to work toward an integrated program model. Additionally, students would have an instrument by which to gauge their skills and abilities relative to the workforce. Teachers would be able to utilize this instrument as a base from which to aid students in setting goals and creating action plans for their individual programs. Finally, this would allow practicing agricultural educators to be more intentional with their implementation of classroom or school-based SAEs to allow students to derive the greatest perceived benefit.

Practicing agriculture instructors can also work with students to develop Supervised Agriculture Experience programming focusing on entrepreneurship and placement programs. These programs require a greater investment from both the student and teacher, but also result in a greater gain, and can be supplemented with other individual projects (research and exploratory). Requirements must be structured in such a way as to provide the greatest possible opportunity for students to plan, execute, and reflect on their experience. SAE must be a shown as a valued component of a program’s agricultural education model, rather than a mark in the gradebook or an award application.

Should Supervised Agricultural Experience be a required component of the agricultural education model? That depends on the outcome expectation of the teacher, student, parents, and community. If SAE is integrated to meet a requirement, it is obvious that it is going to provide as little benefit as having no SAE implementation. However, if SAE is implemented to incorporate goal setting, program planning, and skill evaluation with the help of all stakeholders (teachers, parents, employers, and students) it will continue to hold a necessary and vital role in agricultural education programs across the country.

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Does Motivation Matter? Examining the Relationship between Student Motivation and Performance in Career Development Events

Abstract

This study examined the role of motivation on the performance of competitors at National-level FFA Career Development Events (CDEs). A census of all competitors (N = 1306) in nine events representing team-based content and skills, team-based leadership, and individual leadership events was conducted. Competitors were surveyed on the motivational constructs of grit, interest, and self-efficacy, and survey data were connected to individual performance in the event (gold/silver/bronze emblem). GPA and all motivation measures surveyed had small positive correlations with individual performance. Further analysis displayed differences between the different genres of competition. Competitors in individual leadership events were grittier than students from all other genres of competitions and displayed higher values of self-efficacy even though there was no difference in GPA between the groups. Coaches should explore ways to build the self-efficacy of their students and future research needs to investigate the underpinnings of why students in individual FFA leadership events are more motivated to compete than their team-based counterparts.

Introduction

One of the most prominent components of FFA programs across the country are Career and Leadership Development Events (CDE/LDEs). Career Development Events are competitive educational events that develop content area skills for FFA members in both team and individual environments. Leadership Development Events focus on developing personal skills that are needed in the workforce and transfer across several career areas. These diverse competitions allow students to hone skills in a variety of content and leadership areas. Talbert and Balschweid (2006) recognized the degree of CDE participation by FFA members, reporting seven in ten FFA members had participated in a CDE at some level and 60% were involved in a CDE focusing on leadership skills. Transferring this percentage to the 649,355 FFA members on the national roster in 2016 (National FFA, 2017), one could estimate over 450,000 FFA members are competing in CDEs each year across the country. Their popularity aside, CDE participation can provide FFA members with valuable life skills such as goal setting, dedication to the completion of tasks, and a desire for excellence (Vaughn, Keith, & Lockaby, 1999). With the potential impact for competitors and the large numbers of participants nationwide, it seems logical FFA members are highly motivated to compete; but how so? Competitors in these events showcase their talents in everything from public speaking and tool identification to meat evaluation and conducting a chapter meeting. Given the wide diversity of CDE events, are we to assume students are motivated in the same manner regardless of the event?

Learning more about how students are motivated to engage in FFA competitions would benefit coaches and stakeholders alike. When linked to performance outcomes, coaches could make strategic decisions about how they teach and motivate students by better understanding which motivational factors drive student success. Further, understanding which motivational factors offer the greatest outcome for students allows coaches to be more efficient with the time of both parties. Participation in a CDE allows students to develop and refine skills needed in the workplace and generates student interest in agricultural careers. Potentially, motivational factors for skill development in CDEs could be transferred to other youth development programming. Ultimately, skill development, prior experience, and career interest will benefit the agricultural industry by providing a pipeline of qualified and motivated employees.

Literature Review

Prior investigations have sought to articulate the motivational drivers of agricultural competition. Arnold, Meinhold, Skubinna, and Ashton (2007) investigated factors motivating 4-H members to participate in the county fair and concluded that the opportunity to have fun was the biggest motivator. Additionally, participants identified achieving goals, spending time with friends, and building teamwork as encouraging factors. Factors not serving as motivators included collecting fair premiums, qualifying for State Fair, and making a presentation. With an interest in why youth elect to participate in career development events, Knobloch, Brady, Orvis, and Carroll (2016) initiated an effort to develop and validate a survey instrument to more reliably assess students' motivations to participate in competitive events. The expectancy-value theory (Eccles & Wigfield, 2002) was identified as an appropriate theoretical framework to inform the development of the instrument which measured intrinsic task value, attainment, cost and utility value, task value, and self-efficacy. The research concluded self-efficacy makes the largest contribution to youth motivation (Knobloch et al., 2016).

Croom, Moore, and Armbruster (2009) surveyed FFA CDE participants and their coaches and reported a disagreement between coaches and competitors on the most important reason for participation. Students identified relatedness to career goals as the most important factor for participation, while coaches identified competition as the primary motivator. Lancaster, Knobloch, Jones, and Brady (2013) examined the motivational constructs of self-efficacy, task value, and career interest among participants of several livestock-based CDEs in Indiana. Although the authors corroborate part of the findings from Croom et al. (2009), they encouraged future research to connect motivational constructs with performance in the event, an objective of the present study.

In addition to understanding motivational drivers, researchers have investigated the outcomes of competitive agricultural events. Radhakrishna, Everhart, and Sinasky (2006) concluded 4-H members had positive attitudes towards 4-H competitions and participants credited the competitive events with encouraging them to learn new things, to engage in goal setting, to acquire important life skills, and to set high expectations for personal achievement (Radhakrishna et al., 2006). Davis, Keith, Williams, and Fraze (2000) conducted a qualitative investigation of 4-H members, parents, advisors, and livestock show officials over the duration of a livestock show season. The themes that emerged as benefits to participation in competitive livestock exhibition included the development of social relations, character and family relations, exposure to competition, opportunity to experience new cultures and environments, and financial support for future educational endeavors.

CDE performance is related to the unique habits and traits of competitors. In an analysis of the training practices of the National FFA Livestock Judging CDE, participants rated the importance of 16 different traits identified as characteristics contributing to their selection as a member of the team, (Rayfield, Fraze, Brashears, & Lawver 2009). The research found “competitiveness” had the highest correlation (.342) of any other trait to performance. These were traits students identified as characteristics that led to them being selected as a member of the team. When used in a linear regression to predict performance in the event, only two recruitment factors (“competitiveness” and “good study skills”) yielded statistically significant results. Training practices and strategies are the result of careful consideration and planning by CDE coaches. Ball, Bowling, and Bird (2016) conceptualize coaching strategies in a continuum model of motivation and performance strategies. Further, they recognize the importance of changing extrinsic and intrinsic motivational tactics based on student needs.

Grit

Grit is considered a "global" and long-term measure of persistence (Duckworth Peterson, Matthews, & Kelly, 2007). Researchers define grit as "the perseverance and passion for long-term goals" while asserting a clear distinction from cognitive abilities. Duckworth et al. (2007) argued talent alone does not achieve difficult goals, but also sustained and focused application of talent over time results in goal achievement. Other researchers have provided evidence to connect grit to performance in spelling bees (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011), performance and retention of teachers (Robertson-Kraft & Duckworth, 2014), and performance and graduation rates of USMA Cadets (Maddi, Matthews, Kelly, Villarreal, & White, 2012). Since grit describes the behavior of individuals regardless of the context, grit was chosen as a motivational construct for the present study because it helps describe the type of student attracted to the competition regardless of their content motivation or interest in the topic.

Interest

Interest, in a motivation context, is the psychological state of engaging in a task (Hidi & Renninger, 2006) with implications not just on first exposure, but in also reengaging later. Researchers characterize personal interest as a stable and enduring disposition (Schiefele, 2009). While personal interest can be directed to a specific idea or topic, situational interest is the psychological state of being interested in a task (Renninger, Hidi, & Krapp, 2014) and takes into account the interestingness of the task in a contextual way. In the current study, situational interest was measured to gauge the level of motivation students have pertaining to the content and context when competing in a specific CDE.

Self-efficacy

Bandura (1997) describes self-efficacy as the cognitive process of an individual assessing their ability to perform a domain specific task. A component of his Social Cognitive Theory, Bandura (2001) asserts self-efficacy affects actions such as behavioral choice, performance, strategy selection, goal choice and commitment, and effort. Indeed, self-efficacy has demonstrated positive impacts on many outcome variables, including physical endurance, (Lerner & Locke, 1995) competition anxiety (Hong, Hwang, Tai, & Lin, 2015), and enrollment decisions to enter a career (Bashir, Wee, Memon, & Boone, 2017). Meta-analyses concerning self-efficacy consistently show efficacy beliefs contribute significantly to both motivation and performance (Bandura & Locke, 2003). Measuring the self-efficacy of competitors is important to this study because it provides information about a student's choice (to compete in a specific contest), effort, and persistence within the task (Schunk & Pajares, 2009).

Theoretical Foundations and Conceptual Framework

The foundations of this study are grounded in Bandura's (1986) Social Cognitive Theory. Bandura's theory has been used to describe how individuals are active in their own development and can influence their performance. Cognitive and personal factors contribute to the outcomes of a situation and are indeed influenced by the environment. Bandura also explained that self-beliefs of a person's own ability in a specific situation or task are central to Self-Efficacy Theory. Self-Efficacy beliefs have been predictors of human motivation and behavior (Bandura, 1986).

Sources of self-efficacy come from four main sources: mastery experiences, physiological and emotional states, vicarious experiences, and social persuasion (Bandura, 1997). Mastery experiences are often considered the most effective way to build self-efficacy (Bandura, 1997) and those mastery experiences can include repeated practice of experiences that closely mimic the summative performance. Coaches and teachers can develop a student's self-efficacy by creating effective practice environments. Bandura also asserts an individual's self-efficacy can control their actions, amount of effort, and perseverance (Bandura, 1997). Perceived self-efficacy effects resiliency to adversity and levels of accomplishment.

A conceptual framework was created for this study to show the relationship between motivation and student performance (Figure 1). A student's performance in an educational environment should closely mimic the experience provided in a real working situation. In this study, the researchers selected Career and Leadership Development Events to gather data on cognitive, psychomotor, and affective performances. The external forces contributing to a student's performance can include teacher behaviors and resources available to acquire content knowledge. The internal forces that are interacting with those external forces include demographic and psychographic factors of the students.

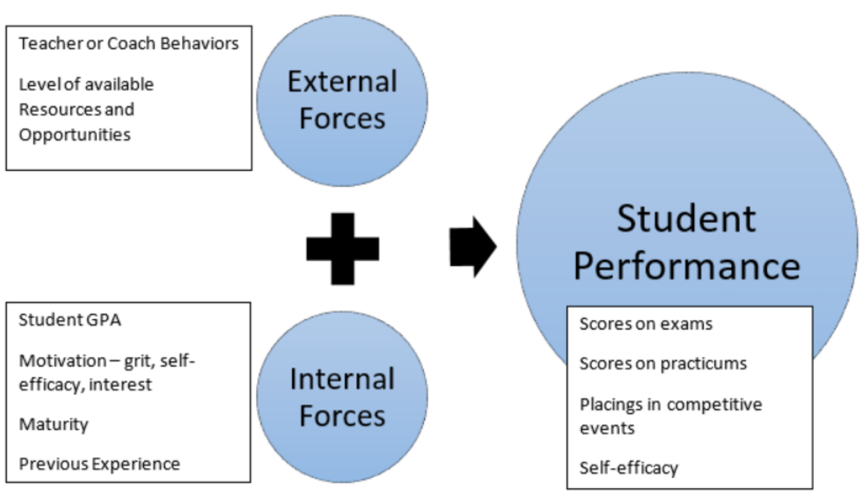

Figure 1: Conceptual framework of the potential relationship between motivation and student performance.

Purpose

The purpose of this study was to examine the relationship between motivation and performance in FFA CDE/LDE competition. Specifically, to determine the relationship between an individual's grit, interest, and self-efficacy and their performance in the event. This research aligns with research priority five of the AAAE research agenda: Efficient and Effective Agricultural Education Programs (Roberts, Harder, & Brashears, 2016). The following research questions guided the investigation:

1. What are the motivational profiles (grit, interest, and self-efficacy) of competitors in National FFA CDEs/LDEs?
2. What is the relationship between motivation and performance in CDE competition?
3. Is there a difference between the motivations of competitors in team-based content, team-based leadership, and individual leadership CDEs?

Methods

The target population of the study was all National FFA CDE/LDE competitors. A one-stage cluster sample, representative of the 24 different CDEs/LDEs offered by National FFA was employed. All events were assigned to one of three clusters (Table 1): team-based content (i.e. livestock evaluation), team-based leadership (i.e. farm business management), or individual leadership (i.e. prepared public speaking). Proportional to the number of events in each cluster, five events from the team-based content cluster, and two events each from the team-based leadership and individual leadership clusters were chosen at random. A census of all students in each of the nine randomly chosen events was then conducted (Figure 2). The number of students surveyed and associated response rates are depicted in Table 2.

Table 1

Assignment of CDEs/LDEs to Genre Cluster

Genre	*N*	CDEs
Team-based content	15	Agricultural mechanics, Agronomy, Dairy cattle evaluation, Environmental & natural resources, Floriculture, Forestry, Horse evaluation, Farm business management, Food science & technology, Livestock evaluation, Nursery/landscape, Meats evaluation, Milk quality & products, Poultry evaluation, Veterinary science
Team-based leadership	5	Agricultural communications, Agricultural issues forum, Agricultural sales, Marketing plan, Parliamentary procedure
Individual Leadership	4	Creed speaking, Extemporaneous public speaking, Job interview, Prepared public speaking

Note. Clusters were designed to reflect the core principles students engage in (content vs leadership) and the presence/absence of the team dynamic (team-based vs individual)

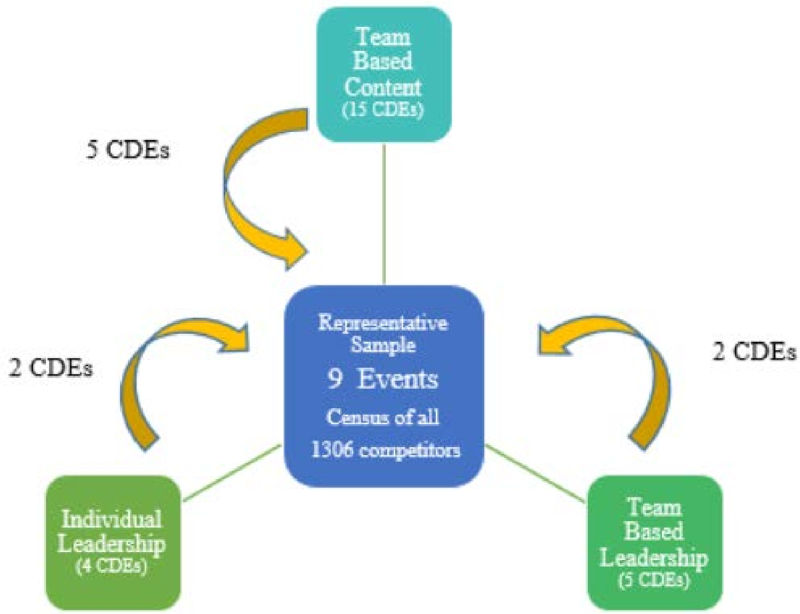

Figure 2. One-Stage Cluster Design

Table 2

Competitors Sampled in each CDE

CDE	Competitors/ Participants (*n*)	Completed Questionnaires (*n*)	Response Rate (*%*)
	Team-based Content		
Ag mechanics	179	162	95.3
Agronomy	152	137	90.1
Poultry	154	150	97.4
Veterinary science	163	148	90.8
Floriculture	171	149	87.1
	Team-based Leadership		
Ag sales	159	135	84.9
Parliamentary procedure	245	245	100.0
	Individual Leadership		
Creed speaking	46	45	97.8
Extemporaneous speaking	46	26	56.5
Total	1197	1306	91.7

Note. "Competitors/Participants" is the total number of competitors officially recognized by National FFA that participated in the CDE.

Online questionnaires were completed by competitors from three events (Creed, extemporaneous speaking, and poultry) whose participant emails were known. Participants were emailed a link to the electronic questionnaire prior to convention. Researchers followed up with nonrespondents via a hardcopy questionnaire during competition at the National FFA Convention. All other competitors completed the paper survey during the convention without the online option. There were no significant differences in any variables based on the method of data collection.

A previously conducted pilot study determined the period just before the awards banquet (after the competition was over) was the optimal time for students to complete the hardcopy questionnaire. Members of the research team set up a station outside of the banquet hall one hour before the scheduled start of the program. Students were asked to complete and return the questionnaire for an FFA decal as an incentive. All questionnaires were finished before the announcement of results.

Measures

As a measure of persistence, grit was measured with the short version Grit scale ($\alpha = .83$, Duckworth & Quinn, 2009). The instrument contained eight Likert-type items (1 = *not like me at all* to 5 = *very much like me*) that measures the two components of grit: consistency of interest and perseverance of effort. Competitors in the study received the "child adapted" version of the instrument. Interest was measured with a modified version of the Initial Interest scale ($\alpha = .93$, Hulleman, Godes, Hendricks, & Harackiewicz, 2010). The measure was comprised of five items on 7-point Likert-type scale (1 = *strongly disagree* to 7 = *strongly agree*) and were adapted to work in the context of a CDE competition. Self-efficacy was measured with a modified version of the Educational Psychology Self-Efficacy Questionnaire (Nietfeld, Cao, & Osborne, 2006). The measure ($\alpha = .90$) consisted of eight items on a 5-point Likert-type scale (1 = *nothing like me* to 5 = *a great deal like me*) adapted to fit the CDE context. Demographic variables collected on competitors included: gender, grade level, race/ethnicity, hometown classification, and self-reported unweighted GPA. Performance was measured by the individual emblem received by competitors in the event (Gold/Silver/Bronze). "Team emblem" served as a proxy for individual emblem in the parliamentary procedure event as individuals are not recognized for individual performance in that event. For analysis purposes gold emblems were coded as "3," silvers as "2," and bronze as "1."

Data were analyzed using SPSS© version 24. Descriptive statistics, including measures of variability and central tendency were used to report grit, interest, self-efficacy, and GPA. Frequencies were used to report all other demographic information. Spearman's Rho correlations were used to determine any relationship between motivation, GPA, and the ordinal measure performance (gold/silver/bronze). One-Way ANOVAs detected any differences between the different genres of CDEs/LDEs with regard to motivation. Post hoc analysis was conducted using the Tukey's procedure for pairwise comparisons of the three genres of CDEs. Effect sizes were reported for ANOVA analyses and interpreted using Cohen's (1988) definitions of small, medium, and large effect sizes.

A panel of experts in educational psychology and agricultural education reviewed all measures of the instrument to establish content and construct validity. The instrument was pilot tested the year prior at three different national FFA CDEs. All motivational measures were adapted from previously validated constructs with known reliabilities. Cronbach's alpha's were reported for all measures to determine construct reliability in the present study.

Results

Of the 1306 competitors who competed in the nine events sampled, 1197 completed the survey for an overall response rate of 91.7%. T-tests revealed no differences between the online (n = 114) and hardcopy (n = 1083) survey delivery options with regard to performance, GPA, or any of the motivation measures ($p < .05$). Respondents of the survey (n = 1197) had significantly higher emblem performance (t = 3.572, p = .00) than nonrespondents (n = 109). Nonrespondents were largely comprised of those who left convention early and were thus unavailable to complete the survey at banquet.

The sample was predominantly comprised of 12th grade (40.1%), female (59.8%), Caucasian (87.5%), competitors from a rural (58.7%) hometown. Frequencies of demographic variables are found in Table 3. Cronbach's alpha scores of each of the three motivation measures demonstrated acceptable levels of internal consistency (see Table 4). Overall mean values and associated standard deviations (see Table 4) are consistent with previous research using similar scales (Curry, Warner, & Park, 2016). All motivation measures (grit, interest, self-efficacy) and self-reported GPA had low, but significant correlations to individual performance (see Table 5).

Table 6 provides descriptive statistics of the motivational measures and GPA broken down by genre of CDEs. Coupled with One-Way ANOVA analysis, significant differences were found between the three genres on all measures of motivation (Table 7), however, no differences were found for GPA. Tukey's post hoc analysis of pairwise comparisons revealed individual leadership competitors are grittier than team-based content (p = .01, d = .36) and team-based leadership (p = .01, d = .38) participants, and more self-efficacious than team-based content (p = .00, d = .43) and team-based leadership (p = .05, d = .31) peers. Furthermore, they are more interested in their CDE than their team-based content (p =.00, d = .45) counterparts.

Table 3

Descriptive Statistics for Demographic Variables

Variable		Frequency (*n*)	Proportion (%)
Grade Level			
Freshman (9th grade)		15	1.3
Sophomore (10th grade)		140	12.0
Junior (11th grade)		279	23.9
Senior (12th grade)		467	40.1
Graduate (college/workforce)		265	22.7
	Total	1166	100.0
Gender			
Male		470	40.2
Female		698	59.8
	Total	1168	100.0
Ethnicity			
White/Caucasian		1029	87.5
African American		17	1.4
Asian		11	0.9
Hispanic/Latino of any race		50	4.3
American Indian or Alaskan Native		17	1.0
Two or more races		40	3.4
Other		6	0.5
None disclosed		11	0.9
	Total	1176	100.0
Hometown			
Rural		686	58.7
Town		308	26.4
Suburban		121	10.4
City		53	4.5
	Total	1168	100.0

Table 4

Summary Statistics of Motivational Measures

Measure	α	*n*	*M*	*SD*
Grit[a]	.71	1192	3.66	.55
Self-efficacy[b]	.83	1189	4.02	.61
Interest[c]	.84	1188	5.94	.93

[a] Scale = 1 (*strongly disagree*) - 5 (*strongly agree*)
[b] Scale = 1 (*nothing like me*) - 5 (*a great deal like me*)
[c] Scale = 1 (*strongly disagree*) - 7 (*strongly agree*)

Table 5

Spearman's Rho Correlations with CDE Performance as Measured by Individual Emblem

Variable	*r*	Sig. (2-tailed)	*n*
Grit	.07*	.03	1192
Interest	.16*	.00	1188
Self-efficacy	.19*	.00	1189
Grade point average	.20*	.00	831

Table 6

Means and Standard Deviations of Measures by CDE/LDE Genre

CDE Genre	Grit (μ, *sd*)	Interest (μ, *sd*)	Self-Efficacy (μ, *sd*)	GPA (μ, *sd*)
Team-based content	3.65 (.54)	5.84 (.94)	3.98 (.62)	3.70 (.36)
Team-based leadership	3.64 (.55)	6.09 (.90)	4.06 (.59)	3.71 (.33)
Individual leadership	3.85 (.56)	6.26 (.91)	4.25 (.65)	3.74 (.39)
n	1192	1188	1189	831

Table 7

One-Way Analysis of Variance (ANOVA) of Motivation Measures

Variable	Source	*df*	*SS*	*MS*	*F*	*p*
Grit	Between groups	2	2.74	1.37	4.6	.01
	Within groups	1189	354.43	.30		
	Total	1191	357.17			
Interest	Between groups	2	23.69	11.82	13.87	.00
	Within groups	1185	1009.73	.85		
	Total	1187	448.96			
Self-efficacy	Between groups	2	5.21	2.61	6.97	.00
	Within groups	1186	443.74	.37		
	Total	1188	448.96			

Conclusion and Recommendations

It is important to note the sample is generalizable to all National FFA CDE competitors, but not all FFA CDE competitors nationwide. This is an important distinction to make since it is likely the population of national CDE competitors are a more highly motivated group than those at the state and local levels of competition. Another limitation to recognize is the self-reported measure of GPA. Although Kuncle, Credé, and Thomas (2005) recognized self-reported GPAs are good reflections of actual grades for high GPA students, they assert students with lower GPAs may be less precise and recommend researchers exercise caution when reporting. The average unweighted GPA for students in this sample was 3.7/4.0, so these high performers likely have high precision in estimating their actual GPA.

This quantitative investigation of CDE competitor motivation yielded several significant findings to coaches and stakeholders of FFA competition. First, higher levels of motivation are positively correlated to student performance in all areas of FFA competition. A student's level of perseverance over time (grit), their interest in the CDE content, and their confidence in their ability to perform (self-efficacy) each had a statistically significant impact on how they performed the day of competition. Second, students from different genres of CDEs displayed differing levels of motivation in their respective events. Competitors in individual events displayed higher grit, interest, and self-efficacy than team-based events despite similar GPAs.

Rayfield et al., (2009) identified GPA as a positive predictor of performance in a single National FFA CDE. The present study supports this finding, and provides further evidence of a connection between self-reported GPA and emblem performance with a broader sample of national competitors. Although it is evident ability matters, self-efficacy is a nearly identical correlate to performance. This suggests an individual's confidence in their ability to perform is just as important as their ability itself.

It is recommended that agriculture teachers provide opportunities for FFA competitors that enhance motivation in order to maximize chances for student success. In an exemplary case, Ball et al., (2016) described a CDE coaches' motivational strategies to progress from external in the beginning of the coaches' season to more internal by seasons end. Considering the present studies constructs of motivation, this would be consistent with increasing student interest with the content (external), and later building student self-efficacy (internal). Coaches who are purposeful in building the confidence of their students in their ability to perform and motivate their students to compete can expect positive performance outcomes to follow.

The small effect sizes of the pairwise comparisons between individual leadership events and other genres indicate practically significant differences on grit, self-efficacy, and interest. This finding seems logical; competitors who are willing to compete in an event by themselves are likely more motivated than team-based competitors because they experience greater pressures to perform. Individual competitors do not have teammates to encourage them through the grueling parts of the practice season, nor do they have fellow peers to share in the disappointment of not reaching the goal set by their coach. It is recommended future research utilize qualitative methods to explore the decision-making processes of individual competitors to decide and ultimately persist in LDE competition.

Further research should also explore the relationship, if any, between the structure of CDE competitions in different states. For example, certain CDEs in some states are offered as invitationals and field days for many weeks leading up to the regional or state competition. States have different structures and numbers of competitions between the local and state levels. What is the impact of these additional levels and quantities of competitions on student motivation? Also of interest to researchers in agricultural education might be the notion that motivation toward competition in CDEs could transfer to motivation in the classroom and/or potential career opportunities. Does this motivation to compete transfer to motivation for agriculture studies or careers? These are a sampling of future research triggered by this study.

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Exploring the Role of Agricultural Education and Curriculum in Behavioral Change Among Youth in Appalachia

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Abstract

In an effort to reverse students' negative behaviors toward learned practices developed from habits referred to as Apprenticeship of Observation, the researchers implemented a 4-part intervention within secondary Agricultural Education classrooms regarding safety and the implementation of a Cost-effective Rollover Protective Structure (CROPS) Curriculum. Pre- and post- assessments were conducted following the Theory of Planned Behavior (TPB) to measure any changes in learners' attitudes, perceived norm, behavioral control and behavioral intention – the four major factors of changes in learner behavior. Perceived knowledge and skills gained through the intervention were also measured, as they are integral components in assessing the effectiveness of a curriculum. Participants (N=83) were high school students from seven different schools in three states within the Appalachia region. Findings revealed that the intervention led to increased positive attitudes, social norms, behavioral control, perceived behavioral intent, and perceived knowledge and skills gained, with a statistically significant difference in student attitudes toward the CROPS curriculum and perceived knowledge and skills gained. This affirms that the CROPS Curriculum can be an effective tool for teachers in working to create more positive attitude and positive learning outcomes. Recommendations to expand the applications of the curriculum and TPB constructs within agricultural education are provided.

Introduction

It is evident that teacher's play an integral role in the success of their students. Many agricultural educators attribute their desire to teach to the strong example that was shown by their own agricultural instructors (Ajzen, 1985). Unfortunately, this is not the case for all students. As outlined in Lortie's (1975) Apprenticeship of Observation theory, individuals tend to develop behaviors as a direct result of what is witnessed growing up. Many experience a strong tendency to follow the traditions of their upbringing, meaning the role of parent-student relationships can greatly influence the behaviors and perceptions students have toward learning objectives (Lortie, 1975).

Subsequently, it is difficult to identify changes in student behaviors toward agricultural-focused topics, such as safe farming practices, based on the entrance of classroom instruction. Still, Beckman & Smith (2008); Hungerford & Volk (1990); Shultz (1999); and Zelezny (1999) report in their studies that behavioral change can be accomplished through educational programs. However, this cannot effectively be done solely with knowledge-based programs (Finger, 1994; Kaiser & Furher, 2003; Nolet, 2009; Stern, 2000). In order to create a learning environment where true behavioral change exists, the class structure must incorporate cognitive, social, psychomotor, and emotional dimensions. This is especially pertinent within secondary education, as Zelezny (1999) proposed behavioral changes are more likely to occur among younger learners when placed in situations that provide longer exposure to content. As such, the foundation of this study derives from constructs presented in the Theory of Planned Behavior, focusing on targeted educational intervention as a method of engaging students and mitigating the hindrance of Apprenticeship of Observation on student behavior.

Need for Study

Research regarding implementation of the Theory of Planned Behavior (TPB) within the agricultural classroom is sorely lacking. The TPB was initially developed to articulate the relationship between an educator's own experiences with past teachers, and the influence of those interactions in their developed teaching styles and methods (Ajzen, 1985). However, this theory has the potential to provide greater insight into the relationship of agricultural educators and students within secondary education. There are numerous agriculturally related topics that could benefit from such research, not the least of which is agricultural safety.

While the great risk to children's safety within agriculture is well known and acknowledged by many farm families, there continues to be a strong presence of youth in farm labor (Elkind, 1933). Similarly, federal regulations provide for more lenient child labor laws within agricultural work when compared to commercial trades (Marlenga, Berg, Lineman, Brison & Pickett, 2007). This growing presence of children in roles of high risk presents a critical opportunity to increase positive behaviors towards safety measures within farming.

Unfortunately, while the TPB helps to explain the role interventions can play in stimulating engagement, there is minimal research on its applications within the agricultural classroom. This study seeks to examine the role of targeted intervention in successfully changing student behaviors related to agricultural safety in the Appalachian region. More specifically, this research will target behaviors related to the implementation of Cost-Effective Rollover Protective Structures (CROPS) on tractors.

Theoretical Framework

In an effort to reverse learned negative behaviors acquired through the Apprenticeship of Observation (Lortie, 1975), the Theory of Planned Behavior was utilized as a guideline for curriculum construction and behavioral intervention within this study. While traditionally referenced in relation to teacher education, the Apprenticeship of Observation provides insight into how individuals faced with unfamiliar situations revert back to previously observed behaviors (Lortie, 1975). This concept proves to be directly relevant within the context of this study, as high school students have not traditionally received formal agricultural safety training. Thus, they will typically revert back to what they have previously observed. In most cases, students are singularly familiar with the safety practices of their family members or employers, and mimic those practices when placed in similar situations. This can be especially detrimental to youth, as agriculture remains one of the most dangerous careers in the United States, especially for teens as the CDC (2014) reported nearly 113 people 20-years-old or younger die annually from agriculturally related accidents.

As the TPB was developed in furtherance of the theory of reasoned action (Fishbein, 1967), the TPB proposes four key cognitive factors that lead to behavioral change- attitudes, social norm perceptions, behavior control, and perceived behavioral intent. Attitude is outlined as “the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question”; social norms as “the perceived social pressure to perform or not perform a behavior.” Behavioral control as “the perceived ease or difficulty of performing the behavior as it is assumed to reflect past experiences as well as anticipated impediments and obstacles,” and perceived behavioral intention as “the extent to which a person feels able to enact the behavior,” (Ajzen, 1991; Ajzen, 2002). Within TPB, social norms are presented as both subjective and descriptive norms (Rivis & Sheeran, 2003). Meaning these key factors are linked and a persons’ intention to perform a behavior will be at its strongest when attitudes and subjective norms are favorable and perceived behavioral control is high.

The TPB has consistently been found as an effective model for predicting behavioral change, and has been successfully applied to a variety of fields and behavioral outcomes. A meta-analysis was completed on TPB research finding the overall model to explain a significant amount of variance in behavioral intention (Armitage & Conner, 2001). Additionally, researchers found that the TPB framework was an effective model in predicting exercise (Godin, Valois, Jobin, & Ross, 1991) and civic engagement behaviors among other things (Jugert, Echstein, Noack, Kuhn, & Benbow, 2013). While its applications have been numerous, the TPB continues to be tested by researchers in an effort to improve upon the model (e.g. Kahlor, 2010; Wang, 2009). In one example, Harakeh, Scholte, Vermulst, De Vries, and Engels (2004) modified the TPB to include demographic variables, focusing on the role of parental factors. Parental knowledge, parental control, and parent-child relationship were evaluated in an effort to potentially improve the TPB model’s ability to predict smoking behaviors among youth. In a similar instance, an extended version of the TPB in which an investigation was conducted on the role of moral norms was tested (McMillan, Higgins, and Conner, 2005).

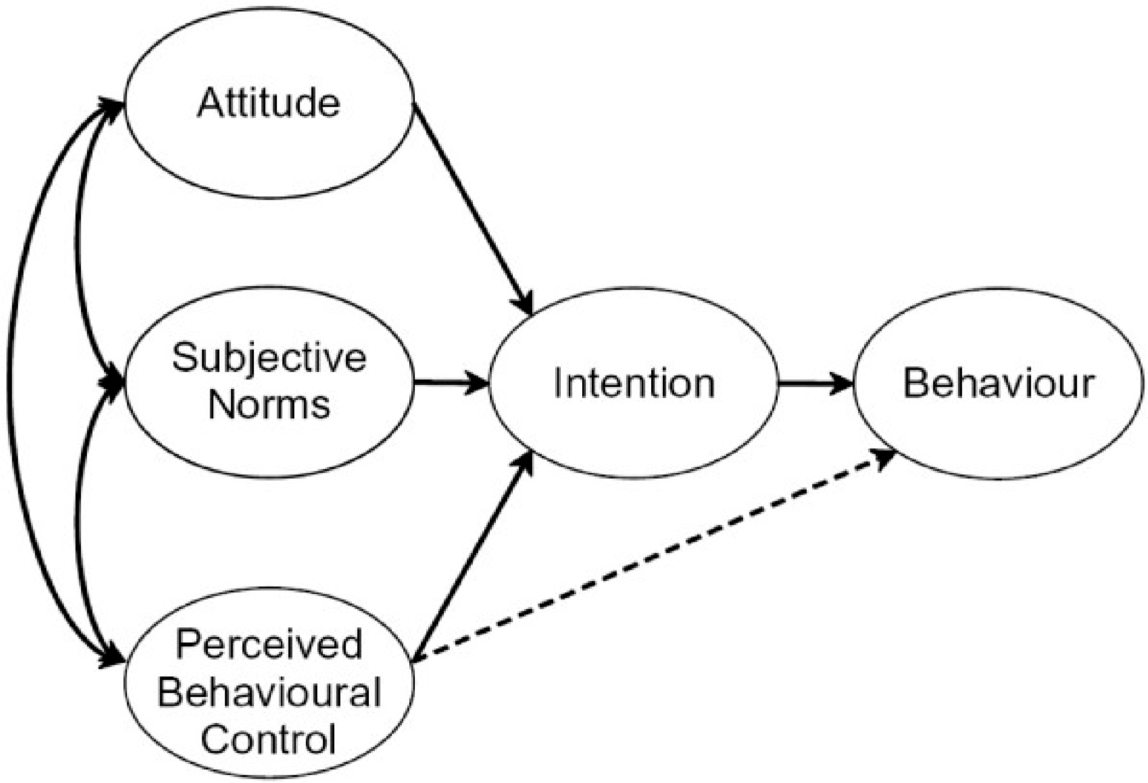

Figure 1- Theory of Planned Behavior (Ajzen, 1991)

In the TPB positive attitude, supportive subjective norms, and a strong sense of behavioral control, are highlighted as indicators toward having strong intentions and ultimately completing the tested behavior (Ajzen, 1991). Likewise, a negativity or weakness in any contributing factor may result in a weak intension, and subsequently failed behavior. Ultimately, the resulting behavior carried out by students is believed to be heavily influenced by a students' own combination of similar intentions, whether they are negative or positive. For the purpose of this study, the negative behaviors of students regarding Agricultural safety are directly influenced by negative contributing factors. Thus, successfully changing the variables to create positive intentions should result in a positive behavioral change among students.

Research Objectives and Hypotheses

The purpose of this study was to assess the factors influencing a student's behavioral change through an educational intervention. Based on the TPB, the study measured changes in student attitudes, subjective norms, perceived behavioral control, behavioral intent, and perceived knowledge and skills gained before and after the implementation of curriculum. In an effort to improve engagement among agricultural education students, five hypotheses were developed for the current study:

H1: Cost-effective Rollover Protection Structures (CROPS) curriculum intervention will have positive impacts on the constructs of the Theory of Planned Behavior (Attitude, Social Norm, Behavioral Control, and Perceived Behavioral Intent).

H1a: Students will have more positive attitude towards CROPS after the intervention.

H1b: Students will have higher levels of subjective norm perception about CROPS after the intervention.

H1c: Students will have higher levels of behavioral control about installing CROPS after the intervention.

H1d: Students will have higher levels of behavioral intent to approve CROPS after the intervention.

H2: Students will have higher levels of perceived knowledge and skills gained in the installation and use of CROPS after the intervention.

Methods

A tractor safety educational intervention was implemented to high school students enrolled in agricultural education courses across three states in the Appalachian region of the Southeast. Participating educators attended a curriculum and professional development training session in July 2015. Starting times for each intervention varied depending on school, and usually followed the course of a five-month semester from pre- to post- assessment with one solid month of curriculum instruction and one month of application/construction of Cost-effective Rollover Protective Structures (CROPS). The five-month intervention took place in secondary agriculture courses taught by full time agricultural teachers. Based on the Theory of Planned Behavior (TPB), the effectiveness of the intervention was evaluated by the changes in participants' attitude (5 items; pretest: $M= 6.05$, $SD=1.28$, $\alpha = .89$), perceived norms (3 items; pretest: $M= 4.70$, $SD=1.39$, $\alpha = .88$), behavioral control (3 items; pretest: $M=5.41$, $SD=1.47$, $\alpha = .85$) and behavioral intention (3 items; pretest: $M=5.40$, $SD=1.40$, $\alpha = .95$) about CROPS. Perceived CROPS skills and knowledge gained was also measured as one of main outcomes of the CROPS curriculum (3 items; pretest: $M=4.55$, $SD=1.80$, $\alpha = .94$). All items were measured with 7-point Likert-type scales before and after the intervention. A paired-sample t-test test was conducted to examine the four changes in TPB variables.

Research Design

Previous research of TPB in relation to the CROPS curriculum has employed qualitative research methods to analyze the behavioral change resulting from teacher intervention (Watson, Mazur, Vincent, 2015). For the purpose of this research, a pre- and post- assessment was conducted prior to and following the intervention. The assessments were designed to examine the difference in behavior towards the CROPS curriculum before and after implementation. In all research there is a concern of reliability error in determining the degree of inconsistency of responses due to random error. While no assessment is perfectly reliable because random error causes scores to occasionally become inconsistent (Jacobs & Clinton, 1992). However, the goal of our study, and for any reliable research, was to minimize inevitable errors of measurement. One method of doing so was limiting the questions within the assessment to 43. Herman and Winters (1992) believed that 30 to 40 questions were appropriate in maintaining a reliable instrument, yet minimizes fatigue. While the 43 questions in the pre- and post- assessment are slightly higher than this recommended number, they remain concise and can quickly be completed by secondary students.

Participants

Seven schools from three different states within Appalachia were targeted for the 2015-2016 CROPS curriculum intervention. Schools in Kentucky, Tennessee, and North Carolina were selected by the research team based on a criteria of being located within the Appalachian region; having a free/reduced lunch rate over 80%; encompassing an agricultural engineering/mechanization program; and residing in a community where tractor injury/fatality had occurred at least once within the past year. While many programs were reached, the first seven schools to show a commitment from their principal and teacher were included in the study. The seven schools enrolled 141 students who participated in the curriculum intervention, with 83 completing the pre- and post- assessments necessary for this study.

Procedures

Pre-assessment: Approval for the pre-assessment was obtained from the University of Kentucky IRB board before initial visits were conducted. Once all necessary measures were taken, and prior to CROPS curriculum implementation and intervention, the research team visited each school to explain the program to students. Prior to administering pre-assessments, consent and assent forms were collected from each student, along with parental consent forms. The pre-assessment immediately followed, leaving schools able to begin the first step in the intervention, a farm safety unit. Along with the administering of the pre-assessment, the research team read an instructional guide verbatim, that assisted with inter- and intra- delivery reliability for the study.

Curriculum Intervention: Following the CROPS teams' pre-assessment, agriculture educators began implementation of the CROPS curriculum, including the capstone project in which students constructed and installed CROPS on tractors within their community. The curriculum intervention utilized in this study was designed through a partnership between the University of STATE and the Southeast Center for Agricultural Health & Injury Prevention in an effort to reduce injuries and fatalities resulting from tractor rollovers in rural Appalachia. The curriculum's aim was to increase the knowledge and use of CROPS by secondary agricultural education students. It included several components related to the construction and understanding of CROPS. Participating agricultural educators were provided with an introduction and overview of the program with disclaimers; two unit plans detailing nine lessons and sixteen subsequent learning objectives with corresponding PowerPoints, worksheets, answer keys and quizzes; National Institute for Occupational Safety and Health (NIOSH) approved ROPS construction plans for Ford 4000, Ford 3000, Ford 8N, Massey Ferguson 230, and Massey Ferguson 135 tractor models; and a teacher's activity log to document progress on instructional goals.

The implemented curriculum assisted participating teachers in ensuring quality, consistent welding, and provided a blueprint type guide detailing the construction process. The role of curriculum was also to assist in creating behavioral control among students, providing them with the skills they would need to potentially gain confidence towards creating a CROPS on their own in the future and following the agricultural safety measures outlined by their instructors. The curriculum served as a key reminder for students to learn the importance and impact their efforts would have not only on their future safety, but also the lives of those within their communities. Plans for the tractors were accessed from the NIOSH website (Centers for Disease Control, 2014). Teachers and students had access to this website as a reference before and during the construction process. In addition to the blueprints provided within the curriculum, an on-call member of the research team was always available to answer questions regarding lessons and construction. Participating teachers were also provided with the necessary tools and resources to implement the intervention. This included all metal and construction supplies for assembly as well as drill bits, paint and primer, seat belts and tractor seats. In addition, information regarding crowd-sourcing opportunities was also provided, allowing educators the tools to continue ROPS construction and curriculum implementation beyond the scope of the study. Funding for the creation of the curriculum was provided for by National Institute for Occupational Safety and Health (NIOSH) Cooperative Agreement #3U54OH007547-13SI.

Post-assessment: The timeframe for the project is one semester. Although participating instructors had the opportunity to postpone implementation of curriculum until the spring of the same year. The CROPS research team provided an all clear for educators to being unit delivery following the pre-assessment visit. Following curriculum completion, the CROPS team returned and collected post-assessment data on all participating students towards the end of the semester. In both cases, the research team visited each classroom, read an instructional guide verbatim, distributed the assessment, and collected responses for analysis.

Findings

To test the differences between pre- and post- assessments of TPB variables and CROPS knowledge and skills throughout this study, a paired-sample t-test was conducted. As shown in Table 1, results of the t-test demonstrate that all TPB variables increased from pre- to post- assessments for all variables.

Table 1.
*Paired sample t-tests between pre and post assessment TPB variables (*N = 83)

Variables	Pre (*m*)	Post (*m*)	*t*	*df*
Attitudes	6.02	6.34	2.01*	82
Social Norms	4.69	4.88	0.97	82
Behavior Control	5.38	5.72	1.59	81
Behavior Intentions	5.26	5.54	1.51	81
Knowledge and Skills	4.54	5.35	3.38**	80

*$p < .05$ **$p < .01$

The first hypothesis stated students would have more positive attitudes towards CROPS after the intervention. The result shows a significant enhancement in positive attitudes toward CROPS from pre- and post- assessments (Pre: $m = 6.02$; Post: $m = 6.34$; $t = 2.01$, $p < .05$). Thus, H1a was accepted. The second hypothesis predicted students would have higher levels of subjective norm perception about CROPS after the intervention. In this study, no significant difference in social norms from the pre- and post- assessments was found (Pre: $m = 4.69$; Post: $m = 4.88$; t = 0.96, *ns*). Thus, H1b was not supported. The third hypothesis stated students would have higher levels of behavioral control about installing CROPS after the intervention. As shown in Table1, there was no significant difference in behavioral control perception from the pre- and post- assessments (Pre: $m = 5.38$; Post: $m = 5.72$; $t = 1.59$, *ns*). Thus, H1c was not supported hypothesis. This study also hypothesized that students would have higher levels of behavioral intent to approve CROPS after the intervention. However, there was no significant difference in behavioral intentions from the pre- and post- assessments (Pre: $m = 5.26$; Post: $m = 5.54$; $t = 1.51$, *ns*). Thus, H1d was not supported. Finally, this study hypothesized improvement in knowledge and skills about CROPS, as predicting students would have higher levels of perceived knowledge and skills gained in the installation and use of CROPS after the intervention. It found there was a significant improvement in perceived knowledge and skills gained from pre- and post- assessments (Pre: $m = 4.54$; Post: $m = 5.35$; $t = 3.38$, $p < .01$). Thus, H2 was accepted.

In sum, although there have been positive changes in all CROPS related outcomes (i.e., attitudes, socials norms, behavioral control, behavioral intentions, and perceived knowledge and skills gained), only the difference in attitudes and knowledge and skills gained were found to be statistically significant.

Conclusions, Implications and Limitations

The overarching purpose of this study was to test the idea that purposeful intervention by agricultural educators could mitigate learned negative behaviors of students regarding agricultural safety. The CROPS curriculum intervention is now in its fifth year of assisting rural, poverty stricken communities within Appalachia. The high school agricultural classes involved in this program have a school enrollment of 100% free/reduced lunch, as well as a reported farm injury/fatality incident within their community in the past year. Regarding interference, the results and implications of this research is limited to the participating schools and other programs of similar demographics.

Based on the results of the survey, all average TPB variables as well as perceived knowledge and skills increased over the course of curriculum implementation, with a significant increase in attitude and perceived skills and knowledge gained through the process. This finding demonstrates that for the students included in our survey, the curriculum implementation by their instructors stimulated positive attitudes and skill development of presented safety topics-namely, the implementation and construction of CROPS on tractors. Students reported they felt more confident in their own ability to construct CROPS, and displayed an increased positivity towards the need and value of CROPS on tractors.

While the findings within this study suggest a positive relationship between the tested group and increases in positive attitudes and perceived skills following curriculum implementation, there remain several limitations. With partial funding for the research and the creation of the curriculum provided for by the Southeast Center for Agricultural Health and Injury Prevention (SCAHIP) there is a concern of researcher bias. However, as the study's focus targeted the role of educational intervention in behavioral change, and not solely on the effectiveness of an agricultural safety curriculum, this is likely not a prominent limiting factor. Similarly, while prior research suggests the applications of TPB spreads across numerous fields, the implications of this study reveal only TPB's role within the presented agricultural safety curriculum and sample population. Further research should be conducted to supply greater validity and scope of application within agricultural education. This, in turn, will address another limitation within the study related to sample size. While the study started with 141 participants, only pre- and post- assessments from 83 students' were able to factor into the conducted *t-tests* due to the natural shifting of students in and out of courses over the span of two semesters resulting with gaps in the data.

Recommendations

Future research should build upon this study to examine the teacher qualities that lead to the greatest influence of behavioral change. This study found proof that a significant behavioral change in attitude and skills gained can be accomplished through an educational intervention. However little attention was given to teacher characteristics and the role they play in a learners' willingness to change a behavior. Future studies should also expand upon this research by experimenting with behavior change in other agricultural areas apart from tractor safety. In order to know the true applicability within agricultural education, curriculums covering several agriculturally related topics should utilize the TPB in similar studies. Additionally, a longitudinal study should be conducted to help further understand and substantiate the change in behavior measured through this study.

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Examining Course Participation, Involvement, and Income in School-Based Agricultural Education

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Abstract

An empirical understanding of the value school-based agricultural education (SBAE) offers has been limited due to lack of widespread, longitudinal studies addressing the impacts of student participation in SBAE. Grounded in Astin's theory of involvement, data from a nation-wide, longitudinal study were analyzed to explore ethnicity and income among students with varying levels of vocational club and SBAE involvement. Results indicated Black males had high involvement in non-SBAE vocational clubs but low involvement in SBAE-vocational clubs. Black and Hispanic females enrolled in SBAE at rates close to the percentages in the high school population; however, they rarely attained officer roles. White females, on the other hand, dominated officer roles within SBAE vocational clubs. Results also indicate females enrolled in SBAE who served as officers earned an additional $10,507 annually compared to non-SBAE, female officers. However, regarding the impact of involvement in SBAE on males who serve as officers, results indicate decreased income compared to their non-SBAE peers. Findings are discussed in relation to Astin's theory of involvement, with an emphasis on recommendations for further research.

Introduction

Student participation in the National FFA Organization is a critical component to a complete school-based agricultural education (SBAE) program experience; yet, little has been done to evaluate participation in, and the long-term impacts of, FFA on a national scale. In the absence of such knowledge, stakeholders to SBAE are unable to holistically evaluate the current realities and future possibilities of the National FFA Organization and the diverse students served by this organization.

Historically, SBAE and FFA have been viewed as vocational approaches to education with the aim of preparing individuals for agriculture, food, and natural resource (AFNR) occupations, innovations, and informed community engagement (Phipps, Osborne, Dyer, & Ball, 2008). As a catalyst to SBAE, the Smith-Hughes Act spurred several pieces of legislation supporting vocational education across the country and, by 1982, 97% of high school graduates had completed at least one vocational course during high school (Boesel, 1994) a percentage which fell to 80% of high school graduates in 2009 (Nord et al., 2011). Today, vocational education (i.e., Career and Technical Education [CTE]) continues with the mission of career preparation (Association for Career and Technical Education, 2016). Within the larger scope of career preparation, disciplines like SBAE have identified a growing importance in recruiting and training a more diverse population of students (Stripling & Ricketts, 2016). To address the mission of career preparation in tandem with increasing diversity, SBAE needs nation-wide research on who is currently being served, and underserved, within SBAE as well as the economic impact of SBAE and FFA engagement. The current study addressed these needs by evaluating the sex and ethnic distribution of student participants in SBAE and vocational clubs as well as post-graduation income of students with varying levels of SBAE and vocational club involvement.

Literature Review

Income

A dearth of research has directly evaluated employment earnings in relation to SBAE involvement (Bird, Henry, & Phelps, 2012; Croom & Flowers, 2001; Rose et al., 2016). Expanding the scope to CTE courses, several studies have evaluated economic outcomes associated with involvement. Unfortunately, consensus has not been reached, with some studies suggesting an increase in employment earnings (Gustman & Steinmeier, 1982; Silverberg, Warner, Fong, & Goodwin, 2004) while others suggest higher earnings achieved among students not taking CTE coursework (Meer, 2007). However, even among research identifying a positive relationship between CTE coursework and employment earnings, benefits appear to vary substantially by sex and ethnic characteristics (Gustman & Steinmeier, 1982) as well as postsecondary attendance and timing (i.e., short, medium, and long-term) of effect (Silverberg et al., 2004).

A similar story unfolds as we transition to the economic impact of club participation, with no research evaluating the relationship between employment earnings and FFA participation (Bird et al., 2012; Croom & Flowers, 2001; Rose et al., 2016). Broadening the scope to include all student clubs at the secondary school level reveals positive outcomes for students involved in clubs (Costa, 2010; Kosteas, 2010; Lipscomb, 2007; Rouse, 2009, 2012). While the focus of research has been on non-economic outcomes (i.e., higher test scores, postsecondary degree attainment), studies have linked club participation with higher employment earnings (Costa, 2010; Kosteas, 2010). Digging deeper, research has identified holding a student club leadership position is related to higher employment earnings (Eren & Ozbeklik, 2010; Rouse, 2009); however, as was the case with coursework, the economic impact varies by sex (Rouse, 2009).

Ethnicity

Historically, SBAE has predominantly been comprised of white males (Gordon, 2014). Data provided by the National FFA Organization (FFA), the largest agriculture-based vocational club, reported 649,355 student members in 2016 with 41% males, 32% females, and 27% of members who did not report their sex. Ethnicity distribution included 41% identifying as White, 13% Hispanic, 3% Black, 1% American-Indian, 1% Asian, Native Hawaiian or Pacific Islander, 1% two or more races, and 40% who did not report their ethnicity (National FFA Organization, 2016b). Research specific to CTE enrollment in 2014 revealed 53.28% of students enrolled in CTE were males and 46.72% were females. White was the predominant ethnicity (51.88%) followed by Hispanic/Latino (23.71%), Black (16.2%), and Asian (4.05%) (U.S. Department of Education, 2016). The higher proportions of white males are mirrored throughout additional literature (e.g., Lawrence, Rayfield, Moore, & Outley, 2013; Talbert & Larke 1995); however, female involvement in SBAE appears to be increasing in recent decades (Retallick & Martin, 2005; Balschweid & Talbert, 2000).

Although several studies investigated benefits and barriers for ethnic minorities to enroll in SBAE, we found no studies exploring ethnicity and sex by varying levels of vocational club (i.e., participant and officer) and SBAE involvement. Studies exploring reasons why minority students enroll in SBAE identified encouraging and passionate SBAE teachers, high parent involvement and family influences, job preparation and skill development, hands on learning environment, response to social pressure, and academic achievement as motivators for enrollment (Balschweid & Talbert, 2000; Jones & Bowen, 1998; Roberts et al., 2009; Sutphin & Newsom-Stewart, 1995; White, 2015). Additionally, research addressing ethnic minority participation in SBAE and FFA is limited; however, Balschweid and Talbert (2000) identified negative perceptions of the agriculture industry and a lack of encouragement by teachers as factors which discourage some ethnicities from participation in FFA.

Analysis of the available literature reveals a need to examine, on a national scale, the ethnicity of students who enroll in SBAE, participate, and assume officer roles. Additionally, there are no studies examining the financial impact of enrolling in SBAE courses as well as participating in vocational clubs. The current study seeks to address both of these knowledge gaps while supporting the National Research Agenda's call to examine the short, medium, and long term outcomes and impacts of educational programs within agriculture and natural resources (Roberts, Harder, & Brashears, 2016).

Theoretical and Conceptual Framework

Given our interest in SBAE enrollment, ethnicity, and income in relation to levels of involvement, we grounded our study in the theory of involvement (Astin, 1999). Astin postulates student involvement in co-curricular activities will result in desirable outcomes in learning and personal development. Astin defined involvement as "the quantity and quality of the physical and psychological energy that students invest to the academic experience" (Astin, 1999, p. 518). Although Astin recognized student motivation, and other internal constructs such as feelings or thoughts as important aspects of involvement, he placed more emphasis on student behavior, actions, and decisions when defining involvement. In our study, we theorize student behavior, actions, and decisions are linked to choices to enroll in SBAE and participate at various levels.

Astin (1999) stated involvement can take many forms, including but not limited to: coursework and studying, school clubs and organizations, and interaction with faculty and peers on campus. The theory of involvement includes five main postulates: (a) involvement is identified as both physical and psychological investment by students, (b) involvement is not concrete, but rather exists on a continuum, and students will manifest involvement in different objects at different times, (c) involvement can be measured both quantitatively (i.e., how many hours a student spends on campus) or qualitatively (i.e., the conversation a student has during a club meeting), (d) the quality and quantity of student involvement in a particular activity will be proportionate to the learning and personal development the student receives, and (e) the effectiveness of any educational policy or program is directly proportionate to the "capacity of that policy or practice to increase student involvement" (Astin, 1999, p. 519). Astin asserted the greatest advantage of this theory is how it shifts attention away from course content and teaching technique and toward student motivation and behavior, viewing student time and energy as institutional resources. Thus, the theory is meant to be utilized by school administrators and faculty to evaluate and design more effective learning experiences for students.

Our study will focus specifically on the fourth postulate of the theory of involvement, which claims, “the amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program” (Astin, 1999, p. 519). Little is known about how involvement contributes to future economic outcomes, in particular the effects of greater involvement, such as becoming an officer in an organization versus simply participating in a club. This study will explore how income, ethnicity, and sex are related to levels of involvement in a vocational club and SBAE.

Purpose of the Study

According to the U.S Department of Education (2004), the Educational Longitudinal Study of 2002 (ELS:2002), “offers the opportunity for the analysis of trends in areas of fundamental importance, such as patterns of course taking, rates of participation in extracurricular activities, academic performance, and changes in goals and aspirations” (p.11). This study examined course taking choices and club participation levels to address the following research objectives:

> Objective 1: Compare ethnicity by varying levels of vocational club (i.e., participant and officer) and SBAE involvement.
>
> Objective 2: Compare income by varying levels of vocational club (i.e., participant and officer) and SBAE involvement.

Methods

In order to address our research objectives, we sought a nationally representative sample of high school students with corresponding club participation and income data. We utilized data from the Educational Longitudinal Study of 2002 (ELS: 2002) which collected baseline data, from high school sophomores, beginning in 2002 and culminating in a 2012 collection. Given the scope of the ELS: 2002, we will only present a general overview of the methods in this paper. We encourage review of the U.S. Department of Education, National Center for Educational Statistics, Education Longitudinal Study of 2002: Base Year Data File User’s Manual (2004) for more detailed methodological information.

One of the challenges of using a longitudinal data collection method is the passage of time between collection points. However, longitudinally tracking a nationally representative sample of students allowed us to examine high school involvement and corresponding income levels six years after graduation. Given the size and scope of this study, the complete dataset was not released for analysis until April 2015.

Target Population and Frame

The overall target population was all regular public schools, including charter schools, Catholic, and other private schools serving sophomore students in the United States, including all 50 states and the District of Columbia (U.S. Department of Education, 2004). A representative sampling frame of schools, stratified by U.S Census divisions, and further substratified by urban, suburban, and rural, was selected resulting in an initial sample frame of 800 schools. Probability proportional to size (PPS) sampling was utilized so the schools and students selected had equal probability of being sampled and were reflective of the national population of high school sophomores in 2002.

Data Collection

Based on an initial sampling frame of 800 high schools, 752 agreed to participate resulting in a 94% sample realization. Of these 752 schools, 580 were public, 95 were Catholic, and 77 were other private schools. As part of the large data collection effort, data were collected from students, parents, teachers, administrators, librarians, and facilities managers. In the current study, we focus solely on the *student* data which was requested from 17,591 students of whom 15,362 elected to participate.

Data Analysis

Based on the overall collection methods, our intent was to examine only students enrolled in high schools where there was an option to participate in agricultural education, thus limiting our generalizability to high schools, within the United States, who offer SBAE. We did not analyze private, religious, or charter schools. All the data, findings, and conclusions are reflective of this particular student population. Of the overall 15,362 participants, 4,150 were included in the target population. The data utilized in this study were weighted to enable the generalizability of the 4,150 participants. While weighting is simply a multiplier that adjusts a respondent's contribution to account for different probabilities within the sample (Solon, Haider, & Wooldridge, 2013), it is important to recognize the weighting multiplier is only applied to those in the original sample. Thus, as is the case in this study, if there were no Hispanic females enrolled in SBAE who also served as officers in vocational clubs in the original frame, the weighted results will still reflect none enrolled.

To address our research objectives, we analyzed descriptive variables and report ethnicity percentages, based on participation levels, including the differences between observed ethnicity percentage and overall ethnicity percentages in the high schools included in our frame. Given the potential influence of sex on both income (McKim, Velez, & Sorensen, 2017) and participation levels, we have chosen to delineate our results by male and female.

The income data used for analysis in this study were collected in 2011, nine years after the collection of initial demographic data. We recognize the role of many mediating and confounding factors that may influence annual income. However, since there are no current or prior nationally representative studies in SBAE that address income and participation, we have chosen to start by focusing solely on our two research objectives.

Participation levels were categorized and reported for those enrolled in SBAE and those not enrolled in SBAE. Under each of these main categories, we analyzed the sub-categories of *no vocational club* involvement, *vocational club participant*, and *vocational club officer*. Typically, students enrolled in SBAE and concurrently enrolled in a vocational club, would likely be members of the National FFA Organization, a large agriculturally-based youth leadership organization. The National FFA has a membership of almost 650,000 members representing 7,859 local high school FFA chapters in the U.S., Puerto Rico and the U.S. Virgin Islands (National FFA Organization, 2016b). Enrollment in FFA requires students to be enrolled in at least one SBAE course during a given academic school year (National FFA Organization, 2016a). Unfortunately, the ELS: 2002 data has identifiers for involvement in vocational clubs, but not a specific identifier for FFA participation. It does however, on the student questionnaire, list four example student vocational education clubs, of which FFA is included. While we cannot definitively quantify the impact of student involvement in FFA, we can distinguish between those students who were not enrolled in SBAE yet are involved in a vocational club and those who are both enrolled in SBAE and involved in a vocational club. Presumably, those who are enrolled in SBAE and involved in a vocational club have a greater likelihood to be members of the National FFA Organization.

Findings

For the first objective, we analyzed the involvement levels of students, both enrolled and not enrolled in SBAE, by ethnicity (Figures 1, 2, & 3). We detail the participation percentages by Black/African American, Hispanic, and White students and utilize a horizontal line denoting the population percentage we would expect to see based on the ethnicity percentages present throughout high schools where SBAE was offered.

Black males (expected 12.1%), who are not enrolled in SBAE, participate in vocational clubs at a high rate (21.3%), however, when enrolled in SBAE, participation in vocational clubs drops to 7.3% (see Figure 1). While low in participation, it appears Black males in SBAE do assume officer roles in vocational clubs at a rate commensurate with overall high school percentages (11.3% to 12.1% respectively). For Black females, participation percentages in vocational clubs (14.3%) exceeds the expected percentage of 10.4%. However, unlike their male counterparts, Black females enrolled in SBAE and in a vocational club, comprise only 6.6% of the female officer roles. This is not the case for non-SBAE enrolled Black females who do assume officer roles in other vocational clubs at a 10.4% rate.

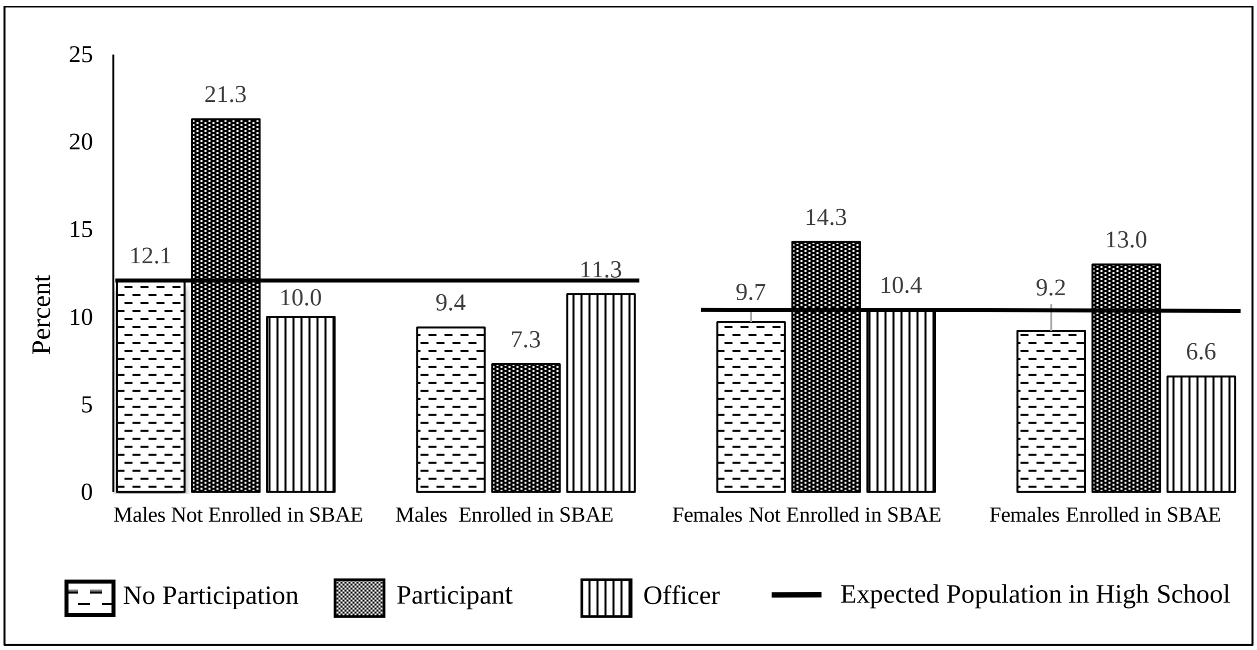

Figure 1. Percent Participation of Black or African American Students by Sex

For Hispanic males, where we would expect 11.9% enrollment in SBAE, participation in vocational clubs is low (5.1%); however, once involved, Hispanic males do assume officer roles at a 14.9% rate (see Figure 2). Females, expected to enroll at 13.8%, enroll in SBAE at greater than expected percentages (16.8%) and participate at a greater rate than males (11.3% to 5.1% respectively). Still, Hispanic females hold fewer officer positions; in fact, within the sample there were no Hispanic females, enrolled in SBAE, who concurrently assumed officer roles in a vocational club.

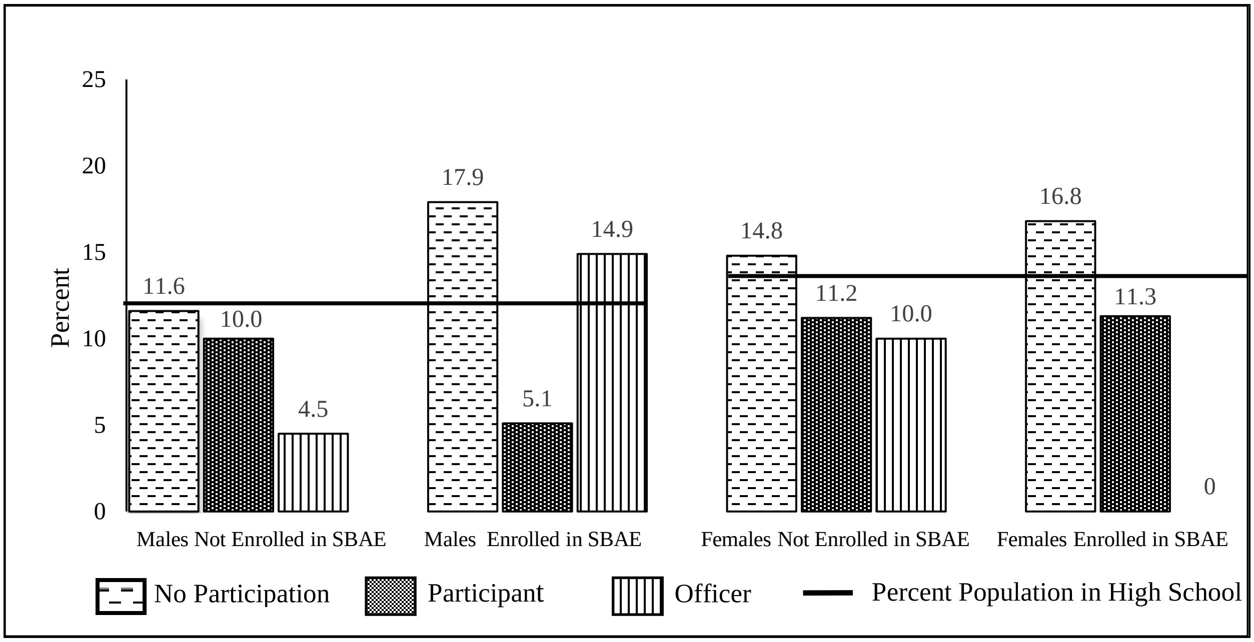

Figure 2. Percent Participation of Hispanic Students by Sex

White males (68.4%) and females (69.4%) enroll in SBAE near the expected 71.2% (see Figure 3). White males participate in SBAE and vocational clubs at a greater than expected rate (84.7%) and white females slightly exceed the participation rate (73.1%). However, we see a decrease in white male SBAE enrollees who assume office roles (68.8%) and a sizeable increase in white females who are SBAE enrollees and assume officer roles (90.8%).

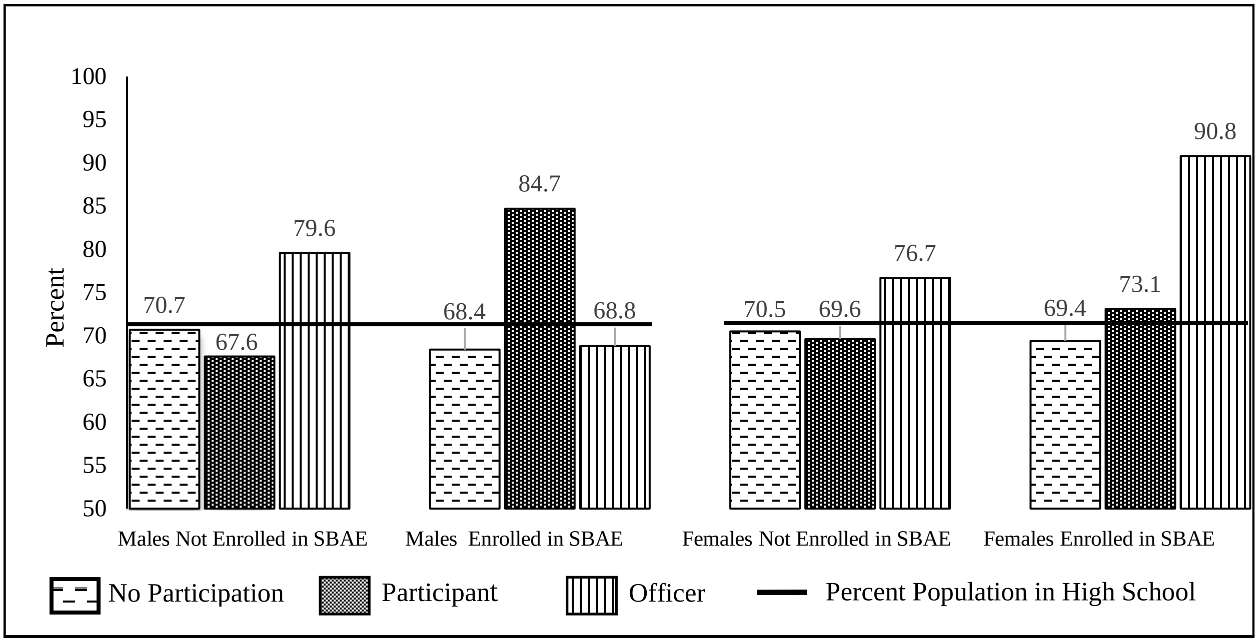

Figure 3. Percent Participation of White Students by Sex

When analyzing the income data (see Figure 4) for our second objective, we see that males who are SBAE enrollees start at a higher annual income (*M* = \$30,049, *SD* = \$22,024), but as they increase in participation and assume officer roles, they make less money (*M* = \$35,995, *SD* = \$27,105) than their non-SBAE peers (*M* = \$40,081, *SD* = \$60,179). Females, who are enrolled in SBAE, make less money initially (*M* = \$15,136, *SD* = \$14,975), but rise above their non-SBAE counterparts at both the participation level (*M* = \$19,994, *SD* = \$14,341) and the officer level (*M* = \$29,758, *SD* = \$17,192).

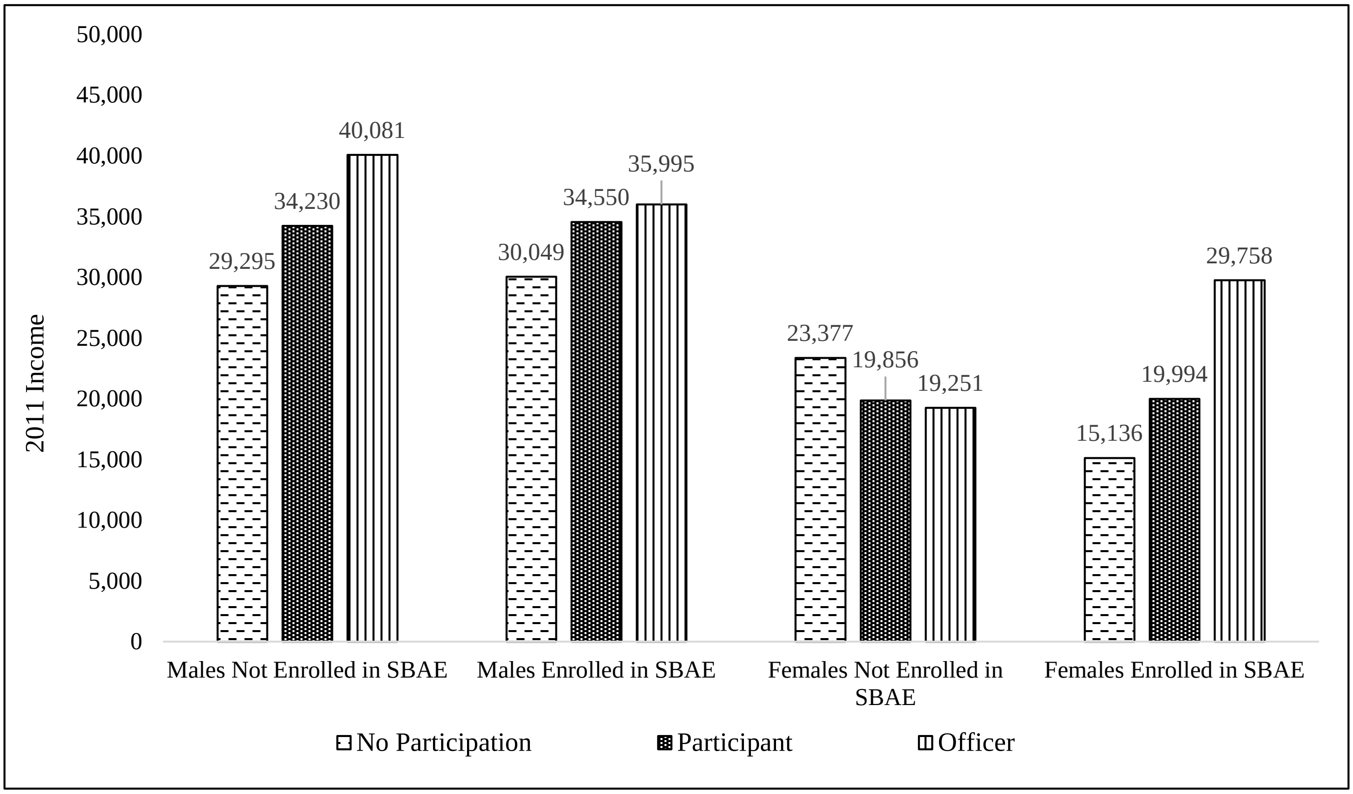

Figure 4. Annual Income for SBAE enrollees and Non-SBAE enrollees, Based on Vocational Club Involvement

Discussion, Implications, and Conclusions

The methodology used in this study allows description of both income and ethnicity percentages and patterns or areas of discrepancy. While our methodologies limit the breadth of our conclusions, we will address some initial insights and conclusions and identify four major phenomena emerging from the data. We also want to clarify that, at times, we have chosen to refer to the National FFA Organization as it represents the largest and only vocational club directly linked to SBAE. For our study, students enrolled in SBAE and concurrently enrolled in a vocational club, meet the criteria for FFA members. However, we do want to be clear that anyone in FFA would meet the SBAE/Vocational club enrollee parameters, but potentially not everyone in the SBAE/Vocational club enrollees category might be in FFA.

Our first research objective explored the participation levels of male and female students both enrolled and non-enrolled in SBAE by ethnicity. For comparison purposes, we examined all levels of actual participation compared to the high school population percentage of the same ethnicity. When examining the data for African American and Hispanic males, we observed what we are terming the Black and Hispanic Male Leadership Phenomena.

Black and Hispanic Male Leadership

We found Black males have high involvement in non-SBAE vocational clubs but low involvement in SBAE-vocational clubs. These individuals have demonstrated a willingness and commitment to participate in vocational clubs, just not SBAE-based. In SBAE, we recommend examining the structures of other vocational clubs who enroll a higher percentage of African American males. In addition, qualitative research should explore why Black males, specifically, are choosing not to enroll in SBAE. It is also intriguing that while, for those enrolled in SBAE, participation in a vocational club is low, officer participation is on par with participation levels outside of SBAE. Once African American males do become involved in SBAE and presumably FFA, they hold officer positions at a disproportionally high percentage compared to their participation levels.

Similar to Black males, Hispanic males in SBAE participate in vocational clubs at a disproportionately low rate. Yet, similar to Black males, once involved, they ascend to officer positions at a rate far higher than would be expected. Future research should examine why Hispanic males chose to enroll in FFA and what enhances or limits their participation and leadership. Although additional recruitment is needed, once they become participants, both groups pursue officer positions at an accelerated rate. This is encouraging for the National FFA organization as it illuminates what may be an initial recruitment hurdle but also provides evidence these select groups perceive benefit once involved. As Astin (1999) indicated, the quality and quantity of involvement will be proportionate to the learning and personal development a student receives. In the case of Black and Hispanic males, their disproportionate rise to officer roles indicates that, once involved, they are both learning and engaging in personal development.

White males, on the other hand, enroll in SBAE near the population percentage, but choose not to enter into officer positions. However, White males not enrolled in SBAE, do pursue officer positions in vocational clubs at a rate greater than expected. For some reason, White males chose not to pursue officer roles within SBAE-vocational clubs. A potential clue may rest on the rate of White female participation in officer roles, discussed later as White Female Leadership Empowerment.

Minority Female FFA Leadership Barrier

In contrast to the involvement levels of Black and Hispanic males, Black and Hispanic females display a phenomenon we refer to as the Minority Female FFA Leadership Barrier. Both groups enroll in SBAE at rates close to the percentages in the high school population, and some participate, yet there is a precipitous decline in officer roles. It seems Black and Hispanic females rarely serve in officer roles. Based on Astin's theory (1999), females in these groups may not be experiencing the learning and professional development they need and are therefore not involved. Alternatively, perhaps there are cultural or organizational structures, policies, or practices limiting or even discouraging involvement. Further research is needed to examine why Black and Hispanic females are not attaining officer positions.

White Female Leadership Empowerment

We term our next observed phenomenon as White Female Leadership Empowerment. White females participate in SBAE and are involved in vocational clubs at, or very near, the expected rate. Yet, for officer roles, we see participation which exceeds the expected rate by 20% among SBAE enrollees. It appears White females dominate officer roles within an SBAE-related vocational club, presumably FFA. What is it about the organizational structure and cultural dynamics which are both appealing and highly beneficial to White females? Our second objective identified SBAE enrolled female officers overall make more money than their non-SBAE enrolled fellow vocational club officers. White female SBAE officers, given their high rates of participation, realize a financial benefit at a proportionally greater percentage then both the Black and Hispanic female SBAE officers. Further research should examine what aspects of the current culture and structure support White females, and how we can design a system to equally support all females.

Objective two sought to highlight the income levels, based on level of involvement, for students in this sample. Males enrolled in SBAE who are officers in vocational clubs annually make $4,086 less than males who are officers in vocational clubs outside of SBAE. For some reason, the impact of involvement in SBAE on males results in decreased income compared to their non-SBAE peers. One potential influencer to these results may be socioeconomic status (SES). Prior research (McKim et. al., 2017) revealed that proportionally, students enrolled in SBAE have a lower SES than students not enrolled in SBAE. This disproportionate SES enrollment may relate to and influence the overall earnings we are seeing.

Female FFA Income Effect

For females, we observed an interesting phenomenon we are labeling the Female FFA Income Effect. Namely, enrollment in SBAE provides tremendous additional earning potential compared to their non-SBAE peers. Females who do not enroll in SBAE make $8,242 more than females who are enrolled in SBAE. At first glance, this appears concerning. However, when we look at the effects of participation, we see rapid gains in annual income for females involved in SBAE. The clearest gains are for SBAE enrolled female officers who make $10,507 more than their fellow officers from non-SBAE vocational clubs. For females, enrollment in SBAE makes a positive economic difference provided they either participate in a vocational club or serve as an officer. Unfortunately, despite the benefits associated with female participation, female annual income still lags behind their male counterparts.

Data revealed some surprising results when examining female income for those not enrolled in SBAE. Namely, as participation level increased from no club involvement to involvement in a vocational club, to officer involvement, income decreased. These results show an opposite trend from both overall males and females enrolled in SBAE. For some reason, participation in a vocational club, outside of SBAE, results in decreased income for females.

We recommend future research examine income to specifically account for additional variables. While our research focuses solely on identifying what is, and we are limited in speculating as to why we are seeing these results, it is important to note females are gaining more from enrollment in SBAE than their male colleagues. What is it about the structure of SBAE and concurrent involvement in a vocational club that enhances the success of females? What are the organizational practices, structures, reward systems, and activities that promote the earning success of females? What are female students gaining, through enrollment in SBAE that is distinctive from their non-SBAE peers?

We recognize in this paper we focus on involvement and income as it may relate to the potential structures, policies, and practices of a national organization. Specific to income, ethnicity, and sex, we acknowledge that upbringing, SES, size of school, and cultural distinctives may play a role in the results we are seeing. However, detailed analysis of these areas is outside the scope of the current study. Astin (1999) reminds us the effectiveness of any program is directly proportionate to its capacity to increase student involvement. As we assess SBAE, we need to develop the capacity to increase student involvement across all ethnicities and sexes. We now know where we are at in relation to income, sex, and ethnicity in SBAE. What remains is to determine where we need to be and how we are going to get there.

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Supervision of School-based, Agricultural Education: A Historical Review

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Abstract

The purpose of this study was to understand the historical evolution of the supervision of school based, agricultural education (SBAE). Supervision as a concept was described, including its emergence as an integral part of public school education in the United States. Moreover, the perspectives of early leaders of vocational education, such as Charles Prosser, were examined, as well as the impact of the Smith-Hughes Act of 1917 and other key federal legislation that came afterward. Supervision of SBAE as inspection and administrative oversight and for the purpose of instructional improvement was explored. We also discuss the early supervisory role of teacher educators of agricultural education, the ascendance and, in some cases, later decline of state staff as supervisors, and the role of local school administrators in the supervision of SBAE, including some of the philosophical tensions and divergent views among and between those stakeholders. Implications and recommendations are offered regarding the supervision of SBAE in the future, especially the role of professional organizations, such as NAAE, AAAE, and NASAE, and their working in concert with The National Council for Agricultural Education.

Introduction

Vocational agriculture education faced a shortage of teacher educators in 1917 (Hillison, 1999), and the existing professionals were in desperate need of assistance *and* support. In many cases, it was teacher educators who were providing supervision and oversight of local vocational agriculture programs in addition to fulfilling professional duties at their respective institutions (Anderson, Barrick, & Hughes, 1992). It was at this critical juncture that the idea of state supervision for vocational agriculture education was first proposed (Hillison, 1999). Soon, this idea became a reality as formal state supervision of vocational agriculture education was mandated with passage of the Smith-Hughes Act in 1917 (Herring, 1999).

In its infancy, supervision was formal, strict, and oriented toward rules enforcement (Hillison, 1999). However, during the next few decades a slow but gradual shift occurred. Hillison (1999) concluded that the influence of state supervisors peaked in the 1960s. At this time, state supervisors had two major roles: supervision and inspection (Herring, 1999). It was the supervision and inspection model that guided the oversight models employed by most states' departments of education.

Supervision is defined in a variety of ways reflecting multiple fields' perspectives (Glatthorn, 1984). The idea of *supervision* is a necessity in "business, political, commercial, social religious or other enterprises in which group effort is to be directed toward a common goal" (Seimer, 1973, p. 6). Seimer (1973) defined supervision, in general, as "includ[ing the] combination of planning, organizing, directing, measuring, controlling, assembling resources, supervising, coordinating, motivating, commanding and integrating" (p. 3). Glatthorn (1984) proposed a broad definition of the act or actions as *general supervision*, i.e., a comprehensive approach, versus *clinical supervision* or a direct approach.

When analyzing the direct approach in regard to instruction, “supervision is a process of facilitating the professional growth of a teacher, primarily by giving the teacher feedback about classroom interactions and helping the teacher make use of that feedback in order to make teaching more effective” (Glatthorn, 1984, p. 2). Glickman (1990) compiled a list of those typically considered supervisors in education, such as “school principals, assistant principals, instructional lead teachers, department heads, master teachers, teachers, program directors, central office consultants and coordinators, and associate or assistant superintendents” (p. 6).

Olivia (1993) defined “supervision [as] a means of offering teachers specialized help in improving instruction” (p. 11) presented in the context of “both individuals and in groups” (p. 11). Therefore, the

> [c]ollaboration and partnership between supervisors and teachers became important. Supervisors began to realize that their success was dependent more on interpersonal skills than on technical skills and knowledge; they had to become sensitive to the behavior of groups and individuals within groups. (Olivia, 1993, p. 9)

“To put it simply, supervision is a means of offering to teachers specialized help in improving instruction” (Olivia, 1993, p. 11); hence, “[e]xpanding curriculum revealed the need for specialists in instructional supervision” (p. 6). This need for supervisory oversight included school-based, agricultural education (SBAE).

During the first decades after enactment of the Smith-Hughes Act, a debate over who should be leading or supervising state vocational agriculture education programs, and, therefore, providing oversight of teachers and departments, became a significant point of contention (Stewart, 1999). Arguments were offered for and against by teachers, teacher educators, state department officials, and other stakeholders, as different approaches to supervision were proposed. If state staff were expected to only oversee the “responsibility for funding, teacher placement, and program quality” (p. 6) and local school administrators were mostly responsible for supervising the quality of instruction provided by vocational agriculture teachers, the state supervisor’s role might have been criticized or even lacked teachers’ respect (Stewart, 1999). On the contrary, if state staff focused on providing instructional leadership for local programs, the need to expand their capacity would have been opened to debate (Stewart, 1999). According to Roberts (1971), however, the primary goal of state supervision was to improve *instruction.* To that end, federal funding was established to promote and enhance the quality of SBAE programs in each state (Straquadine, 1990). Even though state supervisors became a norm for SBAE in a majority of states’ education agencies or departments, these units experienced gradual reductions in staffing levels beginning in the 1980s (Stewart, 1999).

Nonetheless, the U.S. Department of Agriculture and the Department of Education were encouraged by Congress through the Agricultural Research, Extension and Education Reform Act of 1997 to work together to support SBAE (Case, 1999). Case (1999) explained: “It is the sense of Congress that the Secretary of Agriculture and the Secretary of Education should collaborate and cooperate in providing both instructional and technical support for school-based agricultural education" (p. 5), as indicated by Public Law 105-185 (S. 1151 Public Law 105-185). This position also implied the need to provide program supervision and oversight.

Early in the history of SBAE, decisions needed to be made regarding the role of state supervisors, as well as the qualifications for such positions (Hillison, 1999). Many state supervisors, of what was then called vocational agriculture education, were required to have from three to five years of teaching experience in that field (Swanson, 1940). However, little is known about how these individuals influenced SBAE, especially in its formative years. An important part of this story includes the relationships between supervisors and teacher educators of agricultural education as well as local school officials also responsible for supervising aspects of SBAE programs. This study sought to explore the historical roles and actions of those charged with supervising SBAE.

Purpose and Research Questions

The purpose of this study was to examine the historical role of supervisors in SBAE. Three research questions guided this inquiry: 1. How was SBAE supervised before passage of federal legislation that mandated supervision by government agencies? 2. What key federal legislative acts formalized supervisory regulations and procedures for SBAE programs? 3. Were the programmatic philosophies of those individuals charged with the supervision of SBAE unified or divergent over time?

Methods

Historical research methods were used to answer this study's research questions. McDowell (2002) proposed using historical evidence to understand our past and elaborated that our responsibility is to provide the best interpretation of events, as supported by primary and secondary sources. To further ensure this study meets standards for rigor and trustworthiness, we also followed Tracy's (2010) recommendations for worthiness, rich rigor, sincerity, credibility, resonance, significant contribution, ethics, and meaningful coherence.

We developed an outline of historical events presaging as well as fomenting the emergence and evolution of the supervision of SBAE over time. Primary sources used for this study included federal legislative acts, bulletins, and circulars. The study's secondary sources were comprised of peer-refereed journal articles, books, peer-reviewed articles, and the website of a relevant professional organization. We relied on Internet search engines made available by the Edmon Low Library at Oklahoma State University as well as Google Scholar. Search terms used included vocational agriculture education; school-based, agricultural education; vocational supervisors; supervision; supervisors of teacher education; state supervisors; and instructional leader. All data sources for this study were subjected to internal and external criticism by the researchers (McDowell, 2002). This was accomplished by examining multiple sources to triangulate findings and verify authenticity and accuracy (McDowell, 2002; Tracy, 2010). Our aim was to produce a logical, coherent, and explanatory account of historical events and actors surrounding the phenomenon studied (McDowell, 2002).

Findings

Research Question #1 – How was SBAE supervised before passage of federal legislation that mandated supervision by government agencies?

In regard to the formal enterprise of education, *grammar schools* were the first educational units for which supervision was required from authoritative figures, such as *headmasters* or *headteachers* (Gwynn, 1967; see Figure 1). “By 1721, visiting committees were being used to investigate the work [of teachers] in the Latin Grammar School” (Gwynn, 1967, p. 7).

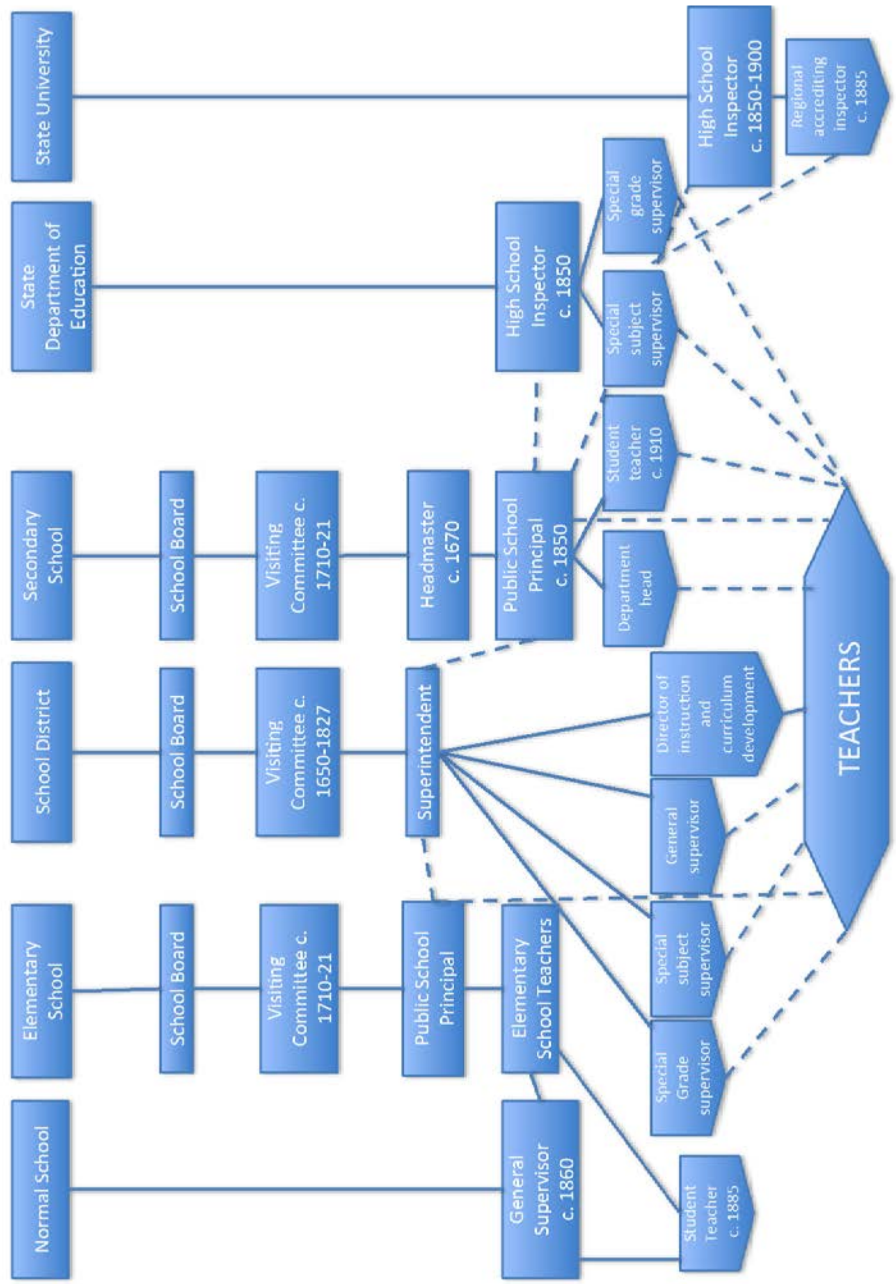

Figure 1. Historical Development of School Supervision in the United States: The kinds of supervision that grew out of each major type of school or educational agency in the United States. Adapted from *Theory and Practice of Supervision* by J. Minor Gywnn, 1967, p. 6. Copyright 1967 by the Dodd, Mead, & Company.

The school principal position emerged in 1821 with the continued development of secondary education (Gwynn, 1967). “After 1827 this power [, i.e., to oversee the school administratively,] gradually became vested in a single person, a local superintendent, who was to administer and inspect the schools” (Gwynn, 1967, p. 5). In addition,

> [w]ith the establishment of legal support for the secondary school (1874), and the passing of compulsory attendance laws which greatly increased secondary school attendance, experienced teachers were often used to supervise other teachers in the same subject fields; thus the position of department head as supervisor was created. (Gwynn, 1967, p. 7)

Before passage of the Smith-Hughes Act of 1917, the idea of states’ departments of education supervising SBAE programs was close to nonexistent (Hillison, 1999). Local school administrators, in most cases, principals, provided the primary supervision of SBAE (Field, 1929). Hence, the need for administrative supervision of SBAE was recognized before passage of the Smith–Hughes Act of 1917.

Nonetheless, Payne (1875) asserted the purpose and benefits of supervision were recognized in mechanical, trade, and government environments, but significant “reluctance [existed] to admit its value and necessity in the management of school systems” (p. 21) in many cases. Payne (1875) also recognized the need for secondary education supervision and stated the importance of implementing supervisory roles in public schools: “A school system requires direction by one responsible head. – It is thus seen that the work of instruction follows the law which prevails in all other industries . . .” (p. 17). In the context of the late 1800s in the United States, Payne (1875) defined the roles and characteristics of school supervisors:

> To superintend the work of instruction with advantage requires, at least, considerable executive ability, a somewhat complete knowledge of the branches taught and ready skill in discipline. With these qualifications alone, a system of instruction may be kept from deterioration. (p. 19)

Early school supervisors were responsible for developing plans of study, classification of students, discipline procedures, teacher evaluations, and record keeping (Payne, 1875): “He [, the supervisor,] is to prepare plans of instruction and discipline, which the teachers must carry into effect; but the successful working out of such a scheme requires constant oversight and constant readjustments” (p. 76). The initial contributors to supervisory practice in regard to SBAE programs, such as Rufus Stimson, maintained that supervisors were responsible for two tasks, *teacher training and state supervision* (Moore, 1988). To this end, “Bawden, [a vocational agriculture instructor], after his 1913 visit in Massachusetts, point[ed] out that Stimson’s visits [to schools teaching agriculture] were not merely supervisory and inspectional but also furnished guidance and help for the teachers” (Moore, 1988, p. 14).

“The Nelson Amendment of 1907 provided [the first] federal support to land-grant universities to provide training for the purpose of teaching agriculture and mechanical arts” (Hillison, 1999, p. 57). After 1917 and enactment of the Smith-Hughes Act, the number of supervisors, in regard to specific subject areas, increased as a result of “compliance with the provisions of federal grants for vocational education, such as vocational home economics and agriculture and trades and industries” (Gwynn, 1967, p. 8). “Early inspectional services of state departments [of education], however, usually had their origin in the state university or in other institutions for higher education in the state or region . . .” (Gwynn, 1967, p. 8).

Moreover, Charles Prosser (1918) asserted that supervision of vocational education emanated through the advancement of work and inspection with the continuation of program funding attached to the outcomes derived from conducting supervision. Gwynn (1967), however, questioned the roles and responsibilities of the early supervisors, and highlighted consequences associated with the lack of qualified supervisors in the education workforce. “The supervisor is no longer an inspector, however, for in the years since 1920, a number of broadened concepts of the supervisory role have gradually developed from the administrative function” (Gwynn, 1967, p. 3). Gwynn (1967) further stated: “Recognition must be given to the understanding of both the public and the professional educator as to the nature of both supervision and successful teaching” (p. 4). The supervisor’s role prior to the Smith-Hughes Act and their roles in more contemporary times have shifted and evolved (Moore, 2006).

Research Question #2 – What key federal legislative acts formalized supervisory regulations and procedures for SBAE programs?

The concept of formal, state–provided supervision for SBAE programs emerged as a result of the Smith-Hughes Act of 1917 and this approach to administrative oversight peaked in the 1960s (Hillison, 1999). It was through this act that federal funding was provided to expand and sustain SBAE, as well as home economics and trade and industrial education, in the public schools (Finch, 1999).

> Under the vocational education act [of 1917] the Federal grant available each year for the promotion of vocational education in the States increase[d] . . . to the maximum of $7,167, 000 available in 1925-26 and annually thereafter. For each year that amounts shown as Federal grants must, if expanded, be matched dollar by dollar by State or local money, so that for any year the joint fund available, made up of Federal, State and local money, is double the Federal grant. This joint fund must be expanded for salaries of *teachers* and *supervision* and for a maintenance of teacher training. (Vocational Summary, 1921, p. 10)

Prosser was a leading advocate for federal funding in regard to vocational education, and its *administration*; and therefore should be recognized for his leadership toward “initiating the formal supervision of vocational teaching, academic teaching and teacher education” (Finch, 1999, p. 200). His influence guided much of the early mandates and actions to that end. According to the Federal Board for Vocational Education, nine incorporated responsibilities of the state supervisor of agricultural education were to guide his practice:

1. Supervision of all schools receiving Federal money for the salaries of teachers or supervisors of agricultural subjects.
2. The supervision of all other schools or departments of agriculture in the State meeting the standards set up by the State board and approved by the Federal Board, even though such schools are not to receive Federal aid.
3. The supervision of the training of teachers of agriculture.
4. Studying the agricultural conditions of the State and the school facilities of particular communities which seem best suited to the establishment of vocational schools or classes

of agriculture.

5. The preparation from time to time of manuscripts for bulletins of information concerning the teaching of agriculture in schools or classes in State and the setting forth of the possibilities of such instruction.
6. The preparation of reports for the State board and concerning agricultural subjects.
7. Holding conferences of teachers engaged in the teaching of agricultural subjects.
8. Promoting in other ways of vocational agriculture in the State.
9. Assisting teachers of agriculture to improve their method of instruction. This improvement may be done by personal consultation, by conferences, by correspondence, and through publications. (Agricultural Education: Some problems, 1918, p. 10)

The George-Deen Act of 1936 allotted 1.2 million dollars to "vocational guidance and occupational information . . . including supervisor travel" (National Association of Supervisors of Agricultural Education [NASAE], 2015). Thereafter, the George-Barden Act of 1946 was implemented, "allowing the [use of] funds for state director salary and expenses; vocational counselor salary and expenses; training and work experience programs" (NASAE, 2015).

The Vocational Education Act of 1963 would signal a significant philosophical shift, and presage a changing approach to vocational education in the United States (Finch, 1999). And according to Moore (2006), the "Vocational Education Act of 1963 diminished the power of the supervisors" (p. 2). The increased federal control of education, or that perception, was viewed negatively due to public doubts regarding the power of local education officials to resist such pressures (Keppel, 1966). In some cases, for example, local administrators attempted to balance school financing to meet community needs in a holistic way versus the delivery of exceptional special services (Keppel, 1966), which were being increasingly mandated. To that point, according to Anderson (1977), local school officials voiced concerns about "a decline in quality and quantity of leadership at the state level due to the assignment of reduced authority and visibility to vocational directors by chief state school officers" (p. 8).

In 1977, Anderson indicated the financial support of and attention to vocational education had been a progressive trend that appeared to be continuing. State supervisors and teacher training faculty were allocated the responsibility of directing state programs of vocational education, including SBAE (Weiler, Hemp, & Hensel, 1966, p. 12).

In the late 1980s, however, states would begin requesting block grants to support their vocational education programs. During this time, educational programs faced the possibility of consolidation.

> In education, Title I of the Administration's bill would have repealed and consolidated four major education programs: Title I of the Elementary and Secondary Education Act (ESEA), the Education of the Handicapped Act, the Emergency School Aid Act, and the Adult Education Act. Title II proposed consolidation of virtually all other federal aid programs with the exception of bilingual education, impact aid, and vocational education. (Verstegen, 1990, p. 358)

Moreover, Jennings (1991) stated:

> Channeling federal money to programs that integrate academic and vocational education,

> targeting money more carefully toward programs that produce results, emphasizing programs that serve poor and otherwise disadvantaged people, and easing state regulatory burdens by pushing authority down to the local level. (p. 18)

"[T]he Carl D. Perkins Career and Technical Education (CTE) Improvement Act was passed by Congress and signed into law by President Bush [in the fall of 2006]" (Threeton, 2007, p. 66).

> [The act] focuse[d] on three of the roles and responsibilities found within legislation which include the title change to that of CTE, the inclusion of counselors and CTE instructors in the guidance and student development process and the integration of academics into career and technical curriculum. (Threeton, 2007, p. 66)

In response to the sweeping changes impacting CTE, Moore (2006) suggested that university agricultural educators should supplement federal legislative guidelines by providing *leadership* directed specifically toward SBAE.

Research Question #3 - Were the programmatic philosophies of those individuals charged with the supervision of SBAE unified or divergent over time?

"Supervision, one of the oldest forms of educational leadership, is currently one of the most controversial" (Gwynn, 1967, p. 3). Key players occupy multiple leadership roles in the education system who, at times, express mutual respect for one another, and, at other times, may hold contrarian views about important issues (Keppel, 1966).

The programmatic views held by state supervisors, teacher educators, and instructors of SBAE may not always be aligned or congruent. For example, different opinions regarding the admission of girls to SBAE and solutions to teacher shortages were not uncommon (Weiler et al., 1966). As early as the 1870s, Payne (1875) stated educators are held accountable and responsible for quality instruction and classroom management all *while implementing their own perspective* of teaching methods fitting the evaluation paradigm.

> The conflicting pressures on the school supervisor to teach; to work with student teachers and beginning teachers and to evaluate experienced teachers; to supervise across subject areas; to direct curriculum projects, and to discharge a host of administrative and clerical tasks, complicate the problem of defining the job. (Mosher & Purpel, 1972, pp. 2-3)

Historically, it was noted "there is a lack of skilled labor, and especially of that variety of labor which is most truly productive – supervision [of the education enterprise]" (Payne, 1875, p. 24). A century later, Mosher and Purpel (1972) indicated:

> We lack sufficient understanding of the process of teaching. Our theories of learning are inadequate, the criteria for measuring teaching effectiveness are imprecise, and deep disagreement exists about what knowledge – that is what curriculum – is most valuable to teach. There is no generally agreed-upon definition of what teaching is or of how to measure its effects. (p. 3)

Mosher and Purpel (1972) described a longstanding issue in regard to teaching, learning, and educational outcomes. This continues to impact suppositions and practices of instructional supervision as well as other aspects of educational administration and leadership. SBAE has not been immune to the controversies and contradictions surrounding its purposes, including how the program should be supervised and by whom.

The role of program supervision and who should supervise often led to disagreements among key stakeholders of SBAE. To this point,

> Dr. Melvin Barlow, writing in The 1974 AVA Yearbook, reminded us of the following: It is important to draw distinction between basic philosophical foundations and convenient administration decisions. The former are stable and the latter are more transient in quality. (as cited in Anderson, 1977, p. 3)

The incorporated responsibilities of state supervision manifested Charles Prosser's (1918) views on the administrative supervision of vocational education:

> I feel that our supervision and inspection must be, which would be pictured by a man holding large power in his hands (so far as the use of funds, for example, is concerned) that would be exercised and yet letting the leash loose as far as is necessary consistent with the proper use of the funds and keeping the schools acting in good faith and headed in the right direction, constantly making improvements in their work. (p. 2)

Further, in regard to the responsibilities of state supervisors of SBAE, the supervisor must "render assistance to the teachers, and at the same time check up [on] their work" (Agricultural Education: Some Problems, 1918, p. 75).

> Acting in this capacity, provided he [, i.e., the supervisor,] is administering a system of education in which the state has responsibility for the success or conduct of a school, he is a policing officer charged with the duty of determining whether or not the school meets the standards set up for the state. (Agricultural Education: Some Problems, 1918, p. 12)

Anderson (1977) expressed his concern for standards fearing the loss of integrity and purpose of the vocational education program; in particular, the idea of looser quality program standards in exchange for higher student enrollment concerned him. Decades before, others had expressed concerns with the idea of transitioning supervisory control of SBAE from state education agency personnel to local school principals.

> The first concern was that principals had little time for supervision of instruction. The second concern was that frequently principals were young and inexperienced; often the agricultural teacher was more mature and more experienced. Thirdly, the agricultural education teacher had more education and background in agriculture than did the typical principal. (Hillison, 1999, p. 58)

As the supervision of SBAE shifted more and more into the hands of local principals, in some cases, the aims of state supervision may have shifted to goals reflecting specific aspects of program achievement. To that end, Anderson (1977) asserted: "With rare exceptions, agricultural educators have tended to concentrate their efforts on those students who could win the largest number of awards or activities" (p. 4). Although the FFA organization increased the presence of the agricultural education program to the public, there was an increased demand of time from teachers, state staff and students (Hamlin, 1956). Such an emphasis may have ultimately impacted the way teachers of SBAE were prepared. Even further, Anderson essentially asked this: Should programs that condone the "misuse of vocational resources and rewards vocational teachers who send many of their students to college, or win contests and awards, but place very few of their graduates in occupations for which they were trained" (Anderson, 1977, p. 5) be considered weaker or inferior programs?

Career and technical education programs, including SBAE, are less likely to be supervised by persons who have such backgrounds, which may result in ineffective instructional leadership (Zirkle & Cotton, 2001). As a result of the changing and weakening of the state supervisor, classroom teachers have turned to teacher educators for leadership advice (Hillison, 1998). Moore (2006) questioned from where the leadership for the agricultural education profession is emerging and who is the driving force: "At one time it was very clear who was driving the profession – state supervisors" (p. 1) but, arguably, at least in the case of many states, no more.

"Teacher educators have assumed a greater role in the hiring process of teachers, as well as in the perennial battles with Congress and state legislatures" (Hillison, 1998, p. 6). According to Hillison (1998), the

> teacher educator [should be] one who [is] able to prepare future teachers and in-service current teachers, but do other things as well . . . including teach agricultural communications courses, work with cooperative extension agents, coordinate distance learning, work with rural sociologists, teach leadership courses, coordinate technology, and work with Agriculture in the Classroom. (p. 6)

Indeed, Hillison (1998) described a long and robust list of professional tasks and responsibilities for teacher educators of agricultural education with their involvement in program supervision notwithstanding.

In a study completed by Garton and Chung (1996), Joint State Staff of Missouri and first year in-service teachers prioritized and identified areas of importance for first year teacher in-service. (*Joint State Staff* implies state education agency personnel and teacher educators.) In comparing the inservice needs of the two groups, "the four highest rated inservice needs for beginning teachers, as perceived by the Joint State Staff, were included in the 13 highest rated inservice needs as prioritized by the beginning teacher" (Garton & Chung, 1996, p. 57). Although those similarities emerged between the beginning teacher and the Joint State Staff, in general, the "ranking of the inservice needs as perceived by beginning agriculture teachers did not correspond with the rankings of the inservice needs as perceived by the Joint State Staff" (Garton & Chung, 1996, p. 57). Some *is versus ought* thinking and philosophical divergence may have been divulged by the study's findings. State supervisors, teacher educators, and teachers of SBAE should be encouraged to align their philosophical positions in regard to program aims and standards to increase the likelihood of meeting students' needs and expectations of employers or the post-secondary education institutions to which program graduates matriculate.

Conclusions and Implications for the Supervision of SBAE in the Future

Teachers' experiences, beliefs, and efforts largely determine the success of SBAE programs, and teacher educators play a role in influencing the standards and practices implemented in local programs (Anderson, 1977). Gwynn (1967) reflected on the growth of U.S. education supervision in 1920; some of his points still resonate today:

1. Supervision originated as inspection of schools and continued with that as its major emphasis to about 1920.
2. Much overlapping of the responsibilities and duties of the administrator and the general supervisor communicated itself later to the office of the assistant superintendent or the special supervisor. Among educational writers and school administrators, there was still no clear-cut distinction between the administrative and supervisory responsibilities of the supervisor.
3. Because of the confusion among administrative and supervisory officers as to their authority, teachers on both elementary and high school levels did not know whose instructions to follow. For example, should teachers follow the suggestions of the principal? Or of the supervisor?
4. Both educational theorists and practicing schoolmen were at variance as to the functions of supervision. Such disagreements were forcing educators to define and delimit supervision.
5. *Both teachers and administrators agreed in two respects - that supervision should be more than inspection and that the improvement of instruction was one of its major tasks* [emphasis added]. (pp. 8-9)

Moreover, “supervision, regardless of how it is defined, involves talk between a teacher and a supervisor about teaching” (Mosher & Purpel, 1972, p. 140). Further, “whatever the causes of these difference[s between stakeholders, including supervisors and teacher educators], there is need for an improved working relationship” (Anderson et al., 1992, p. 48).

Writing about state supervisors 50 years ago, Weiler et al. (1966) stated: “[W]e must increase and improve state professional staff for vocational education” (p.15). In addition, Weiler et al. (1966) specified six points addressing state education department personnel:

1. Variety of programs demand more supervision and leadership from the state level.
2. Someone must keep up to date on specialized programs. Delegation of responsibility is essential.
3. We are working with more groups and individuals, consulting committees, local school boards, colleges, area schools, etc. Contacts must be made, informational materials are needed.
4. New occupations are emerging.
5. Consider need for advanced study, research, sabbatical leave, instructional aids, etc.
6. Let’s maintain continuity of leadership by locating and employing younger people into state positions. (p. 15)

In the second decade of the 21st century, these points still resonate as well as many other issues and challenges. If the goals of state supervisors and teacher educators of agricultural education are to prepare and support teachers who, in turn, develop students for employment in the agricultural sector and its allied industries, or for post-secondary education, candid discussions about priorities and expectations should be ongoing. To this end, nearly four decades ago, Anderson argued for less importance on “FFA training future mayors, councilmen, legislators, governors, and congressmen and [more] emphasis [on] evaluating percentage of past FFA members employed at less than college level” (Anderson, 1977, p. 6) jobs or career pathways involving the agricultural sector. Anderson’s (1977) position notwithstanding, rapidly advancing technology coupled with an increasingly globalized economy would appear to support the need for more students to receive post-secondary education and training than he may have envisioned in 1977.

Nearly four decades ago, Stewart, Shinn, and Richardson (1977) concluded supervisors and teacher educators shared a concern to improve the identity of agricultural education with the goal of recruiting and retaining highly effective teachers. A sustained teacher shortage today continues to echo their position. Ten years ago, Moore (2006) spoke to the shortage of agricultural educators and suggested university agricultural educators provide leadership through preservice programs. Their concerns still stand today and have implications for a modern approach to the supervision of SBAE.

Recommendations

To recruit and retain highly effective teachers of SBAE, teacher educators must prepare future practitioners to address current learning needs of students through collaboration with fellow school colleagues (Darling-Hammond, 2006), including the professionals who supervise or oversee their efforts. Anderson et al. (1992) suggested "more frequent contact with teachers and administrators by teacher educators and State Division of Vocational Education personnel is needed in order to keep in touch with the current school situation" (p. 48).

However, in the current era, extensive supervision by state education agency officials is little more than a distant memory in many states (Barrick, 2015; Herring, 1999; Moore, 2006). Nonetheless, "because of increased public demand for teacher accountability and technical advancements in the occupational areas of vocational programs, vocational teacher professional development has never been more important" (Anderson et al., 1992).

Although written nearly 25 years ago, the position of Anderson et al. (1992) still stands. School-based, agricultural educators, university agricultural educators, and program supervisors have a responsibility to provide leadership in furthering the profession. University faculty should collaborate with state supervisors, where the latter exist, to provide meaningful and relevant professional development and leadership to preservice agricultural educators and inservice SBAE teachers such that standards and accountability are supported and maintained. In states where state staff do not exist or their capacity is insufficient, university agricultural educators coupled with teacher organization leaders should unite to fill the supervisory void. In some states, this appears to have occurred (or is occurring) *organically* but it is likely that much more remains to be done.

For SBAE to continue to thrive, instructors, teacher educators, and state staff personnel must strive to guide change through their leadership efforts, individually and collectively, including their respective professional organizations such as the National Association of Agricultural Educators, the American Association for Agricultural Education, and the National Association of State Supervisors of Agricultural Education. The National Council for Agricultural Education and its *Team AgEd* initiative (Barrick, 2015) should serve as the *convener* for guiding and facilitating such efforts.

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