RESEARCH CONFERENCE PROCEEDINGS

North Central Region

American Association for Agricultural Education

Research Conference and Session Coordination
University of Illinois at Urbana-Champaign

Conference Host
North Dakota State University
Fargo, North Dakota

Friday, October 5, 2018

Review Process for the North Central Research Conference

The AAAE North Central members express their sincere gratitude to AAAE colleagues who served as reviewers for research abstracts submitted for the 2018 North Central Research Conference. A total of 34 research abstracts were submitted. The AAAE Protocol Guidelines for Conference Paper Selection were used in the paper review and selection process. Fifteen paper presentation abstracts, nine round table abstracts and ten poster abstracts were selected for presentation at the 2018 North Central Conference held in Fargo, North Dakota.

Manuscript Reviewers for 2018 AAAE North Central Region Research Conference

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Shannon Washburn
Troy White
Susie Whittington
Mark Zidon

2018 North Central Research Conference
Friday, October 5, 2018
9:00 am to 10:30 am – Research Session I

Concurrent Session A
Theme: School-Based Agricultural Education
*Room: NDSU Memorial Union, **Meadow Lark Room***
Discussant: Mark Balschweid, University of Nebraska
Facilitator: Sarah LaRose, Purdue University

Concurrent Session B
Theme: Agriculture Teacher Retention
*Room: NDSU Memorial Union, **Badlands Room***
Discussant: Amy Smith, University of Minnesota
Facilitator: Brooke Thiel, North Dakota State University

2018 North Central Research Conference
Friday, October 5, 2018
9:00 am to 10:30 am – Research Session I

Concurrent Session C
Theme: The State of the Field of Agricultural Education
*Room: NDSU Memorial Union, **Mandan Room***
Discussant: Beth Foreman, Iowa State University
Facilitator: Macey Kleinjan, North Dakota State University

2018 North Central Research Conference
Friday, October 5, 2018
11:00 am to 12:30 am – Research Session II

Concurrent Session D
Theme: Instruction in School-Based Agricultural Education
*Room: NDSU Memorial Union, **Badlands Room***
Discussant: Jessica Blythe, West Virginia University
Facilitator: Tiffany Morey, The Pennsylvania State University

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Concurrent Session E
Theme: Communication and Online Learning Environments
*Room: NDSU Memorial Union, **Mandan Room***
Discussant: Anil Chaudhary, The Pennsylvania State University
Facilitator: Caitlin Pauley, Michigan State University

2018 North Central Research Conference
Friday, October 5, 2018
4:00 pm to 5:00 pm – Round Table Session I

Concurrent Session F
Theme: Examining Agricultural Education Today
*Room: NDSU Memorial Union, **Hidatsa Room***
Discussant: Jason McKibben, West Virginia University
Facilitator: Ryan Anderson, Sauk Valley Community College

2018 North Central Research Conference
Friday, October 5, 2018
5:00 pm to 6:00 pm – Round Table Session I

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Concurrent Session G
Theme: Communicating About Agriculture and Considering the Future of the Field
*Room: NDSU Memorial, **Hidatsa Room***
Discussant: Mary Rodriguez, The Ohio State University
Facilitator: Aaron Giorgi, The Ohio State University

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Engaging Underrepresented Populations in Food and Agricultural Sciences through Urban Agriculture

An Exploration of Land-Grant Faculty's Engagement in Echo Chambers when Communicating Science

2018 North Central Research Conference
Friday, October 5, 2018
4:00 pm to 6:00 pm – Research Poster Presentations

<table>
<tr><td colspan="2" align="center">Research Posters
<i>Room: NDSU Memorial, Hidatsa Room</i></td></tr>
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Creating a Digital Ecosystem to Cultivate the Digital Leadership of Preservice Agriculture Teachers

Study Abroad Community Development Project: Students' Experience

The Literacy Integration Process: A Grounded Theory

Laura Hasselquist, South Dakota State University
Tracy Kitchel, The Ohio State University

Introduction and Literature Review

Success in and out of the classroom is linked to literacy skills. While reading, writing, speaking, and listening may be the components of literacy, they serve a larger purpose of helping us draw meaning from the world (Moje, 1996). For many teachers, activities using at least one component of literacy are a cornerstone of instruction (Schmoker, 2011). By the time students have reached middle school they are expected to regularly use write-to and read-to-learn activities (Chall, 1983). Additionally, each discipline (math, chemistry, etc.) has its own unique style of literacy (Adams & Pegg, 2012; Moje, 2008). Teachers must take the time to help students understand the unique literacy requirements of each class (Moje, 1996). Without this knowledge, students will struggle in the classroom. Outside of the academic setting, literacy skills are needed to complete a job application and enter the workforce (Buehl, 2011; Tannock, 2001). Literacy skills are also somewhat correlational to income levels and help citizens engage in social and civic life (Shanahan & Shanahan, 2008).

Despite literacy's importance for academic and lifelong success, secondary teachers are often hesitant to include literacy (Buehl, 2011; Hall, 2005; Spitler, 2011). Currently, little is known about literacy's role in agricultural education, with most literature pre-dating the implementation of Common Core State Standards (Hasselquist & Kitchel, 2016b). Agriculture teacher attitudes regarding literacy have shifted positively in recent years (Hasselquist & Kitchel, 2016b). However, possessing positive attitudes is not a statistically significant influencer of literacy usage (Hasselquist & Kitchel, 2016a). A majority of agriculture teachers have completed literacy-related coursework (Hasselquist & Kitchel, 2016b; Park & Osborne, 2007). While individuals who have completed literacy-related coursework used a wider variety of strategies (Park & Osborne, 2006b), it was not influential in usage frequency (Hasselquist & Kitchel, 2016a).

In recent years, in-service teachers have become more receptive to literacy integration, but preservice agriculture teachers still lag behind their peers. They are resistant to the use of literacy. They feel it does not align with the hands-on nature of agricultural education (Hasselquist, Naughton, & Kitchel, 2017; O'Brien & Stewart, 1990). However, once they become in-service teachers, they are supportive of literacy and use a wide variety of activities (Hasselquist & Kitchel, 2016b; Park & Osborne, 2006a). Other content areas have noted similar shifts between preservice and in-service (Spitler, 2011). It is not known what leads agriculture teachers to integrate literacy and research must be undertaken to better understand this phenomenon and help teachers become teachers of literacy.

Purpose and Research Question

The purpose of this study was to conceptualize how teacher literacy-related beliefs and experiences translate into classroom practices. The guiding question for this study was: How do agriculture teachers become teachers of literacy?

Methods

The methods used may be similar or identical methods used in extensions of this study. Since the guiding question explored an unidentified process, grounded theory was selected (Creswell, 2013). The population for this study was high school agriculture teachers with at least five years of teaching experience and a reputation of implementing literacy. A list of 13 potential participants was obtained from the Missouri Department of Elementary and Secondary of Education, with only four males identified. Special efforts were made to recruit male participants but were unsuccessful, limiting this study to only six female participants. Semi-structured face-to-face interviews were recorded and transcribed and served as the primary data source. Classroom observations, field notes, and artifact analysis informed the interviews and served as secondary data sources. Artifacts collected included lesson plans and literacy materials used in the classrooms. Data were approached with a pragmatist epistemological lens, which is appropriate for grounded theory (Corbin & Strauss, 2015). Open, axial, and selective coding were used to identify the central phenomenon, related categories, and develop a substantive theory (Corbin & Strauss, 2015). During the coding process, belief drivers emerged as the central phenomenon. Trustworthiness was established through extensive memoing, data triangulation, constant comparative analysis, and member checking (Creswell, 2013).

Findings

Based on the main themes, a theory was developed to describe the literacy integration process of agriculture teachers (see Figure 1). Throughout the description of the findings, each theme is explored in more detail, along their connections to other themes and the literacy integration process.
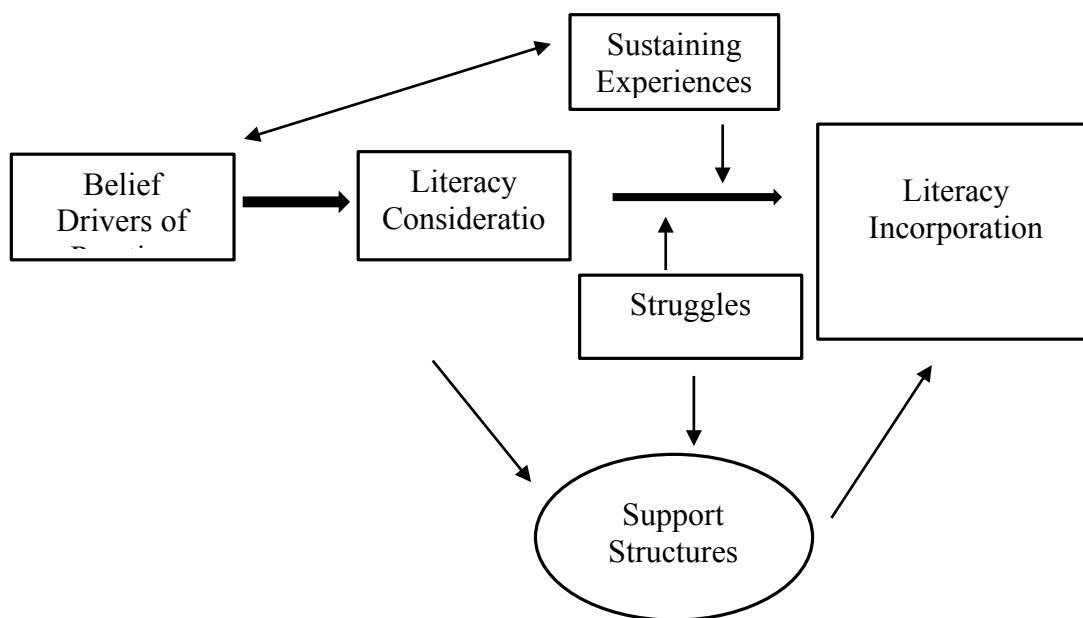
Figure 1. Substantive Theory behind the Literacy Integration Process.

Belief Drivers of Practice and their Connection to Literacy Incorporation

The beliefs teachers held about literacy drove their practice. It explained why they chose to incorporate it and the outcomes they wanted to achieve. Their beliefs centered around the importance of literacy skills for student success in and out of the classroom. Lea said, "If I'm going to set up my students up for success, then they have to be literate." The belief that including literacy activities in their classrooms was important means of transfer was also discussed. Jane describe how the more students interacted with literacy the more "they will get literacy is important." Participants also described the role literacy plays in teaching. "Including literacy is just part of good teaching," was a belief voiced by Sue and other participants. They focused on preparing students for college and careers, including developing the types of literacy skills students need outside the classroom.

Considerations and their Connection with Literacy Incorporation

While beliefs may drive a teacher's desire to incorporate literacy, they had to consider several factors before they actively and thoughtfully used literacy on a consistent basis. First, they had to grow and develop as a teacher. Participants described it taking three years before they became comfortable with the technical content, confident as a teacher, and shifted to a student-centered focus. When asked what was important to help with literacy integration, Jane responded, "Just be confident in yourself as a teacher. Confidence comes with time." Their growth allowed them to recognize and address students' literacy needs. When incorporating it, they planned and used activities based on their knowledge of technical content and relationships with the students. Participants described using literacy as a way to teach information. Knowledge of classroom dynamics was also an important consideration. Amy stated, "I'll be like, 'I think I can get away with that in this class, but definitely not this class.' You make adjustments." They also articulated a variety of ways it was used in conjunction with FFA activities and to support supervised agricultural experiences. Finally, participants recognized using literacy on a regular basis is not a profession norm or expectation, but strongly felt it should be.

Support Structures and their Connection with Literacy Incorporation

When participants begun incorporating literacy, they often sought out and used support structures. They used virtual and in-person support systems. The teachers described turning to electronic sources to help generate ideas. Digital options were their first choice because of the ease of access and time restrictions teachers faced. The participants actively sought out informal communities of practice within their building. Stevie shared, "I asked three [core subject area] teacher I felt had good ideas because I had been in their classrooms and [I saw] simple things to make learning click for kids." When settings were conducive, they also reported sharing ideas with other agriculture teachers. Additionally, Stevie and Sue taught in districts with a stated, financially supported, and sustained literacy initiative. These experiences gave them a wide variety of knowledge to draw from and help with incorporation.

Common Struggles and their Connection with Literacy Incorporation

After the participants had processed through considerations and began implementing literacy, they faced a variety of struggles. The issues they faced were related to lack of knowledge and resources. Participants described frustration around a limited literacy-related knowledge. They noted how district-sponsored professional development did not meet their needs and was not a good use of their time. The lack of time, sources for student readings, and new activities were also concerns. The participants vocalized how their workload limited their

ability to try new strategies and find new materials. Beth said, "Sometimes you're just going to stick with what you've been doing because you know it works instead of implementing something new. I don't have time." Finally, the agriculture programs with either housed in a separate building or in an "out of the way" spot in the building. The lack of face-to-face interaction with other teachers made them feel isolated. They had to make special efforts to engage with other teachers, which drew upon their limited time.

Sustaining Experiences and their Connection with Literacy Incorporation

Despite facing challenges and frustrations, the participants had a variety of experiences to draw from to maintain their beliefs and stay motivated to integrate literacy. All of the teachers identified as readers and engaged in some type of literacy behavior (reading, writing, listening to podcasts) during their spare time. Two participants used their own experiences as struggling readers to stay motivated, empathize with students, and assist struggling students. Formal undergraduate literacy coursework was limited and produced mixed results. What was impactful for the participants was agricultural education faculty who embedded literacy strategies and activities into their teaching methods courses. They describe how seeing literacy activities in context was crucial to reinforce the idea it was an important component of agricultural education.

Discussion

The substantive theory developed from this study indicated the literacy incorporation process is driven by the teachers' beliefs regarding the importance of literacy skills. A teacher's personal beliefs are an important cornerstone of making instructional change. Teacher beliefs were formed from experiences in and out of the classroom. Teacher beliefs are fluid and can change over time based on experience. However, their beliefs concerning literacy's positive role in the classroom are what drove their practice.

Even though beliefs drove practice, the participants reported needing to process through several key considerations before they began actively implementing literacy. One of the key considerations was career growth, which is similar to what other studies have indicated (Spitler, 2011). Time in the classroom allowed them to become familiar with technical content and pedagogy (Darling-Hammond & Bransford, 2005; Hammerness et al., 2005). As their knowledge grew, they became more comfortable with how best to teach the material, indicating a growth in pedagogical content knowledge (PCK) (Shulman, 1986).

How often do teachers use literacy activities because its "good teaching" but fail to recognize it and the long-term benefits to the students? The participants had a very limited working definition of what literacy was and looks like in the classroom. However, field observations and artifact analysis revealed participants regularly used literacy in a wide variety of ways. This mismatch is a concern. Making teachers aware of what literacy entails and the different ways they currently use it is important to enhance practice.

The participants recognized literacy integration should be a social process and reached out to others when the need arose. Using virtual and face-to-face support structures was important for participants (Darling-Hammond & Richardson, 2009). Efforts should be made to increase awareness of existing resources and support structures. Time and lack of knowledge were some of the largest obstacles teachers faced. On recommendation for practice is to develop

a clearinghouse of literacy strategies, texts/articles for use in classrooms, and a list of instructional resources. Teachers would also benefit from being actively encouraged to develop a community of practice within their buildings.

Recommendations for research include determining what role literacy-related knowledge plays in the development of PCK. This study should be replicated with a more representative sample of agriculture teachers. Teacher educators should embed literacy activities into agricultural education classes and discuss them to help preservice teachers contextualize what literacy looks like in the classroom. Finally, professional development should be offered to in-service teachers to help them recognize and enhance current practices.

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Benefits, Barriers and Impact of the Kansas FFA Affiliate Fee Program

Zachary Callaghan, Kansas State University
Gaea Hock, Kansas State University

Abstract

The National FFA Affiliation Fee Program, started in 2009, allows chapters to include all of their members under one fee payment rather than collecting dues from each student. The rationale for the program is to lessen the cost of joining the organization and to equalize opportunities available. This program is voluntary for Kansas FFA chapters, but the state would like to require participation. There has been little research examining perceptions of this program. A qualitative study was previously conducted and findings from that research informed the development of a survey instrument. The survey was sent to 237 agriculture teachers with a response rate of 52% (N = 123). The benefits, barriers, and impact of the program were investigated. The majority of teachers indicated they somewhat or strongly agreed that several aspects of the program were beneficial to their chapter. Almost half of the responding teachers agreed or somewhat agreed they would consider the change to affiliate. Teachers did recognize several barriers to the program including; cost, administration acceptance, and removal of student decision to join FFA. Less than half of the respondents (46%, n = 55) recommended the state require affiliate membership. Almost two-thirds of respondents (63%, n = 75) believe that participation at district, state, and national FFA events would remain the same. Results from this study can help state leaders design professional development and marketing of the program. Other states can benefit from further investigation.

Introduction/Need for Research

It is important for all students to join FFA because the organization can provide many benefits to its members. Students who are members of the FFA are more likely to fulfill their natural desire for love and belonging, build self-esteem, and develop self-actualization (Rose, et al., 2016), which are three levels described in Maslow's Hierarchy of Needs (Maslow, 1943). Members of the FFA are more likely to have a more enjoyable high school experience, gain confidence, and increase their desire for improvement, all through participation in various FFA activities (Rose, et al., 2016).

The National FFA Affiliation Fee Program began in 2009. This program allows chapters to include all of their members under one fee payment rather than collecting dues from each student. The rationale for the program is to lessen the cost of joining the organization and to equalize opportunities available for students (National FFA Organization, 2016). In Kansas, the cost is determined by a sliding scale system (Kansas FFA Executive Committee, 2012). This program is currently voluntary for Kansas FFA chapters ($N = 200$; $n = 30$), but the state plans to require participation in the near future. If implemented, this would impact each chapter in the state. There has been little research examining this program. Research is needed to better understand the perceptions of benefits, barriers, and impact of this program in Kansas and across the country.

Literature Review

To increase teachers use of this program there needs to be some sort of perceived benefit. Benefits of Affiliation, as outlined by the National FFA Organization in a "frequently asked questions" document (National FFA Organization, 2016), can be grouped into two categories; benefits for affiliated states, which are states where 100% of chapters are affiliated, and benefits for affiliated chapters. Affiliated states will see the removal of some fees, including penalty fees, for certain programs offered by the National FFA Organization. Additionally, the state FFA association will see discounts and special pricing on FFA merchandise and programs. Affiliated chapters will receive many of the same discounts and waivers, but could also see more intangible benefits. This program could help students who do not choose to seek "the FFA experience," incoming students who do not understand the worth of the organization, students who do not have mentors encouraging them to be involved, or students who simply cannot afford to join (National FFA Organization, 2016). In addition, some state associations may even provide an extension of those benefits to their respective chapters. In Kansas, it has been proposed, but not yet adopted, that the state provide access to the Agricultural Experience Tracker (AET, 2018), a record-keeping software, at a discounted rate for each FFA chapter.

Research Priority Area #5 of the National Research Agenda for AAAE includes the need to investigate practices and models that impact school-based agricultural education (Thoron, Meyers & Barrick, 2016). The FFA Affiliate Fee program has the potential to positively impact SBAE, but research is needed to determine the effect of the program on student motivation, participation, and other related outcomes.

Theoretical Framework

Ajzen's Theory of Planned Behavior (Ajzen, 1985) served as the theoretical framework for this study. His theory states that behavioral, normative, and control beliefs shape our intentions and, therefore, our behaviors. According to Ajzen, behavioral beliefs generate positive or negative attitudes toward the behavior. Normative beliefs are what people think others believe and bring about a perceived subjective norm. A control belief is ones perceived behavioral regulation or control. We used this theory to examine how teachers' beliefs about the FFA Affiliation Fee program shape their behaviors (whether or not they use it and why that is) during this study.

Purpose/Objectives

The purpose of this study was to identify the reasoning behind a teacher's decision to utilize the FFA Affiliate Fee Program or not.

This study was guided by three research questions:

Research Question 1. What are the benefits of the Affiliate Fee Program?
Research Question 2. What are the barriers to becoming an affiliate chapter?
Research Question 3. What is the impact of a state-wide affiliate program?

Methodology

A qualitative study was conducted last year and findings from that research informed the development of a survey instrument for this study. A panel of experts was used to verify the

instrument and establish content validity. Two tracks were developed for the instrument, one for teachers who advise Affiliated FFA chapters and the other for teachers advising Non-Affiliated FFA chapters. Qualtrics was used to disseminate the instrument via email. The survey was sent to all 237 agriculture teachers in the state with a response rate of 52% ($N = 123$). Although the response rate could be considered low, Sauermann and Roach (2013) identified that online web surveys can "often suffer from low response rates," when compared to alternatives, such as phone interviews. Furthermore, Baruch and Holtom (2008) examined 157 studies published in selected "first and second tier" journals from 2005 and found that surveys distributed by individuals (as opposed to organizations) had an average response rate of 52.7%. This signifies that the response rate from this survey aligns with averages of those of studies published in research journals. It should still be noted, though, that because the study is not representative of the entire population, non-response bias could have impacted the results of this study. Of the 123 teachers who responded, 70% ($n = 86$) were teaching in Non-Affiliated FFA chapters, while 30% ($n = 37$) were teaching in Affiliated chapters. At the conclusion of the survey, a report from Qualtrics was produced and used to analyze the data.

Findings

The first research question sought to identify the benefits of the affiliate fee program. The majority of teachers indicated they somewhat or strongly agreed that several aspects of the program were beneficial to their chapter. Of the 37 teachers who responded to the survey questions and are advising Affiliated FFA chapters, 76% ($n = 25$) of them believe that the program gives students easier access to FFA, 68% ($n = 25$) say it benefits students of low socioeconomic class, and 68% ($n = 25$) would agree that it allows students taking an agriculture class solely for a high school or college class credit to have more opportunities to become involved with FFA. Additionally, 67% ($n = 24$) of those teachers believe that it is easier to pay for the entire chapter's dues rather than collecting money from each student, 62% ($n = 23$) would say that the program helps to complete the Agricultural Education 3-Component model, 51% ($n = 19$) say that it has made FFA a larger part of their curriculum, and 47% ($n = 17$) agree that it has increased student participation at various chapter events. Table 1 shows the perceived benefits of the Affiliation Program.

Table 1

Affiliated Teachers' Perceived Benefits of the Affiliate Program (n=37)
"When thinking about the Affiliate Program, it…"

Item	Strongly Disagree		Somewhat Disagree		Neither Agree nor Disagree		Somewhat Agree		Strongly Agree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Gives students easier access to FFA	0	0.00	2	5.41	7	18.92	15	40.54	13	35.14
Has benefited students of a lower socioeconomic status	0	0.00	2	5.41	10	27.03	12	32.43	13	35.14
Allows students taking an ag. class solely for course credit to have more opportunities to participate in FFA	0	0.00	2	5.41	10	27.03	15	40.54	10	27.03
Makes it easier to pay the chapter's dues, (not collecting money from each student)[1]	3	8.33	2	5.56	7	19.44	11	30.56	13	36.11
Helps complete the 3-Component model	2	5.41	1	2.70	11	29.73	12	32.43	11	29.73
Has made FFA a larger part of my curriculum	3	8.11	5	13.51	10	27.03	10	27.03	9	24.32
Has increased student participation at chapter events[1]	2	5.56	5	13.89	12	33.33	10	27.78	7	19.44

Note: [1] n=36

The second research question investigated the barriers to becoming an affiliated chapter. When teachers, who are currently using the program, were asked if the program would increase how active their chapter members were, 33% ($n = 12$) strongly or somewhat disagreed, while 39% neither agreed nor disagreed that it would increase activity. When asked if the program would decrease the students' awareness of their membership in the FFA, 43% ($n = 16$) strongly or somewhat agreed that it would and 27% neither agreed nor disagreed. When all teachers were asked what barriers existed with the program, 87% ($n = 107$) responded and listed several barriers, including; cost of program, administration/parent acceptance, and that not all the students will participate in FFA. Table 2 exhibits the perceived barriers held by teachers.

Table 2

Affiliated Teachers' Perceived Barriers of the Affiliate Program (N=37)

Item	Strongly Disagree		Somewhat Disagree		Neither Agree/Disagree		Somewhat Agree		Strongly Agree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Will increase activity of chapter members[1]	2	5.56	10	27.78	14	38.89	4	11.11	6	16.67
Decrease students' awareness of their membership in FFA	5	13.51	6	16.22	10	27.03	14	37.84	2	5.41

Note: [1] n=36

The final research question sought to understand the impact of a state-wide affiliate program. Less than half of the respondents (47%, *n* = 57) recommend that the state require affiliate membership for all chapters. On the other hand, of the non-affiliated teachers (*N* = 86) 49% (*n* = 42) strongly or somewhat agreed that they would at least consider transitioning to affiliated status. Almost two-thirds of respondents (62%, *n* = 76) believe that participation at district, state, and national FFA events would remain the same regardless of affiliation status. Table 3 displays the non-affiliated teachers' thoughts toward transitioning their program.

Table 3

Non-Affiliated Teachers' Thoughts Toward Transitioning Membership Type (N=86)

Item	Strongly Disagree		Somewhat Disagree		Neither Agree/Disagree		Somewhat Agree		Strongly Agree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
I would consider transitioning my program to an Affiliated Chapter	18	20.93	8	9.30	18	20.93	28	32.56	14	16.28

Conclusions

In Ajzen's theory, he states that behavioral, normative, and control beliefs shape our intentions and, therefore, our behaviors (Ajzen, 1985). The decision to convert or not convert to an Affiliated FFA chapter is the behavior exhibited by teachers and seems to be largely dependent on their beliefs toward the Affiliation Fee Program, just as Ajzen's theory states. Teachers indicated more negative connotation in regards to the barriers when compared to the positive aspects of the benefits. As a result, they are choosing not to implement this program. This does not necessarily mean that it is a bad program, but the benefits are possibly being overlooked or outweighed by the negative perceptions held among teachers. As previously reported, non-response bias could have impacted the results of this study due to the average response rate of 52%. Because the study is not reflective of the entire population's responses, the results could be skewed to reflect those who are strongly for or against the program.

The National FFA Organization identified several benefits to adopting the Affiliate program through discount and fee waiver programs in their "Frequently Asked Questions" document. (National FFA Organization, 2016). They also provide purpose for the program by identifying several intangible benefits for FFA chapters, such as helping students who cannot afford to pay FFA dues or recruiting those who do not seek out membership on their own. Teachers were able to list many of the intangible benefits, but did not mention the discounts or fee waiver programs for FFA activities and merchandise. Additionally, Rose, et al., suspects that FFA helps its members meet some of their basic human needs, identified by Maslow and presented in Maslow's Hierarchy of Needs (Maslow, 1943).

Overall, this program provides many benefits, such as giving students easier access to FFA and benefiting students of lower socioeconomic status. There are also barriers, such as cost and decreasing students' awareness of their membership in FFA. If a state-wide Affiliate program were to be implemented, teachers believe that participation on nearly every level would stay about the same. With that being said, teachers are fairly divided on the issue with slightly less than half wanting to see a state-wide program.

Implications/Recommendations/Impact on Profession

These results were shared with the state's agricultural education consultant at the Kansas Department of Education and the Kansas FFA Executive Secretary. It would be important to note here that approximately one month after the conclusion of this study, at the Kansas FFA Convention, the state FFA association voted on implementing a state-wide Affiliation program and the delegates failed the motion by a large margin. If this motion were to come up again at some point in the future, which is likely, the state association will be able to use these results to address the concerns of teachers during the process of implementing a state-wide Affiliation program. If the state association staff were to share the National FFA Organizations "Frequently Asked Questions" document with teachers, they may be able to identify more benefits to the Affiliate program. Kansas agriculture teachers, who took this survey, did not discuss many advantages outlined in that document. These results could also be shared with teachers and FFA associations in other states going through a similar process.

National FFA has expressed a strong desire to increase diversity and improve inclusion of all students (Needs of the Committee…, n.d.). This membership program has the potential to diversify the membership and allow all agricultural education students to benefit from programming offered by the FFA at each level of membership (National, State, chapter). More efforts are needed to promote the program and the benefits received by FFA members.

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Interdisciplinary Connections: Evaluating Collaboration between SBAE and Leadership, Mathematics, and Science Educators

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Introduction and Literature Review

Agriculture, food, and/or natural resources (AFNR) content offers a tremendous context in which to build knowledge and skills from core disciplines, making school-based agricultural education (SBAE) an ideal environment for interdisciplinary teaching and learning (National Research Council, 2009; Stubbs & Myers, 2015). In SBAE, the most commonly cited interdisciplinary connections are between SBAE and leadership (Morgan, Fuhrman, King, Flanders, & Rudd, 2013), mathematics (Stripling & Roberts, 2014), and science (McKim, Velez, Lambert, & Balschweid, 2017); however, there exists potential to increase the amount, and rigor, of interdisciplinary connections. A strongly cited recommendation for increasing interdisciplinarity in SBAE is for AFNR and core content area educators to collaborate (Stephenson, Warnick, & Tarpley, 2008; Warnick & Thompson, 2007); however, existing research lacks an empirical investigation of the relationship between interdisciplinary educator collaboration and outcomes associated with interdisciplinary teaching in SBAE. Therefore, the current national study explores the scope of collaboration between AFNR, leadership, mathematics, and science educators and the relationship between collaboration and intentions to teach leadership, mathematics, and science in SBAE.

Theoretical Framework

If interdisciplinary teaching and learning is the goal, opportunities to engage with others, contribute to an interdisciplinary community, and refine interdisciplinary practices must be created (Wenger, 2009). Collaboration between AFNR and core content area educators provides opportunities to create a community of practice focused on interdisciplinary teaching and learning. However, not all collaborative efforts share equal success. The theory of collaborative advantage describes collaborative efforts as reaching "collaborative advantage" or "collaborative inertia" (Vangen & Huxham, 2014). Collaborative advantage is the positive, forward energy created by collective action among members, the ideal achievement of collaboration; whereas, collaborative inertia is the idle lack of energy created by conflict and exasperated by ineffective management (Vangen & Huxham, 2014). In the context of interdisciplinary collaboration in SBAE, success must not be measured by the number of collaborations; rather, by the ability to foster collaborative advantage, operationalized as emergent communities of practice enhancing interdisciplinary teaching and learning.

Purpose and Objectives

The purpose of this study was to understand the characteristics of interaction between AFNR and leadership, mathematics, and science educators on a national scale, as well as the relationship between interaction and the intentions of AFNR educators to teach leadership, mathematics, and science in SBAE. This study was guided by the following objectives.

1. Describe characteristics of interaction between AFNR and leadership, mathematics, and science educators.
2. Analyze the relationship between characteristics of interaction and intentions to teach leadership, mathematics, and science in SBAE.

Methods

Data utilized for this study were derived from a larger research project in which survey methodology was used to collect quantitative data.

Population, Sample, and Data Collection

The target population included all school-based AFNR educators in the United States during the 2015-2016 school year. A simple random sample of 950 school-based AFNR educators from the National FFA Organization frame was obtained. Due to frame error, potential respondents were limited to 828. Dillman's (2007) tailored design method was used to collect data in November and December of 2015. Usable data were provided by 212 respondents ($n = 212$; response rate = 25.60%). Non-response bias was not an issue as a comparison of on-time respondents ($n = 168$) and late respondents ($n = 44$), using methods described by Linder, Murphy, and Briers (2001), resulted in no statistically significant differences.

Instrumentation

Three variables of interest for each core content area (i.e., leadership, mathematics, and science) were utilized from the larger dataset. The first two variables quantified interaction between AFNR and leadership, mathematics, and science educators. For the first measure, frequency of interaction, respondents were asked to indicate the "average *instances per week* [spent] talking with leadership, mathematics, or science teachers (i.e. middle school, high school, or post-secondary) about their discipline's content." Similarly, for the second measure, duration of interaction, respondents were asked to report "average *hours per week*…" Each variable was reported separately for interaction between AFNR and leadership, AFNR and mathematics, and AFNR and science educators.

The third variable of interest was intentions to teach leadership, mathematics, and science in SBAE. Sought in this group were intentions to teach leadership, mathematics, and science in courses AFNR educators had taught, were currently teaching, or planned to teach, indicating familiarity with the curriculum. For familiar courses, respondents reported the percentage of curriculum in which leadership, mathematics, and science content/practices were intended. Responses were summed across courses to determine average intentions to teach leadership, mathematics, and science across SBAE curriculum.

Face and content validity were evaluated by a panel of experts, which included four faculty in SBAE. Reliability was established via a pilot test among 31 preservice teachers at Oregon State University and Utah State University. Each construct of interest, intentions to teach leadership (Chronbach's Alpha = .96), mathematics (Chronbach's Alpha = .93), and science (Chronbach's Alpha = .96), exceeded the threshold for reliability (Fraenkel & Wallen, 2000).

Data Analysis

The first research objective, describing the characteristics of interaction between AFNR and core content area educators, was analyzed using descriptive statistics. Two respondent variables (i.e., frequency per week and duration per week) were utilized. A third variable, duration per instance, was calculated by dividing average duration per week by average frequency per week. Objective two was accomplished by analyzing correlations between characteristics of interaction and intentions to teach leadership, mathematics, and science in SBAE. Effects sizes for correlations were established at .10 = small, .30 = medium, and .50 = large (Cohen, 1992).

Findings

Research objective one sought to describe the characteristics of interaction between AFNR and leadership, mathematics, and science educators (see Table 1). On average, AFNR educators reported interacting with science educators between three and four times per week ($M = 3.42$, $SD = 5.52$) resulting in nearly three hours of weekly interaction ($M = 2.90$, $SD = 5.43$); whereas interaction with leadership educators occurred about three times ($M = 2.97$, $SD = 5.53$) and approximately two hours and eight minutes per week ($M = 2.14$, $SD = 4.29$). Interaction between AFNR and mathematics educators occurred about twice per week ($M = 2.12$, $SD = 4.98$) for a total of about an hour and 20 minutes per week ($M = 1.36$, $SD = 3.55$). While the weekly frequency and duration varied, average time per interaction was similar across discipline areas, at about an hour per interaction (i.e., leadership $M = 1.04$, $SD = 3.48$; mathematics $M = 1.05$, $SD = 3.76$; and science $M = 1.10$, $SD = 3.26$).

Table 1

AFNR Educator Interaction with Leadership, Mathematics, and Science Educators

		F	Minimum	Maximum	M	SD
Leadership						
	Instances per Week	185	0	45	2.97	5.53
	Duration per Week	182	0	40	2.14	4.29
	Duration per Instance	130	0	40	1.04	3.48
Mathematics						
	Instances per Week	177	0	50	2.12	4.98
	Duration per Week	182	0	40	1.36	3.55
	Duration per Instance	111	0	40	1.05	3.76
Science						
	Instances per Week	177	0	50	3.42	5.52
	Duration per Week	182	0	40	2.90	5.43
	Duration per Instance	149	0	40	1.10	3.26

Note. Duration indicates "interaction time (hours)." Duration per instance indicates "average time (hours) per instance."

Research objective two sought to analyze the relationship between characteristics of interaction and intentions to teach leadership, mathematics, and science in SBAE. Regarding interaction between AFNR and leadership educators, there existed a trivial (Cohen, 1992) correlation between both frequency ($r = -.04$, $p = .587$) and duration ($r = -.04$, $p = .623$) of interaction and leadership teaching intentions, as well as a small (Cohen, 1992) negative correlation between duration per interaction and leadership teaching intentions ($r = -.14$, $p = .118$; see Table 2).

Table 2

Relationship between Interaction with Leadership Educators and Intentions to Teach Leadership

	Dependent Variable: Intentions to Teach Leadership	
Characteristics of Interaction	Pearson Correlation (*r*)	*p*-value
Instances per Week	-.04	.587
Duration per Week	-.04	.623
Duration per Instance	-.14	.118

Analysis of the relationship between interaction with mathematics educators and intentions to teach mathematics identified duration per instance had a statistically significant, medium (Cohen, 1992), negative correlation with intentions to teach mathematics ($r = -.21$, $p = .024$; see Table 3). Additionally, while insignificant, interaction frequency had a small (Cohen, 1992), positive correlation ($r = .15$, $p = .052$) and duration had a trivial (Cohen, 1992), negative correlation ($r = -.07$, $p = .319$) with mathematics teaching intentions.

Table 3

Relationship between Interaction with Mathematics Educators and Intentions to Teach Mathematics

	Dependent Variable: Intentions to Teach Mathematics	
Characteristics of Interaction	Pearson Correlation (*r*)	*p*-value
Instances per Week	.15	.052
Duration per Week	-.07	.319
Duration per Instance	-.21	.024

Interaction between AFNR and science educators revealed a similar relationship (see Table 4). There existed a statistically significant, small (Cohen, 1992), negative correlation between duration per instance and intentions to teach science ($r = -.24$, $p = .003$). Though insignificant, trivial (Cohen, 1992) correlations were also identified between weekly frequency ($r = .06$, $p = .417$) and duration ($r = -.06$, $p = .430$) of interaction and intentions to teach science.

Table 4

Relationship between Interaction with Science Educators and Intentions to Teach Science

| | Dependent Variable: Intentions to Teach Science | |
Characteristics of Interaction	Pearson Correlation (*r*)	*p*-value
Instances per Week	.06	.417
Duration per Week	-.06	.430
Duration per Instance	-.24	.003

Conclusions and Implications

The current study sought to understand the characteristics of interaction between AFNR and leadership, mathematics, and science educators as well as the relationship between interaction and the intentions of AFNR educators to teach leadership, mathematics, and science. Results suggest interaction between AFNR and core content area educators vary; though, over half of AFNR educators reported at least weekly collaboration with core content area educators (i.e., mathematics, = 60.00%, leadership = 69.70%, and science = 82.50%). Conversely, 17.50% of AFNR educators reported no interaction with science educators, 30.30% reported no interaction with leadership educators, and 39.00% reported no interaction with mathematics educators, which suggests an opportunity to initiate new interdisciplinary communities of practice.

However, the focus of collaborations should not be measured solely by amount of interaction, rather by outcomes. Findings from research objective two suggest what appears to matter is not the number of times educators interact per week or the length of time they engage per week, but the duration of each interaction, with shorter meetings relating to higher interdisciplinary teaching intentions. Established conclusions are supported by the theory of collaborative advantage. The shorter interaction of AFNR and mathematics and science educators results in collaborative advantage, where the desired outcome is realized (Vangen & Huxham, 2014). However, longer interaction appears to result in collaborative inertia, where barriers prevent outcome attainment (Vangen & Huxham, 2014).

While the current study explored the scope of interdisciplinary interaction, a wholistic view of the relationship between collaboration and interdisciplinary teaching and learning is limited. The current study did not explore the content nor context of interdisciplinary interaction; therefore, it is unclear what exhibited factors, beyond duration, frequency, and duration per frequency, contribute to, or detract from, collaborative advantage.

Recommendations

Increased collaboration between AFNR and core content area educators has been recommended to promote further interdisciplinary teaching and learning within SBAE (Stephenson et al., 2008; Warnick & Thompson, 2007). Implementing this recommendation has the potential to initiate

new communities of practice centered around interdisciplinary teaching and learning (Wenger, 2009); however, practitioners should be intentional about engaging in short conversations with core content area educators and teacher educators should provide guidance and opportunities to practice these types of interaction among pre-service teachers in AFNR, mathematics, and science. While shorter interdisciplinary interaction was found to be correlated with higher mathematics and science teaching intentions, the content of these interactions is unknown. A limitation identified in the current study is the absence of data describing the content and context of interdisciplinary interaction; therefore, a qualitative study exploring interdisciplinary interaction is recommended.

The current study identified practical strategies and future research to continue the growth of interdisciplinary teaching and learning within SBAE. With focused efforts, SBAE practitioners, teacher educators, and researchers can create an interdisciplinary community of practice to better the learning experience for all students.

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What Moves You? How SBAE Teachers Navigate Program Migration

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Introduction

Within agricultural education, 33-38% of vacant programs are filled by migrating teachers (Foster, Smith, & Lawver; 2015 & Klapoetke & Buttles, 2016), yet scant literature exists validating the anecdotal, perceived challenge of starting over as a first year teacher or exploring the motivations of migrating teachers. A migrating teacher, stepping into a new program, must learn the norms and traditions of the school and community, a heightened role for agriculture teachers compared to their counterparts. According to Bateson's theory of learning (Engestrom, 2009), and in conjunction with expansive learning, this study seeks to examine the "double bind" in which agriculture teachers find themselves upon making the decision to change programs. A double bind is a form of perceived impasse where the subject finds itself navigating a conflicting relationship with one or more system components.

The problem in this case is three-dimensional. First, little is known about agriculture teachers who migrate within the profession. While admittedly difficult to track, a lack of understanding regarding teacher migration is problematic for programs, students, and teachers. Second, when referenced, migrating teachers generally receive acknowledgement as "movers," identified because of the program positions they vacate rather than the positions they fill. Finally, anecdotal evidence exists that teachers view a program transition as "starting over." Inadequate research exists to understand the challenges faced or supports needed to aid teachers in remaining in the profession through migration despite perceived obstacles. This study seeks to identify the ways SBAE teachers navigate their "double-bind" (Engeström, 2009) in a manner that retains them in the profession and supports successful navigation of program transitions.

Conceptual/Theoretical Framework

Engeström (1982, in Illeris, 2009) proposes a third generation of activity theory, and five key principles, useful for examining learning in a variety of systems. First, the main unit of analysis is the system's interaction with an object. Second, activity systems have an implied "multi-voicedness," and as such account for a broader community. The third principle addresses the element of time, defining the shape of the activity system. Fourth, it is the tensions or binds that serve as the sources of change. Finally, activity systems conceptualize the possibilities of expansive transformation (Engestrom, 2009). Having successfully navigated the "double-bind," individuals learn, grow, and are able to utilize the expansive process to find themselves in a state of reduced conflict (Engestrom, 2009).
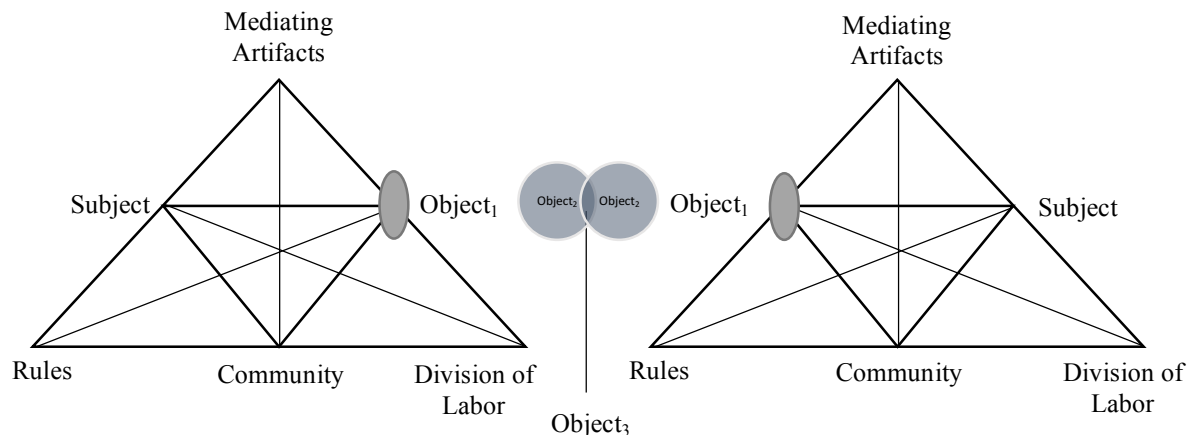
Figure 1: Third generation activity systems (minimal model)

The current study focuses on Learning III, the theoretical space in which teachers navigate their options (the objects) when migrating systems, to explore migration motivations within a modified third generation activity systems model (Engestrom, 2009). In the case of teacher program transition, Learning III describes the process where teachers begin to question their fit within a given program. Expansive learning encapsulates the various considerations a teacher weighs in their decision to migrate programs.

Research Questions

The research questions guiding this study are as follows:
1. Why do agriculture teachers migrate programs?
2. What challenges agriculture teachers about the migration process?
3. What systems aid agriculture teachers in successful program migrations?

These questions align with AAAE Research Priority 3, Question 2: "What methods, models, and practices are effective in recruiting agricultural leadership, education, and communication practitioners and supporting their success at all stages of their careers?" (Roberts, Harder, & Brashears, 2016).

Methodology

This study utilized a phenomenological approach to SBAE teacher program migration. The study of SBAE teacher migration necessitates the unique approach phenomenology provides, accounting for both the experience and the grounding of experience in reflective meaning making (Van Manen, 1990). Another important component of the phenomenological approach involves viewing the participants as co-researchers (Moustakas, 1994), thus this study took an iterative approach, going back to the study participants after data interpretation to ensure accuracy in the account.

SBAE Teachers self-identified through participation in an online discussion group and opted into the study after initial outreach by the researcher. The sample for this study consisted of eight SBAE teachers located throughout the United States. All teachers in the study,

interviewed via the Zoom platform, experienced at least one SBAE program migration and had one to sixteen years of teaching experience.

The phenomenological reduction grounded itself in the theoretical framework for this study and addressed the themes of navigating the systems between programs toward expansive learning (Engestrom, 2009). Themes included community, rules, mediating artifacts, object, and division of labor, subject, double binds, and expansive learning. Each theme received a designation based on the identification by the interviewee as a factor of the vacated program or the new program. Additionally, data were organized into clusters and themes through horizontalization, treating all data with equal weight (Merriam, 2009). The result is a "composite" structure of one interpretation of the SBAE teacher migration experience (Merriam, 2009).

Findings

While, in total, the interviewees identified with thirteen themes, five major shared themes emerged. Significant weight occurred at the community, rules, mediating artifacts, expansive learning, and subject levels within the new program. Across the sample, teachers discussed their current program as a greater driver than their former program in the decision to migrate. Many noting, as Caden did: "Moving programs has kept me in the profession; moving schools made every bit of a difference."

SBAE teachers overwhelmingly identified time as a positive function of changing programs. Time identified positively, across components of the systems, toward family relationships and the ability to reset priorities toward work-life balance. Karly commented, "It's definitely the right [choice]. My family… they tell me I'm happier, and a lot of my friends tell me I'm happier. I don't always notice…But I am, I know I am." Furthermore, teachers discussed both the time required and allotted to be better teachers because of changing programs. Amber noted, "I think the fact that I had to change things and move the apple cart around has been a really good thing for me. It's got me to think about my teaching again, why I do certain things, and what's really important." Altogether, teachers identified their work as more than a job; they expressed commitment to the profession beyond a means of making a living. Karly noted a few rewards of being an SBAE teacher regardless of the program: "Knowing that no matter what school you're in that has FFA and Ag Ed, you're going to make a difference in a kid's life and seeing [their development] right away even though I was a total stranger to them. It's rewarding to know that if you're doing a program and it's working the way National FFA talks about that it can really happen." Deep commitments to students, programs, and agriculture were resounding messages throughout our conversations.

The most commonly addressed theme for teacher migration was the community in the new program. Within this theme, teachers repeated overarching community support on a variety of levels as one of their greatest sources of validation in terms of worth and value. Lisa put it this way: "I don't even have to say anything and they're here, and they're ready, and it's the community, and parents, and everybody." Teachers discussed the challenge of student mindset as both a frustration and a reward of their new program. As a reward, Bethany discussed, "Seeing the seventh and eighth graders really kind of take ownership of it and get excited…So

ultimately, they kind of see the starting point and the end goal." SBAE teachers found value in a renewed sense of collegial atmosphere in their new program compared to their former, and expressed a heightened sense of administrative support upon entering a new program. Lisa added, "I still have to propose the idea and I still have to back up why we need to do this, but they're just on board."

Rules and mediating artifacts presented almost interchangeably as expectations dictated available resources and vice versa. Teachers shared both frustration and contentment regarding navigating expectations within their new program. Frustrations involved establishing new expectations with students, especially among teachers who taught for more than eight years in a previous district. Bethany noted, "I told the kids, 'You practice like you want to play' and 'Would you be upset at your coach if they just throw you into the game?' And they said yeah. And I said, 'Well that's kind of my thing. I don't want you to feel silly when you go to a contest.'" In multiple instances, teachers worked to negotiate their expectations in relation to the students' prior experience and the expectations of the broader community they served.

Finally, each teacher discussed the importance of their move as reinvigorating them in the profession. Jenny advised, "I just want people to understand that if they are not happy do not choose to leave the profession. You might find somewhere else that might be your niche and you do not have to do it all." Several expressed enjoying the challenge and recognized that changing programs helped retain them in SBAE. As Jim said, "I don't know why but [my new program] has so much potential and opportunity. I'm excited for it. It will be interesting to see what we can do." Each offered encouragement to others regarding the positives of changing programs, especially the impetus the new program provided for breaking the norm, continuing to learn, and re-evaluating their teaching practice. Lisa offered, "It's okay that they have a different program and they're doing things differently but just to make sure that it still exists and they're still kind of trying to have that positive impact on the kids." Teachers in this study thrived on the opportunities and challenges presented in their new programs. Amber noted, "I believe that if you stop learning then you really have no place in teaching because everything changes. So I think [continuing to learn] was just a bonus for me." Recognizing the opportunity to do something they are already good at, in a new environment, provided new validation that contributed to their overall longevity as an educator.

Conclusions and Recommendations

This study offers a different lens through which to view program migration. It is by no means exhaustive, generalizable, or the end of the conversation. Rather, this study offers a fresh perspective as a means to understand the expansive learning that takes place for SBAE teachers as they move programs. This study raises challenging questions and identifies additional work for researchers, teacher educators, and SBAE teachers. For researchers, additional work should address motivations for migration and seek to quantify the supports that retain teachers through the migration process. Given the role community support plays in the validation of an SBAE teacher, additional studies should examine how individuals within the community view their role toward supporting SBAE. Examining programs with high teacher-turnover may be an essential next step to understanding the role of community support in SBAE teacher success.

A resounding message from those interviewed was a plea for other teachers to consider their move seriously in terms of motivations for moving. For example, Karly posed these questions, "You really have to weigh your level of unhappiness where you're at. What's driving your move? Are you bored? Are you bored because you don't want to be a teacher anymore? What's the driving force that's giving you problems?" Jeff advocated, "Don't be afraid to take a job you think may not work out. I discovered so many different ways to not make a lightbulb, but my year of experience somewhere else prepared me a lot better than I thought it would for my next experience. Don't be afraid to fail." Without careful consideration, the stress of a move may not produce the desired result, and could instead lead to additional teacher attrition and community fatigue toward a revolving door of agriculture instructors. Teachers must consider what truly moves them before they make a program change, but should not shy away from a potential change that may retain them to SBAE.

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Examining the Relationship Between Routes to Certification and Turnover Intentions of Wisconsin Agriculture Teachers

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Introduction and Literature Review

The recruitment and retention of agriculture teachers is one of the most important issues currently facing agricultural education as evidenced by the National Supply and Demand Study (Smith, Lawver, & Foster, 2018), efforts by the National Teach Ag Campaign (National Association of Agricultural Educators, 2018), and emphasis in recruiting qualified individuals within the National Research Agenda (Roberts, Harder, & Brashears, 2016). Unfortunately, this is not a new challenge for the profession. A shortage of agricultural educators is documented as early as 1965 in the first supply and demand study in agricultural education (Kantrovich, 2010). Concern regarding a shortage of teachers is also occurring outside of agricultural education. According to the Learning Policy Institute (Sutcher, Darling-Hammond, & Carver-Thomas, 2016), from 2009 to 2014 there was a 35% decrease in the number of teachers entering the teaching profession nationwide through all subjects and grades.

One way to solve the teacher shortage is diversifying the paths into the teaching profession. Policymakers and school districts embrace alternative routes to certification as an answer to the teacher shortage (Ingersoll & Smith, 2003). Alternative routes to certification encompass any type of certification other than a university teacher preparation program (National Research Council, 2010). Often alternative routes to certification are used synonymously with the term alternative certification (Cochran-Smith et al., 2016). However, alternative routes to certification range from programs which reflect traditional teacher preparation programs to emergency certification (Walsh & Jacobs, 2007). Within agricultural education, alternative certification became prevalent in the 1960s with a shortage of teachers (Bowling & Ball, 2016). In the past two decades, alternative certification research in agricultural education focuses on individual states, but provides valuable insight into population of teachers. The findings indicate agriculture teachers who enter the profession through alternative routes have practical agriculture knowledge, limited pedagogical awareness (Rocca & Washburn, 2006; Young & Edwards, 2006), differed in levels of self-efficacy (Roberts & Dyer, 2004; Robinson & Edwards, 2012) and instructional competencies (Croom, 2009; Robinson & Edwards, 2011) compared to traditionally certified agriculture teachers. While alternatively prepared agriculture teachers are often older (Robinson & Edwards, 2012) and have more occupational experience (Rocca & Washburn, 2006), Robinson and Edwards (2011) found alternatively certified agriculture teachers in Oklahoma were more likely to leave teaching.

Teacher turnover is a common theme in discussions regarding the teacher shortage. A key variable to the supply and demand of teachers is ensuring the profession retains quality teachers. Ingersoll (2001) noted teacher turnover is a major factor in the demand of teachers. Teachers who choose to leave the classroom classify as either "movers," who go to a different school to teach, or "leavers," who exit the profession (Ingersoll, 2001). With the consistent shortage of

agriculture teachers, agricultural education researchers have focused on the attrition of teachers (Clark, Kelsey, & Brown, 2014; Lemons, Brashears, Burris, Meyers, & Price, 2015). Sorensen, McKim, and Velez (2016) found agriculture teachers have moderately low intentions to leave the profession.

Beyond the research completed by Robinson and Edwards (2011), no research currently exists in agricultural education regarding the turnover intentions of alternatively certified agriculture teachers. In 2017, alternatively licensed teachers accounted for approximately 20% of new hires in school-based agricultural education (Smith et al., 2018). Limited information exists regarding agriculture teachers who enter the classroom through an alternative route, especially their background and likelihood of remaining in the profession. A national study comparing the rates of attrition of traditionally and alternatively certified teachers across disciplines indicates higher attrition for alternatively certified teachers (Redding & Smith, 2016). There is not any similar data in agricultural education. The purpose of this study was to examine the routes to certification and turnover intentions of Wisconsin agriculture teachers with fewer than three years of teaching agriculture to identify differences between alternatively and traditionally certified teachers.

Conceptual Framework

To guide this study, the authors built upon a conceptual framework of the relationship between teacher's personal and professional background from a report for the United States Department of Education entitled "An Evaluation of Teachers Trained Through Different Routes to Certification" (Constantine et al., 2009). The conceptual framework (see Figure 1) illustrates the importance of teacher background and whether the teacher preparation program or type of certification impact teachers' likelihood to leave the profession. This conceptual framework proposes a possible linkage to personal and professional background and route to teacher certification to turnover intentions. The conceptual framework is based on the research completed by Constantine et al. (2009) and evidence indicating the type of certification may be a predictor of teacher turnover (Redding & Smith, 2016; Robinson & Edwards, 2011).
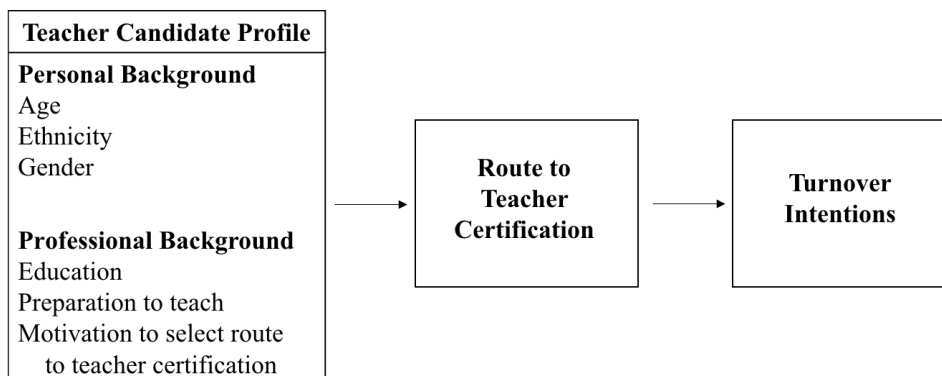
Teacher Candidate Profile

Personal Background
Age
Ethnicity
Gender

Professional Background
Education
Preparation to teach
Motivation to select route
   to teacher certification

Route to Teacher Certification

Turnover Intentions

Figure 1. Conceptual framework of the relationship between teacher's personal and professional background, route to teacher certification, and turnover intentions. Adapted from "An Evaluation

of Teachers Trained Through Different Routes to Certification: Final Report," by J. Constantine, D. Player, T. Silva, K. Hallgren, M. Grider, J. Deke, and E. Warner, 2009, *National Center for Education Evaluation and Regional Assistance*, p. 3.

Purpose and Research Questions

The purpose of this study was to examine the routes to certification and turnover intentions of Wisconsin agriculture teachers with fewer than three years of teaching agriculture. The following research questions lead this study:

1. What are the routes to certification and teacher preparation of Wisconsin agriculture teachers with fewer than three years of experience teaching agriculture?
2. How do turnover intentions differ by routes to certification for Wisconsin agriculture teachers with fewer than three years of experience teaching agriculture?

Methodology

This study utilized descriptive and correlational methods. A survey instrument was distributed to all Wisconsin agriculture teachers with fewer than three years teaching agriculture in the spring of 2017 ($n = 67$). The survey instrument included questions to examine routes to certification and turnover intentions with descriptive questions focused on educational background and teacher certification based on Constantine et al. (2009) while turnover intentions were measured using a previously validated construct from Sorensen (2015). Eight items formed the turnover intentions construct (Cronbach's alpha = .95). A panel of experts reviewed the instrument for face and content validity.

Data collection was completed by making four points of contact with participants via email in spring 2017. The final response rate was 52% with 35 respondents out of the 67 agriculture teachers participating in the study. Nonresponse error was a concern with 48% of the population not participating in the study. The Mann-Whitney U test was performed to compare early ($n = 16$) and late ($n = 17$) respondents for three variables of interest: highest level of education, route to earning teaching license, and turnover intentions. There were no statistical differences for any of the variables of interest (p-value > .05) and non-response error was not determined as significant in this study.

Results/Findings

The first research question sought to identify the routes to certification and teacher preparation. The majority of respondents (80%) received a bachelor's degree with 17% indicating their highest degree was a master's degree and one respondent (2.9%) held a doctoral degree or other professional degree. There was no significant difference between traditionally and alternatively certified teachers in regards to their highest level of education.

The majority of respondents (71.4%) went through a traditional teacher preparation program as part of a bachelor's degree program. The remainder of respondents completed an alternative certification program before being hired (11.40%), after being hired (8.60%), or earning an experienced-based license (8.60%). Eight respondents signified they held a teaching

license in another area before adding an agriculture license, with the majority of this small group (75%) having a license in a science area prior.

Respondents selected from a list of statements about why they became a teacher. The majority of respondents (71.4%), who were traditionally certified, noted as an undergraduate they planned to be a teacher and took all necessary courses to become certified. For alternatively certified respondents, 70% indicated that as an undergraduate they did not plan to teach and chose a route to becoming a certified teacher post-graduation that allowed them to work full-time (50%), was based on a program that was conveniently located (40%), and had required coursework and training which fit their schedule (40%).

Research question two sought to identify respondent's turnover intentions and whether they differed by certification route. Turnover intentions were measured by a six-point scale ranging from strongly disagree (1) to strongly agree (6). Overall, the respondents had moderately low turnover intentions ($M = 2.95$, $SD = 1.13$). Alternatively certified respondents had a somewhat higher turnover intention ($M = 3.04$, $SD = 1.13$) than traditionally certified teachers ($M = 2.91$, $SD = 1.16$). A Mann-Whitney U test indicated there was no statistically significant difference between the routes to certification and turnover intentions of Wisconsin agriculture teachers with fewer than three years of experience teaching agriculture ($U = 130.50$, p – value = .843), with effect size measurements showing certification had a negligible effect (Cohen, 1988) on teachers' turnover intentions ($r_s = .03$).

Conclusions and Implications

Previous studies in agricultural education have explored different aspects of alternatively certified teachers, but have not specifically focused on the type of certification or turnover intentions. While this research is limited to a small, non-generalizable population of agriculture teachers, it provides a foundation for further research to understand the relationship between certification and turnover intentions.

The majority of respondents' highest level of education was a bachelor's degree from a traditional teacher preparation program. Additionally, eight respondents were traditionally certified, but added an agriculture license to an existing license. The traditionally certified teachers in the study knew they wanted to teach as an undergraduate. Teachers certified through alternative routes did not decide to teach until after they completed their bachelor's degree. In pursuing alternative certification, respondents chose a program that allowed them to work full time, was conveniently located, and fit their schedule. The respondents reported a moderately low turnover intention, which matches the findings by Sorensen, McKim, and Velez (2016), with no statistical difference between traditionally and alternatively certified teachers. In accordance with the conceptual framework, the teacher candidate personal and professional background influenced their route to teacher certification, however, there was no link found regarding their background and certification or turnover intentions.

A key finding from this research is the diversity of the alternatively certified group of teachers. Within this limited population, there were three different routes to certification. Due to the varying requirements of traditional and alternative routes to certification, future research

should identify both traditional and alternative programs of study, as well as required coursework, field experiences, and other certification requirements for agriculture teachers. Additionally, there is a unique population of traditionally certified educators who are adding an agriculture license. While these teachers have completed a teacher preparation program through a university, they have not been trained in agriculture. There are still unknowns regarding this population of teachers, especially their agricultural content knowledge and the number currently in the profession, which should prompt further research.

As the agricultural education profession seeks to recruit and retain qualified teachers, teachers entering through alternative routes to certification need to be considered as a solution to the challenge (Bowling & Ball, 2016). Further research should seek to confirm the findings in this study in regards to understanding how teachers are becoming certified, as well as the turnover intentions of traditionally and alternatively certified teachers nationally. If certification is not a predictor of turnover intentions, additional research should be completed to identify other possible variables leading to teacher turnover. Another implication, specifically for teacher education, is alternatively certified teachers chose to become certified in ways that were convenient for them. As the profession focuses on recruiting agriculture teachers, reasons why individuals choose their route for certification, especially alternative certification, should be considered when providing programming in teacher education.

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Emergent Opportunities in Complexity, Leadership, and Sustainability

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Introduction

A vision of sustained ecological viability, social equity, and economic prosperity (Ferdig, 2007) compels the current "white paper" advocating leadership for sustainability as an emergent focus across the social sciences in agriculture, food, and natural resources. Authors argue leadership for sustainability, framed within complexity theory, is a required evolution in how leadership is conceptualized, resulting in new approaches to developing, practicing, and evaluating leadership (Shriberg & MacDonald, 2013). Within this abstract, the case for leadership for sustainability is built through a condensed philosophical review of complexity theory, leadership, and leadership for sustainability. Importantly, the current abstract does not adhere to the traditional outline (e.g., no research methods section) as the intent is to understand leadership for sustainability as opposed to empirically test a hypothesis or theory.

Complexity Theory

Complexity theory represents a radical shift in how the world is understood (Marion, 1999; Regine & Lewin, 2000). Challenging Newtonian worldviews (i.e., linear, reductionist, cause-and-effect relationships), complexity theory suggests a nonlinear and dynamic reality, characterized by unpredictability and uncertainty (Ferdig, 2007; Marion & Uhl-Bien, 2001). Complexity theory illuminates a world comprised of complex systems which include a "diversity of agents who interact with one another" (Marion & Uhl-Bien, 2001, p. 390). The aims of complexity theory, therefore, are to understand these interactions and how innovation, learning, and change emerge from agent interactions (Brown, 2012; Ferdig & Ludema, 2005; Marion & Uhl-Bien, 2001).

Scholarship on the process by which agent interactions result in innovation, learning, and change suggests these outcomes emerge due to self-organization as systems move from stability to instability (Brown, 2012). Specifically, as systems become more chaotic, agents within the system naturally respond by creating new patterns, knowledge, and interactions (Ferdig, 2007; Prigogine, 1997). Change-inducing responses to instability, at the system level, have been distilled into four mechanisms: (a) correlation - in which agents within a system share beliefs and preferences, called resonance, with each other, (b) bonding – in which agents come together under shared resonances, (c) autocatalytic mechanisms – in which new behaviors are catalyzed by other interactions within the system, and (d) sudden shifts – in which a system completely and suddenly changes due to external forces; for example, change resulting from natural disasters (Brown, 2012).

Complexity Theory and Leadership

Complexity theory challenges previous notions of change, influence, systems, and leadership. Specific to leadership, complexity theory spawned *complex leadership*, representing a shift from

perceptions of conventional leadership in the Industrial Era to perceptions of complex leadership in the Knowledge Era (Marion & Uhl-Bien, 2001). Transitioning from conventional to complex leadership illuminated four myths about conventional leadership under the new perspective (Brown, 2012; Plowman & Duchon, 2008). These myths provide quick insight into how complexity theory has evolved the understanding of leadership (see Table 1).

Table 1

Four Myths of Conventional Leadership Illuminated by Complexity Theory

Conventional Leadership Myth	Complex Leadership Perspective
Leaders specify a vision for a desired future.	Rather than clarifying future outcomes, leaders clarify emergent processes as systems in disequilibrium self-organize.
Leaders manage change processes.	Within disequilibrium, leaders identify, label, and support patterns of small change emerging from agent collaborations.
Leaders establish order within a system.	Innovation, learning, and change emerge from system disequilibrium; therefore, leaders encourage the disruption of existing patterns of behavior within a system.
Leadership is the ability to influence others.	Leaders connect agents within a system to other agents and emergent structures to exchange information, ideas, and innovations.

Note. Based on work by Plowman and Duchon (2008) and Brown (2012).

In total, complex leadership shifts what leadership entails, what leaders do, and who leaders are. No longer are leaders assumed to have an "enlightened view about what is required for success of the enterprise" (Ferdig, 2007, p. 30); instead, leaders are positioned to support emergent agent interactions to increase the "capacity of the organization to be productive in mostly unknown, future states" (Brown, 2012, p. 4). Representative of the paradigmatic shift in leadership, brought about by complexity theory, is the role of influence in the leadership process. Conventional leadership relies heavily on leadership as interpersonal influence (DeRue, Nahrgang, & Ashford, 2015; Gardner & Avolio, 1998). Influence is grounded in a worldview of linearity, or determinism, where it is believed all events are the direct result of preceding events or actions and by understanding the cause(s), we can predict the effect(s) (Marion & Uhl-Bien, 2001). Within complexity theory, and its nonlinear worldview, it is unrealistic to suggest leaders could envision an organizational change emerging from complex and dynamic interactions. Therefore, instead of attempting to influence a system toward a desired future, leaders should develop their own ability to support the collaboration, innovation, and learning of all agents throughout an organization or system (Brown, 2012).

Leadership for Sustainability

The evolution of leadership from conventional to complex has vast implications for sustainability. Working toward ecological, social, and economic sustainability, individuals encounter myriad systems in need of innovation and change (Ferdig, 2007). Applying the principles of complexity theory and complex leadership to sustainability yields the concept of sustainable leadership or, as referenced henceforth, leadership for sustainability. Historically, conventional leadership has been particularly damaging to the work of sustainability as conventional leadership models suggested the need for an identified leader from whom followers received a vision and influence (Marion & Uhl-Bien, 2001). This leader reliance contributed to a "learned helplessness that impedes synergistic momentum needed to generate innovative solutions" to the complex problems faced within sustainability efforts (Ferdig, 2007, p. 30). Replacing reliance upon leaders, leadership for sustainability suggests anyone can, and everyone must, adopt the identity of a leader and accept responsibility for working with, as opposed to over, others toward innovative solutions to sustainability problems.

Leadership for sustainability, therefore, requires all individuals see themselves in a collective system of human relationships in which every action, and interaction, creates an opportunity for emergent change within the entire system (Lichtenstein & Plowman, 2009). Further, the inclusion of ecological viability as a component of sustainability requires individuals acknowledge the interconnections between human and natural systems; meaning, every action and interaction not only creates an opportunity for change within human systems, but ecological systems as well (Ferdig, 2007). As the number and complexity of challenges at the human-ecological nexus increases, leadership for sustainability must also grow, empowering a dynamic human system able to innovate, learn, and change. The social sciences of agriculture, food, and natural resources, which work directly at the human-ecological nexus, have the opportunity to catalyze the growth of leadership for sustainability through education, research, and community engagement. To inform this movement, four focal elements of leadership for sustainability, developed from research in complexity leadership (Brown, 2012; Marion & Uhl-Bien, 2001), are explored.

Disrupt Challenges to Sustainability

Leadership for sustainability relies upon collective awareness of systems, norms, and leaders operating counter to ecological, social, and economic sustainability. However, awareness alone accomplishes nothing. Once identified, collaborations of individuals must work to disrupt these systems (Brown, 2012). In conventional perspectives, disruption has a negative connotation; however, leadership for sustainability necessitates individuals understand dissonance, uncertainty, and self-organization are the processes by which innovation, learning, and change emerge (Ferdig, 2007; Shaw, 2002). Therefore, to advance toward a more sustainable future, disrupting systems which themselves, or by correlation influence other systems to, operate in ecologically, socially, or economically unsustainable ways is essential.

Collaborate across Differences

Individual agents attempting to self-organize within an organization in disequilibrium innovate, learn, and change themselves, and the system, because of the potential for breakthrough thinking emerging from differences in perspective (Shaw, 2002). Therefore, individuals being able to come together across differences in backgrounds, perceptions, and knowledge is essential to leadership for sustainability. Additionally, for individuals operating within these systems, especially those in traditional leadership positions, it is imperative to identify when to contribute to collaborations and when to leave the system alone to allow for positive emergence from others operating within the system (Brown, 2012; Marion & Uhl-Bien, 2001).

Learn Continuously

The work of leadership for sustainability requires continual inquiry and learning (Ferdig, 2007). For example, understanding when to participate in collaborations and when to leave the system alone is knowledge developed through engagement, reflection, and learning. Often, this requires individuals take risks and fail; however, leadership for sustainability relies upon individuals recognizing failure as an opportunity for new knowledge to emerge (Ferdig, 2007). In addition, individuals should encourage the learning of others within the system by allowing others to experiment with new practices and approaches, supporting a culture of candid interactions and feedback, and empowering collective action (Brown, 2012).

Become a "Tag"

"A tag is the flag around which all parties rally, the binding philosophy that brings people together" (Brown, 2012, p. 6). Emergent change occurs within systems as agents within the system engage in resonance (i.e., sharing of beliefs and preferences) and bonding (i.e., agents coming together under shared resonances). As this process unfolds, individuals can be inspired, motivated, and organized by a single person or event. Therefore, in the work of leadership for sustainability, individuals must recognize when an opportunity exists to become a "tag," and accept that opportunity for the sake of innovation, learning, and change that can emerge from the process (Brown, 2012; Marion & Uhl-Bien, 2001).

Recommendations

It was the intent of this "white paper" to inform the adoption of leadership for sustainability within the agriculture, food, and natural resources social sciences. Specific recommendations for adoption include integration of complexity theory, complex leadership, and leadership for sustainability within postsecondary leadership education and communications courses; exploring curriculum and experiences (e.g., supervised agricultural experiences, career development events) in which students in school-based agricultural education can develop skills related to leadership for sustainability (i.e., disrupt challenges to sustainability, collaborate across differences, learn continuously, become a "tag"); and exploring the application of complexity theory within the practices of formal and non-formal educators with the intent to encourage learner creativity, innovation, and change. In addition, like the evolution of leadership, it is recommended that social science research within agriculture, food, and natural resources evolve

out of linear, deterministic, and reductionistic (i.e., research in which parts of the system are studied independently with the logic of understanding individual parts leading to understanding the whole system; Marion & Uhl-Bien, 2001) approaches and into more complex, systematic, and holistic investigations of problems and phenomena.

Conclusions

Leadership for sustainability presents an emergent opportunity for the social sciences in agriculture, food, and natural resources to empower individuals to work collectively toward ecological, social, and economic sustainability. Importantly, taking up the mantle of leadership for sustainability requires focal areas like education, leadership, communications, and extension within the contexts of agriculture, food, and natural resources engage in their own process of dissonance, uncertainty, and self-organization with regard to how leadership is conceptualized, practiced, taught, and evaluated. Importantly, it is through this challenging process that learning, innovation, and change can emerge. Of equal importance is recognizing some systems within agriculture, food, and natural resources are, themselves, operating against sustained ecological viability, social equity, and economic prosperity. As social scientists within this field, it is not only our responsibility to develop individuals to enact leadership for sustainability. It is also our opportunity, and responsibility, to engage in, learn from, and support the dynamic change process ourselves as we seek to disrupt, collaborate, and support systems for the betterment of today and tomorrow.

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Trends in Subject Matter Topics Published in the *Journal of Agricultural Education* (1986-2016): Implications for Agricultural and Extension Education Research and Scholarship

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Introduction and Conceptual Framework

The *Journal of Agricultural Education* (*JAE*) is the premier journal for the agricultural and extension education profession. For about 60 years, the *JAE* has served as the major outlet for disseminating agricultural and extension education (AEE) research and scholarship. In the last 30 years, several scholars in the profession have examined various aspects of the *JAE*. These include citation analysis (Radhakrishna, et al., 1994), prolific authors (Radhakrishna & Jackson, 1995), core journals (Radhakrishna, 1995), methodological and statistical analysis (Bowen, et al., 1990), theoretical framework (Kitchel & Ball, 2014). Specifically, the subject matter topics have been examined by many scholars, the earliest being Moss (1986), followed by Moore (1987), Crunkilton (1988), Buriak & Shinn (1993), Radhakrishna & Mbaga (1995), Radhakrishna & Xu (1997), Edgar, Edgar, Briers, & Rutherford, (2008), Chaudhary & Radhakrishna, 2014), and Fiorentino & Radhakrishna (2018). Findings from these studies suggests that scholars in the profession are publishing a variety of subject matter topics indicating greater breadth and depth of scholarship in AEE.

The conceptual framework for the study was drawn from the work of many scholars identified in the above paragraph and the philosophical base that supports the broader AEE discipline. As shown in Figure 1, the data source for the study comes from the *Journal of Agricultural Education*, a premier publication of the American Association for Agricultural Education (AAAE). The subject matter topics, the focus of this study, is grounded in the five disciplinary foci of AAAE—teacher education, Extension education, ag communications, leadership education, and international agriculture. The framework also attempts to link the subject matter topics published in *JAE* to the National Research Agenda (NRA) and its seven priority areas--. PR1) *Public and Policy Maker Understanding…;* PR2) *New Technologies, Practices and Products Adoption…*; PR3) *Sufficient Scientific and Professional Workforce that Addresses the Challenges…*; PR4) *Meaningful, Engaged Learning in all Environments*; PR5) *Efficient and Effective Agricultural Education Programs*; PR6) *Vibrant, Resilient Communities*. PR7 *Addressing Complex Problems* was added as a 7th priority area (Roberts, Harder, & Brashears, 2016).

Almost 20 years has passed since Radhakrishna and Xu (1997) study that examined subject matter topics in AEE. Since then several changes have occurred in the AEE profession. These include: 1) broadening the philosophical base for submission of articles to *JAE*, 2) publication of the National Research Agenda to guide research and scholarship in AEE, 3) emergence of new research initiatives fueled by federal and state funding priorities, legislation and other policy changes, and 4) increased emphasis to carry out interdisciplinary work. Collectively these changes call for examination of trends in subject matter topics published in the *Journal of Agricultural Education* to help us better understand the nature and scope of research and scholarship activities in the AEE profession.
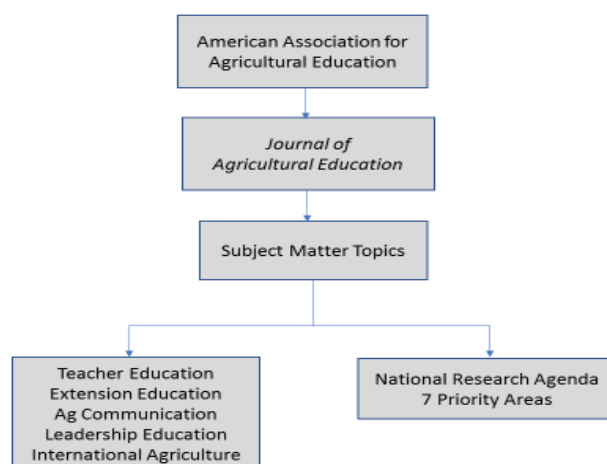
Figure 1: Conceptual Framework for the Study

Purpose and Objectives

The purpose of this study was to examine trends in subject matter topics published in *JAE* for the last three decades (1986-2016). The following objectives guided this analysis:

1. Identify subject matter topics published in *JAE* for the period 1986-2016;
2. Determine trends subject matter topics published in *JAE* for the period 1986-2016; and
3. Link the subject matter topics published in *JAE* to the NRA priority areas

Methods and Procedures

The population for the study consisted of all articles published in the *JAE* from 1986 to 2016 (N=1,280). The rationale for selecting this time frame was the availability of data on subject matter topics for the period 1986-1996, which allowed for examining the trends over a 30-year period (1986-2016). A relational content analysis was performed among 1280 articles published in *JAE* over a 30-year period. After reviewing the 1280 articles, they were compared with the previous study (Radhakrishna & Xu, 1997) and categorized into 21 distinct subject-matter topics. For ease of analysis, some topics were combined or included in the other topics category. For example, microcomputers, internet, and social media were combined into one topic, distance education. For objective two, the trends for top 10 subject matter topics were analyzed, while for objective three, the 21 subject matter topics were then linked to the seven NRA priority areas. Each of the 1280 articles was independently reviewed by the authors for assigning articles to the subject matter topics and to the seven NRA priority areas. There were some disagreements between the two authors on accurately assigning the articles to appropriate subject matter topics. Those articles were reviewed again to make sure they were assigned to appropriate subject matter topics and priority areas.

Findings

A total of 1280 articles were published in *JAE* during the 30 years (Table 1). As shown in table 1, the number of articles published in *JAE* has increased over the years, especially after the *JAE* became an online publication in 2009.

Table 1:
Number of Articles Published in the Journal of Agricultural Education (1986-2016)

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	**Total**
Articles Published	35	34	30	35	45	36	31	44	47	34	31	**402**
Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Total**
Articles Published	32	32	30	42	29	29	36	34	34	42	47	**387**
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2215**	**2016**	**-**	**-**	**Total**
Articles Published	45	43	49	55	49	66	69	57	58	-	-	**491**
Grand Total	-	-	-	-	-	-	-	-	-	-	-	**1280**

Objective 1: Subject Matter Topics Published in *JAE*

As shown in Table 2, subject matter topics published in *JAE* for the last 30 years covers a broad spectrum of topics in AEE. Complete listing of topics is shown in Figure 2. The top 10 subject-matter topics published in *JAE* were: teaching and learning (260), post-secondary education (95), program assessment and evaluation (94), secondary education programs (92), FFA (72), distance education (59), Extension (52), leadership (52), and international agriculture (43). Other topics constantly published in *JAE* include agricultural mechanics, research methods, and communication. Topics that were fewer than five were grouped into "other topics" (96) category, and the topics that could not fit into any of the 21 subject matter topics were grouped under "other." Examination of both Figure 2 and Table 2 reveals that subject matter topics published in *JAE* is constantly changing.

Objective 2: Trends in Subject Matter Topics Published in *JAE*

When examining the subject matter topics published in *JAE* over the last 30 years, several trends emerged. First, the subject matter topics which are viewed as "bread and butter" of AAAE continued its dominance in *JAE*. These topics include teaching and learning, post-secondary education, secondary agricultural education programs, and FFA. These topics were showed a constant presence in *JAE* for the last 30 years.

The topics that showed increasing trends in the last three decades were program evaluation and assessment, Extension, leadership and international. Although microcomputer/distance education dominated the decades of 80s and 90s but showed a declining trend in last 10 years.

The subject matter topics such as SAEP, 4-H youth development, professionalism, historical and philosophical, job satisfaction, and adult education showed a declining trend. These topics were very relevant and appropriate to the discipline in the earlier decades but lost its dominance in recent years.

Table 2.
Subject Matter Topics Published in Journal of Agricultural Education by Decades

Subject Matter Topics	1986-1996	1997-2007	2008-2016	Total
Teaching and Learning, Learning styles/theory and cognition/Instruction teaching	46	85	129	260
Post-secondary education	19	36	40	95
Program evaluation/assessment	1	34	59	94
Secondary ag programs	27	30	35	92
FFA	16	19	37	72
Microcomputers/distance education	21	35	3	59
Extension	19	17	16	52
Leadership	12	17	23	52
International	15	10	18	43
Ag mechanics	17	3	15	35
Research methods	6	12	13	31
Career development	7	2	18	27
Communication	1	10	16	27
4-H youth development	9	14	3	26
Professionalism	26	0	0	26
SAEP	20	0	0	20
Historical Philosophical	20	0	0	20
STEM	2	10	7	19
Elementary education	1	10	8	19
Job satisfaction/burnout	16	0	0	16
Adult education	7	4	2	13
Other topics – fewer than 5 in at least one of the three decades (program development/curriculum, environmental, young farmers, agribusiness, women minorities, ag literacy, inservice training, special needs, recruitment and retention)	63	13	20	96
Other	31	22	29	82
Total	402	387	491	1280

Figure 2: Comparison of Past Studies on Subject Matter Topics Researched/Published in Agricultural and Extension Education

Moss (1986)	Moore (1987)	Crunkilton (1988)	Radhakrishna and Jackson (1992), Radhakrishna and Mbaga (1995)	Radhakrishna and Xu (1997)	Fiorentino and Radhakrishna (2018)
1.Adult Education 2. College faculties 3. Curriculum 4. Employment opportunities 5. FFA 6. Research/ Methodology Impact 7. Special needs 8. SOEs 9. Teacher attitudes and problems 10. Teacher training 11. Teacher effectiveness and methods 12. Others	1. International 2. Extension 3. History and philosophy 4. Adult/young farmers 5. Ag. mechanics 6. FFA 7. SOEs 8. Teacher education 9. Curriculum/ program planning 10. Administration and supervision 11. Professional and general	1. Administration and supervision 2. Ag instructors 3. Adult/post secondary 4. Extension 5. Learning theory 6. Teaching methods 7. Inservice education 8. History and philosophy 9. International 10. Program development and curriculum 11. Recruitment 12. Evaluation 13. Experiential learning 14. Elementary ag programs 15. Youth organizations 16. Research methodology 17. Policy 18. Special needs 19. Others	1. Secondary ag programs 2. Ag instructors 3. Adult post secondary 4. Extension education 5. Learning theory 6. FFA 7. SOEs 8. Teacher education 9. Curriculum/ program planning 10. Administration and supervision 11. Professional and general	1. Ag mechanics 2. SAEP 3. Microcomputers 4. Distance education 5. Leadership 6. International 7. Environmental 8. Extension 9. Evaluation 10. Learning styles, theory, cognition 11. Adult education 12. Inservice training 13. Job satisfaction/ morale/burnout 14. Secondary ag programs 15. Problem solving 16. FFA 17. Research methods 18. 4-H youth 19. Special needs 20. Undergrad/ graduate education 21. Program development/curriculum 22. Historical/philosophical 23. Instruction/teaching 24. Retention/Recruitment 25. Professionalism 26. Young farmers 27. Ag literacy 28. Ag careers 29. Women minorities 30. Agribusiness 31. Others	1. 4-H youth 2. FFA/SAE 3. STEM 4. Extension 5. Technology 6. Leadership 7. Young farmers 8. Ag Mechanics 9. Ag Communication 10. International 11. Teaching and learning 12. Internet/social media 13. Elementary education 14. Morale/burnout 15. Secondary ag programs 16. Post-secondary education 17. Adult education 18. Distance education 19. Program evaluation 20. Research methods 21.Other

A number of "other subject matter topics" published in *JAE* also declined over the last three decades. These include program development/curriculum, environmental, young farmers, agribusiness, women minorities, ag literacy, and inservice training. Furthermore, these other topics were important to the AEE discipline, but seldom published in *JAE*.

Objective 3: Linking Subject Matter Topics Published in JAE to NRA Priority Areas

The 21 subject matter topics and other categories were linked to the seven NRA research priority areas. Findings revealed that a majority of the 1280 articles published were in three NRA priority areas: PR5 - efficient and effective agricultural education programs (n=291); PR7 – addressing complex problems (n=265); and PR3 - sufficient scientific and professional workforce… (n=167). Collectively these three priority areas represent 56% of the total articles published in *JAE* during the 30-year period. Articles categorized under priority areas two, four, and six were seldom (less than 10%) published in *JAE*. However, PR6 (Vibrant Resilient Communities) has shown significant growth in recent years. When the subject matter topics linked to the NRA and priority areas were examined for trends, priority areas 1, 3, 5, and 7 showed an increasing trend, while priority area 4 showed a declining trend. On the other hand, articles linked to priority areas 2 and 6 remained the same.

Conclusions/Implications

Review of articles published in the *Journal of Agricultural Education* suggests that scholars in the profession are advancing knowledge and discovery in AEE. The scholarship depicted in 1280 articles published in *JAE* continue to indicate both breadth and depth of subject matter topics. Furthermore, the subject matter topics published are constantly changing making way for new topics that are critical to meeting changing societal needs. However, the subject matter topics such as teaching and learning, secondary ag programs, leadership, Extension, postsecondary education, and international continue its dominance in *JAE*. These topics are the heart and soul of AAAE. In fact, a closer review of topics suggests that *JA*E, true to its philosophical shift, is publishing in the top five disciplinary foci of AAAE (see Figure 1 and Table 2). In addition, programmatic changes (new faculty expertise, merging of academic departments, new majors and minors, online learning, and emphasis on globalization) may also have contributed to these changes in topics published in *JAE*.

The trends in subject matter topics published in *JAE* showed some interesting facts. For example, the top subject matter topic, teaching and learning continued its dominance over the last three decades. Both faculty and graduate students have researched various aspects of teaching and learning in both formal and non-formal settings. Other topics such as FFA, secondary ag programs, and post-secondary education dominated the AEE research and scholarship.

Another interesting trend is the dominance of program evaluation and assessment in the last decade. Similarly, publication of Extension, leadership, and international topics in *JAE* also increased. This may be due to expanding the disciplinary base of agricultural education to other areas. Further, societal problems that require interdisciplinary approach has also resulted in the emergence of these topics in *JAE*.

The subject matter topic of microcomputers/distance education dominated the decades of the 1986-96 and 1997 to 2007. These were the two decades where technology made a huge impact on higher education and agricultural education was no exception. A number of faculty started

researching and publishing in this topic which paved way for many of the current initiatives such as on-line course offerings and web presence in educational information delivery.

Findings also suggest that research and scholarship in AEE discipline has not been diversified enough to reflect all the seven NRA priority areas. As indicated earlier, over one-half of the articles published are concentrated in only three priority areas (PR5, PR7, and PR3). It is significant to note that PR7 did not even exist in the previous two rounds of NRA but has made significant strides in research scholarship. While research in these areas may be trending and of relevance, we as a discipline/profession must not neglect the other societal issues that exist. Further research is needed to fill the literature gap in the NRA priorities: PR4, PR2, and PR6 (Fiorentino and Radhakrishna, 2018).

The NRA and priority areas not only provided focus to AEE research and scholarship, but also provided direction to research priorities keeping in mind the societal and programmatic changes that are happening. However, Edgar et al, (2008) study found that the priority areas in the NRA are very broad. Taking Edgar et al., findings into consideration, the 2nd NRA was substantially revised and added a seventh priority area (Doerfert, 2011). But, the findings from this study confirms that NRA priority areas are still too broad and are challenging to neatly fit the subject matter topics into the NRA priority areas. In this study, over 170 articles were included in the "other topics" category (Table 1). Further research is needed to revisit the NRA priority areas and the subject matter topics published in *JAE*. Such an undertaking will help further refine the NRA in the next round.

This 30 years analysis of scholarship published in *JAE* should serve as a springboard to all graduate students to identify potential topics for their theses or doctoral studies, and for new faculty to fill the gaps in the AEE knowledge base. They should consider the findings from this study to chart a research and scholarship agenda not only for themselves but also the AAAE profession.

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Usefulness and Effectiveness of Delivery Methods for Receiving Climate Change Information: Perceptions of Pennsylvania Farmers

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Introduction

Extension has been a communicator of change for U.S. farmers for over a century (USDA National Institute of Food and Agriculture [NIFA], 2017). Assisting during the depression, increasing food supplies during World War II, and presently providing a host of services for the nearly 3,000 counties across the country, Extension has and continues to meet rural needs and communicate with communities to address local, national, and global concerns. One pressing issue is climate change. Agriculture is directly impacted by changes in the earth's climate, and these changes impact human lives (World Health Organization, 2017). Thus, it is imperative that we begin to mitigate the effects of climate change and work with today's farmers to have positive and impactful communications on climate change mitigation and adaptation strategies.

Traditionally, Extension has been at the forefront of agricultural communication as a nationwide educational and outreach network. Extension has been in partnership with the USDA and land-grant universities across the nation since 1914, acting as a conveyor of agricultural information in every county in the country, giving them the ability to attend to county specific needs (USDA NIFA, 2017). While it is true that the majority U.S. population believes in climate change (Leiserowitz, Maibacj, Roser-Renouf, Feinberg, & Rosenthal, 2015), there are still communities that harbor doubt, including U.S. farmers (Rodriguez, Molnar, Fazio, Sydnor, & Lowe, 2008). Extension is well-positioned to be in communication with farmers and work with them to manage impacts from climate change. Working together, Extension can assist farming communities to mitigate and adapt to the impacts felt from climate change (Bartels et al., 2013).

Due to their county-based appointments, Extension educators are prime to understand county level local needs. Tyndall et al. (2015) emphasized the importance of localized information for farmers in America's Corn Belt, and Prokopy et al. (2015) indicated that local information is necessary to address farm specific problems and engage local farming community members. These studies demonstrate the need for local information and suggest localized delivery methods to engage in their target audiences. For example, Niles, Lubell, and Haden (2013) observed that California farmers perceived environmental policy changes to be a one of their greatest risks, while Liu, Smith, and Safi (2014) indicated that certain Nevada ranchers prefer discussions in a dialogue model compared to a knowledge sharing model. How an audience receives information can assist in determining how helpful and ultimately useful that information is.

One method of communicating with local communities, is to understand what farmers perceive as the most effective and useful education materials. Merriam Webster defines *useful* (useful, n.d.) as "of valuable or productive kind" and *effective* (effective, n.d.) as "ready for service or action." Therefore, finding a communication method for climate change educational materials that farmers find to be both productive and ready for action will enable Extension educators to provide the most relevant and best received sources for their target populations. While climate change communication is increasing, and the global phenomenon is being accepted by more and more of the U.S. population, further information is needed at the local level, specifically to find the most *useful* and *effective* communication methods. Particularly considering the politically controversial and challenging nature of a topic such as climate change, it is important for local Extension and outreach organizations to know their audiences' communication methods. Therefore, a need exists to find flexible and adaptable strategies to meet the needs of farming operations in a regional context. Understanding what a local farming community determines to be both useful and effective will go a long way in assisting Extension in making the greatest impact.

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Conceptual/Theoretical Framework

The conceptual/theoretical framework for the study is grounded in communications theory (Bettman,1979; Mcguire, 1984). The communications theory proposes three key elements assist in bringing about KASA (knowledge, attitude, skills, and aspirations) change: (1) who likes what, (2) what channels they like to receive information, and (3) with what effect. This theory guides our study in understanding (1) who are Pennsylvania farmers; what role might tradition play in on-farm decisions, does education have any relation to belief in science-based facts? The study is further guided by the second element of communication theory (2) what delivery methods do Pennsylvania farmers find to be 'useful' and 'effective.' Is there a preference for face-to-face communication or will mass-communication reach the same audience? Working to understand the channels in which producers prefer to receive information will allow Extension to engage the greatest number of producers in the most effective and useful ways. Lastly, (3) what effect could Extension educators have in communicating with Pennsylvania farmers, see Figure 1. Once a stronger understanding of communication methods is determined, Extension is likely to be better able to reach and communicate with their target audience.

Adult education theory describes how adults (in this case agricultural producers) might adjust their KASA based on the usefulness and effectiveness of the information they receive. Therefore, certain behaviors or attitudes, for example, might change depending on how an individual receives information. Understanding the three stages mentioned above from the communication theory, can give way to having a better base of knowledge on how to influence change in a target population. This could be more impactful when considering the challenging topic of climate change. An individual's attitudes towards the topic might be influenced based on his/her literacy levels, technological competency, or interest in engaging with various media outlets. Guided by these two theories, Extension agents in communication with producers will be best equipped to make useful and effective decisions regarding choice of delivery methods for packaging information. Program planners should be aware of multiple factors when considering

communicating with farmers, especially when the program's goal is to bring about KASA change in their target audience.
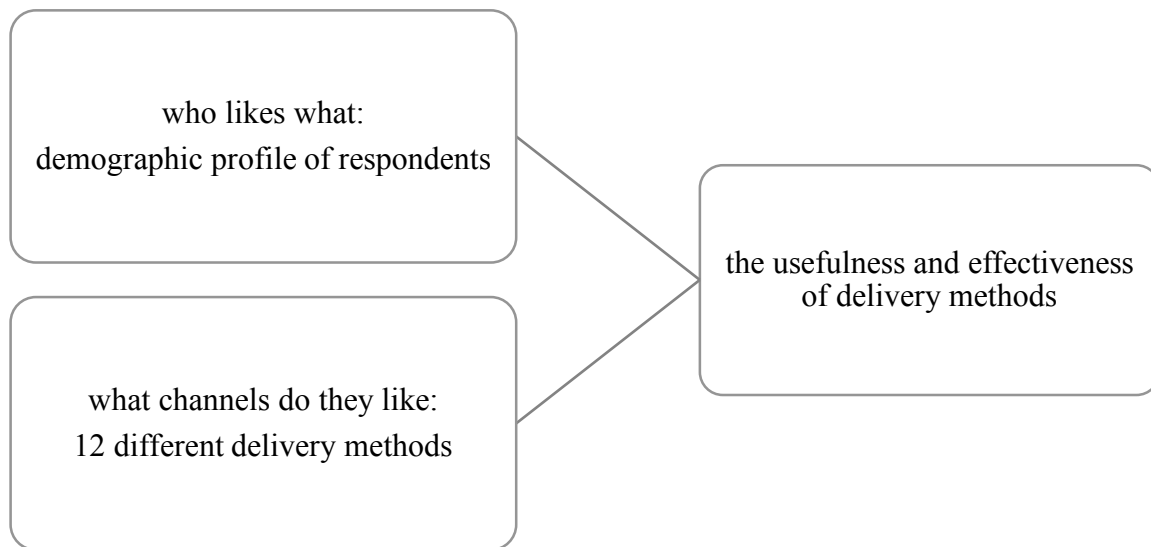
Figure 1: Conceptual Framework

Purpose and Objectives

Need exists to have more localized information regarding climate change in agricultural communities. This study stemmed from a larger study that more comprehensively examined Pennsylvania agricultural farmers' perspectives, barriers, and communication channels as they relate to climate change. Two objectives guided this study:

1. Describe the demographic profile of Pennsylvania Agricultural farmers
2. Determine the usefulness and effectiveness of delivery methods for communicating climate change information of Pennsylvania Agricultural farmers.

Methodology

The population for this study consisted of Pennsylvania farmers (N=59,309), and the target population consisted of 3,860 Pennsylvania farmers. Researchers used Krejcie and Morgan's (1970) sampling procedures to determine the sample size to be 357 farmers for a 5% sampling error. To adjust for limitations in sampling, we oversampled to 500 farmers. A six-section survey instrument was developed by the researchers, and was reviewed by a panel of experts, field tested, and pilot tested to ensure validity. Three key questions were tested for reliability, with each question receiving a Cronbach's alpha score of .70 or higher based on the pilot test. Survey questions were measured using nominal, ordinal and interval/ratio scales. Section one of the questionnaire consisted of seven questions, asking participants farm demographics in a nominal and interval/ratio format.

To determine preferred delivery methods, farmers were asked to examine 12 delivery methods for receiving educational information about weather changes (this vocabulary was used

intentionally based on literature around the vocabulary 'climate change'). Farmers rated the *usefulness* and the *effectiveness* of each of the 12 delivery methods. Scales ranged from 1= not at all useful to 5 very useful, and 1= not at all effective to 5= very effective.

Following Dillman's five-point, tailored design method (Dillman, Smyth, & Christian, 2014), five mailings occurred over an eight-week period. In total, 260 surveys (52.1%) were returned with 252 (50.5%) surveys usable for analysis. Non-respondents were contacted through phone calls. Early, late and non-respondents were compared on key questions on the survey and no significant differences were found between the groups and thus the results are generalizable to the population (Miller & Smith, 1983; Radhakrishna & Doemekpor, 2008).

Results

Objective 1: Demographic Profile of Respondents

Demographic responses indicate that farmers' average age was 59 years old, with a range of 22-90 years. Most respondents (95.0%) were male. Over one-half of the respondents (54.4%) had a high school level education, while another 40.8% had education through undergraduate or professional degrees. As for income level, over one-half of respondents (58.6%) had an annual net income ranging from $0.00-$74.999. Regarding political affiliation, the majority of respondents identified with the Republican Party (67.8%), while 18.4% affiliated with the Democratic Party, 10% indicated no political affiliation, and other (3.8%), see Table 1.

Objective 2: Usefulness and Effectiveness of Delivery Methods

Farmers were asked to examine a list of 12 delivery methods and determine the 'usefulness' and the 'effectiveness' of each method. Mean scores were calculated and a rank order was determined for each delivery method. Despite having different mean scores, the order remained the same for both the 'usefulness' and the 'effectiveness' of delivery methods. As indicated in Table 2, *print newsletters*, *demonstration projects*, and *workshops* were identified as both the most 'useful' and the most 'effective' delivery methods. The least 'useful' and 'effective' delivery methods were *radio programs*, *webinars*, and *social media*.

Conclusions and Discussion

Findings from this study provide valuable information on farmers and their preferred delivery methods for communicating information. On average respondents were older, ages 51-70 years, males with a high school education (54.4%) or undergraduate/professional degree (40.8%), and having an annual income ranging between $0.00-$74,999 (58.6%). Additionally, most respondents (67.8%) identified *Republican* as their political affiliation. These characteristics help to identify a likely response to climate change, as many older, male, Republicans are reluctant to believe in climate change (McCright, & Dunlap, 2011), which is even more true in the agricultural sector (Agri-Pulse, 2016).

Table 1.

Demographic Characteristics of Pennsylvania Farmers

Demographic Category	n	%
Age		
20-50	57	22.8%
51-70	154	61.6
71-90	39	15.6
Total	250	100.0
Gender*		
Female	11	4.4
Male	240	95.2
Other	1	0.4
Total	252	100.0
Education		
High School	136	54.4
Undergraduate/Professional	102	40.8
Graduate	11	4.4
Other	1	0.4
Total	250	100.0
Income		
$0.00-$74,999	133	58.6
$75,000-$149,000	49	21.6
$150,000-$200,000+	45	19.8
Total	227	100.0
Political Affiliation		
Democrat	44	18.4
Republican	162	67.8
Not Affiliated	24	10.0
Other	9	3.8
Total	239	100.0

In communicating with farmers about climate change information, continued understanding of farmer preferences considering demographic changes and shifts in communication technologies is ever important (Bardon, Hazel, & Miller, 2007; Iams & Marion, 1991; Radhakrishna, Nelson, Franklin, & Kessler, 2003). This study asked respondents to identify the level of *usefulness* and *effectiveness* of a list of 12 commonly cited educational delivery methods. The results showed that the top three best ways to deliver educational materials to farmers is through (1) print newsletters, (2) demonstration projects, and (3) workshops. These results indicate an audience who prefers face-to-face communication, or when mass media is warranted, traditional print communication. This finding is consistent with previous Extension programming, which indicates a continued preference of face-to-face interactions (Bairstow, Berry, & Driscoll, 2002; Hobbs, 2004). While considering the skepticism regarding climate change that can exist among farmers (Arbuckle et al., 2013), it is thought that face-to-face interaction can provide a promising method for having "meaningful dialogue" (Morris, Megalos, Vuola, Adams, & Monrow, 2014).

Table 2.

Usefulness and Effectiveness of Delivery Methods

Usefulness				Effectiveness		
Rank [A]	n	M*	Delivery Methods	Rank	n	M**
1	230	3.50	Print newsletters	1	226	3.44
2	229	3.48	Demonstration projects	2	225	3.39
3	230	3.30	Workshops	3	225	3.32
4	231	3.05	Websites	4	226	3.07
5	229	3.04	Informal courses	5	223	3.04
6	230	2.91	Formal courses	6	225	2.99
7	230	2.87	Electronic newsletters	7	225	2.80
8	230	2.77	Electronic factsheets	8	225	2.77
9	224	2.70	Short videos	9	219	2.73
10	231	2.52	Radio programs	10	224	2.54
11	225	2.44	Webinars	11	223	2.48
12	226	2.26	Social media	12	225	2.24

* Responses ranged from: 1= Not at all Useful to 5= Very Useful
** Responses ranged from: 1= Not at all Effective to 5= Very Effective
[A] The rank order for both the 'usefulness' and 'effectiveness' is the same, despite the means for each item being slightly different.

While this study is indicative of farmers finding more face-to-face and traditional media as the most useful and effective educational delivery methods, Extension educators and research faculty in the Northeast have been found to prefer these same delivery methods (Thorn, Tobin, Radhakrishna, Chatrchyan, Chan, & Allred, 2017). Together, these two studies indicate that Extension is well-positioned to engage in climate change education using resource intensive, face-to-face delivery methods.

This study also indicates which delivery methods farmers did not find to be very *useful* or *effective*. Receiving the lowest rank were (12) social media, (11) webinars, and (10) radio programs. Although online decision-support tools are no doubt important in their ability to provide farmers with up-to-date data, they were not identified as preferred delivery methods for this audience. For educators, this information can be useful in understanding ineffective ways to communicate with farmers. For example, social media is likely to be a method only found preferred with a certain audience. The respondents of this study indicated that they were older. Therefore, they may be less likely to communicate through social media, whereas young farmers in Florida prefer to receive their information online or through social media sources (Telg & Barnes, 2012).

Webinars are often used as a cost-effective manner in sharing information and education. However, educators can use this study's findings to support more cost heavy modes of educational delivery methods, as they are perceived as more useful and effective among farmers.

As communication methods and demographics shift with time, understanding how an audience prefers to communicate is essential in reaching their needs. In the face of concerns such as climate change, understanding a farmers' use of delivery methods and the best manner to reach them is essential (Bairstow et. al, 2002; Hobbs, 2004).

Recommendations

Based on the findings of this study, the following recommendations are suggested:

1) Extension professionals need to work within their specific communities to understand the delivery methods that farmers in that community find to be the most useful and effective.
2) When working with a more traditional older agricultural community, Extension should increase their face-to-face and traditional print delivery methods when engaging farmers in climate change information.
3) Impact studies are needed to address the adoption of climate change adaptation and mitigation practices relative to specific delivery methods.
4) Further research is needed to determine the usefulness and effectiveness of face-to-face delivery methods with online delivery methods as well as using audience segmentation.

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Factors Associated with Agriculture Teachers' Perceived Use of Instructional Methods

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Abstract

This study investigated agriculture teachers' perceived use of instructional methods and belief of method effectiveness. A web survey was administered to 406 agriculture teachers in the state of Florida. One hundred and eighty three results were analyzed for associations between use of instructional methods and teacher demographics, and between use of instructional methods and belief of method effectiveness. Results indicate that teacher demographics (age, degree level earned, years of teaching experience, gender, certification type) had no significant association with method use. Significant associations were found between belief of method effectiveness and instructional use for low and medium users of common instructional methods.

Introduction

School-based agricultural education (SBAE) has been established as an academic discipline centered in experiential and hands-on learning (Phipps, Osborne, Dyers, & Ball, 2008). However, agriculture teachers have been encouraged to use a broad array of teaching methods that each offer a unique approach to meeting desired student learning outcomes, while recognizing students' backgrounds and abilities (Newcomb et al., 2004). Research on the effects of specific instructional methods within SBAE is fairly expansive and have focused on student outcomes ranging from content knowledge achievement (Myers & Dyer, 2006; Thoron & Myers, 2012) to creativity (Baker & Robinson, 2016). Despite a body of research that has examined the effects of specific instructional approaches, limited studies have analyzed teachers' perceptions of instructional method effectiveness and teachers' everyday use of instructional methods. The purpose of this study was to examine factors associated with agriculture teachers' perceived use of instructional methods.

Theoretical Framework

Social cognitive theory (Bandura, 1986) was used to guide this study. According to social cognitive theory, a multi-dimensional interaction exists between personal determinants, environmental determinants, and behavioral determinants. Smith, Rayfield, and McKim (2015) applied social cognitive theory to develop a model for examining factors that influenced STEM integration in SBAE. Their model was adapted and utilized for this study. Teacher's personal determinants are described by outcome expectations and self-efficacy (Bandura, 1997), and include teachers' perceived belief of instructional method effectiveness. Environmental determinants are described by factors that influence an individual's social environment and include teacher factors such as age, gender, degree level earned, teaching experience, and certification type. Teachers' behavioral determinants, such as the selection and use of a teaching method, are a result of multi-dimensional interactions between environmental and personal determinants.

Purpose & Objectives

The purpose of this study was to establish a baseline for Florida agriculture teachers' perceived use of common instructional methods. Additionally, this study sought to explore associations between teachers' demographics and perceived use of common teaching methods, and between teachers' beliefs of method effectiveness and perceived use of common teaching methods.

The objectives identified for this study were:
1. Describe agriculture teachers' use of instructional methods in agricultural courses.
2. Describe agriculture teachers' belief of effectiveness for instructional methods.
3. Determine the relationship between teacher demographics, belief of method effectiveness, and perceived use of instructional methods.

Methods

A researcher-developed questionnaire was used as the instrument to collect quantitative data for this study. The targeted population was all teachers who taught SBAE courses at the middle school or high school level in Florida. A sampling frame was generated from the state's agriculture teacher database and included contact information for 406 agriculture teachers. The questionnaire was administered in the form of a web survey through Qualtrics.

Question one asked participants if they were currently teaching middle school or high school agricultural education courses in Florida. Respondents selecting "no" did not meet the criteria identified for this study and were directed to the end of the survey. Question two asked participants to select courses they were currently teaching from a list of 12 common agriculture courses identified in Florida. For each course that was selected in question two, participants were asked to indicate the percentage of teaching time they used each instructional method from a given list. The list included the name and definition for twelve common instructional methods. The list was generated by a panel of four agricultural education faculty members from the University of Florida to ensure face and content validity. The next section of the survey asked participants to indicate how effective they believed each of the 12 instruction methods were by using a five-point, Likert-type scale. The last section of the survey included multiple choice questions used to describe participants' demographic characteristics including gender, years of teaching experience, age, education level, certification type, and grade level(s) taught.

Survey Delivery

The survey was administered to all members of the sampling frame ($n = 406$) during the spring 2018 semester and followed the Tailored Design Method (Dillman, Smyth, & Christian, 2014). A customized email was sent to all participants with a link to complete the survey. When responses dropped to zero, a reminder email was sent to non-respondents. A second reminder was sent following the same method.

Data Analysis

SPSS version 25 was used for data analyses. Descriptive statistics in the form of means and standard deviations were used to address Objective 1. Frequencies were used to address Objective 2 and chi-square analyses were used to address Objective 3. An *a priori* alpha significance was established at .05. Data were compared between early and late respondents to identify response bias (Lindner, Murphy, & Briers, 2001). Significant differences between early and late respondents were not seen and therefore response bias was not detected.

Results

A total of 183 responses were received, which indicated a response rate of 45.1%. Of the 183 responses, 30 were incomplete and 7 responders did not meet the criteria identified in question one, resulting in 146 usable responses. The sample consisted of more female teachers (59.6%) compared to male teachers. Age was distributed fairly evenly in categories from 20 to 30, 31 to 40, 41 to 50, and older than 50. Thirty-four percent ($n = 49$) of teachers indicated having a master degree or higher, and 41.8% ($n = 61$) indicated teaching for more than 15 years. A majority (58.9%; $n = 86$) of teachers indicated having alternative certification. Table 2 displays teachers' demographic characteristics.

Table 2. Demographic Characteristics of Teachers ($n = 146$)

Demographic Variable	n	%
Gender		
Male	58	39.7
Female	87	59.6
Age		
20 to 30	38	26.0
31 to 40	32	21.9
41 to 50	40	27.4
Older than 50	35	24.0
Highest Degree Level Earned		
Bachelor Degree	96	65.8
Master Degree	46	31.5
Doctoral Degree	3	2.1
Years Teaching Experience		
Less than 5 years	43	29.5
Six to 15 years	42	28.8
More than 15 years	61	41.8
Certification Type		
Traditional Agriculture Teaching Certification	48	32.9
Provisional Agriculture Teaching Certification	86	58.9
Unsure	11	7.5

Teachers indicated teaching the following courses: Introduction to Agriculture ($n = 112$); Animal Science ($n = 73$); Plant Systems / Horticulture ($n = 57$); Agribusiness ($n = 29$);

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Agricultural Mechanics (*n* = 26); Environmental Sciences / Natural Resource Management (*n* = 26); Food Products (*n* = 25); and, Biotechnology (*n* = 18).

Objective 1

Objective 1 sought to describe teachers' perceived use of instructional methods. Responses for each course taught were averaged for each participant. Teachers reported using lecture the most often, with a reported mean percentage of 30.3% (*SD* = 18.9). Cooperative learning was found to have the second highest mean percentage at 16.3% (*SD* = 14.23), followed by demonstration (*M* = 12.23; *SD* = 8.55) and paired and small group discussion (*M* = 11.68; *SD* = 9.09). Resource person, field trip, case study, and role play had the lowest perceived use, with mean percentages below 3%. Table 3 displays agriculture teachers' perceived use of instructional methods as a percentage of allocated class time.

Table 3. Teachers' Perceived Use of Instructional Method by Percent Class Time

Instructional Method	Mean	SD
Lecture	30.28	18.91
Cooperative Learning	16.26	14.23
Demonstration	12.23	8.55
Paired & Small Group Discussion	11.68	9.09
Experiment	6.70	7.39
Supervised Study	6.64	9.51
Brainstorming	5.50	6.17
Resource Person (i.e. Guest Speaker)	2.77	4.16
Debate	2.61	3.73
Field Trip	2.59	4.44
Case Study	2.09	3.66
Role Play	.64	2.13

Objective 2

Objective 2 sought to describe teachers' belief of effectiveness for each instructional method. Results indicated that teachers believed demonstration to be the most effective, with over 78.8% of teachers believing demonstration to be very effective or extremely effective. Teachers also perceived cooperative learning to be highly effective, with over 74% of teachers believing cooperative learning to be very effective or extremely effective. Other methods showing an overall high belief of effectiveness included experiment, field trip, supervised study, and paired and small group discussion. More than half of teachers believed lecture, case study, brainstorming, and debate to be moderately effective or slightly effective. Role play had the lowest perceived effectiveness with 11.6% (n = 17) of teachers believing the method is not effective at all, and 30.8% (n = 45) believing that it is only slightly effective. Table 4 displays frequencies for teachers' belief of effectiveness by instructional method.

Table 4. Frequency of Teachers' Belief of Effectiveness by Instructional Method

	Not effective at all		Slightly effective		Moderately effective		Very effective		Extremely effective	
Instructional Method	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Demonstration	-	-	3	(2.1)	28	(19.2)	76	(52.1)	39	(26.7)
Cooperative Learning	1	(0.7)	6	(4.1)	31	(21.2)	75	(51.4)	33	(22.6)
Experiment	-	-	6	(4.1)	37	(25.3)	76	(52.1)	27	(18.5)
Field Trip	2	(1.4)	10	(6.8)	37	(25.3)	63	(43.2)	32	(21.9)
Supervised Study	1	(0.7)	9	(6.2)	48	(32.9)	65	(44.5)	22	(15.1)
Paired and Small Group Discussion	-	-	8	(5.5)	54	(37.0)	71	(48.6)	13	(8.9)
Resource Person (i.e. Guest Speaker)	1	(0.7)	9	(6.2)	53	(36.3)	66	(45.2)	17	(11.6)
Lecture	-	-	13	(8.9)	63	(43.2)	62	(42.5)	8	(5.5)
Case Study	5	(3.4)	14	(9.6)	67	(45.9)	46	(31.5)	12	(8.2)
Brainstorming	1	(0.7)	23	(15.8)	69	(47.3)	44	(30.1)	9	(6.2)
Debate	2	(1.4)	28	(19.2)	64	(43.8)	45	(30.8)	6	(4.1)
Role Play	17	(11.6)	45	(30.8)	53	(36.3)	23	(15.8)	6	(4.1)

Objective 3

Objective 3 sought to determine relationships between characteristics of teachers and perceived use of instructional methods. The four most frequently used methods in this study were examined. The assumption of normality was violated for instructional method use, and therefore, interval data was converted to categorical data for chi-square analysis. Each participant's instructional method use was classified as either low (more than one standard deviation below the mean), medium (within one standard deviation from the mean), or high (more than one standard deviation above the mean). Significant findings were followed by a z-test (Field, 2013) to determine significant differences between low, medium, and high users. Results of the chi-square analyses indicated that no statistically significant associations existed between perceived method use and age, years of teaching experience, degree level, certification type, and course level taught.

Belief of method effectiveness was found to have significant associations with low and medium use for lecture, demonstration, and paired/small group discussion, as can be seen in Table 5. Individuals who reported low use of lecture tended to believe that lecture was moderately or slightly effective. Slightly more individuals reporting medium use tended to believe that lecture was very or extremely effective. A large majority of individuals who were found to have a medium use of demonstration believed demonstration to be very or extremely effective. Low users of paired/small group discussion tended to believe that it was only moderately or slightly effective, compared to medium users who tended to believe it was a very or extremely effective method.

Table 5. Chi-square analyses between perceived method effectiveness and perceived use

Perceived Level of Use	n	Belief of Method Effectiveness		c^2	p
		Moderately or Slightly Effective (%)	Very or Extremely Effective (%)		
Lecture				6.91	.032
Low	21	76.2_a	23.8_b		
Medium	95	45.3_a	54.7_b		
High	30	56.7_a	43.3_a		
Demonstration				12.92	.002
Low	25	48.0_a	52.0_b		
Medium	102	15.7_a	84.3_b		
High	19	15.8_a	84.2_a		
Paired/Small Group Discussion				10.06	.007
Low	28	67.9_a	32.1_b		
Medium	101	34.7_a	65.3_b		
High	17	47.1_a	52.9_a		

Note: subscripts of the same letter on the same row indicate proportions that do not significantly differ from each other at the .05 level.

Discussion, Conclusions, and Recommendations

The most highly used instructional method identified by teachers was lecture, which was nearly double the second most commonly used method, collaborative learning. Despite lecture being identified as the most utilized method, the average belief for lecture effectiveness was lower than other methods. High users of lecture appeared to not be affected by their belief of its effectiveness, however low users were, indicating that they used lecture less frequently. The belief of effectiveness for cooperative learning was roughly the second highest, as well as its use. However, belief of effectiveness did not have a significant association between its use. Demonstration was found to have the highest overall belief of effectiveness and was found to be used fairly often. High users of demonstration appeared to not be impacted by their belief of its effectiveness, however, low and medium users were. A statistically significant difference was observed between medium and low users. Individuals who believed demonstration to be very or extremely effective used the method much more often, compared to individuals who believed the method was moderately or slightly effective. Responses to paired and small group discussion followed the same trend.

Findings that lecture, demonstration, and cooperative learning are the most commonly utilized teaching method align with similar studies (Smith, Rayfield, & McKim, 2015). However, findings that teacher demographics (gender, age, teaching experience, certification type, degree level) do not have an association between the level of use for commonly used instructional methods are impactful to the profession. In order to encourage teachers to broaden their use of instructional methods to meet learning objectives and student characteristics (Newcomb et al., 2004), professional development coordinators may seek to improve beliefs of method effectiveness, especially for teachers who currently use methods at average or below

average levels. Further research is recommended to seek why individuals believe some methods are more effective than others. Additional research that examines why teachers utilize lecture more than other methods would be beneficial. Replication of this study on a state-by-state basis or on a national level is recommended, as results of this study can only be generalized to the state of Florida.

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Determining the Training Needs of Iowa Agricultural Education Teachers Regarding Program Design and Management, Leadership, and SAE Development

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Introduction

A continual challenge presented to teacher educators is providing pre-service teachers with the skill set needed to be successful when entering the classroom. In order for teacher educators to focus on the needs of pre-service teachers, we must understand the specific worries and concerns of pre-service students (Stair, Warner, & Moore 2012). This research is congruent with a multitude of previous research, which have reported concerns of beginning teachers (Edwards & Briers, 1999; King, Rucker, & Duncan, 2013; Myer, Dyer, & Washburn, 2005; Veenman, 1984; Warnick, Thompson, & Gummer, 2007).

Moir (1990, 2011) suggested beginning teachers go through a series of six stages during the first year of teaching: anticipation, survival, disillusionment, rejuvenation, reflection, and anticipation. The anticipation phase, where student teachers fall, is also known as the time frame when excitement is the highest, teachers are entering their first teaching job, and they are enthusiastic. Understanding that this theory can be applied to the student teaching experience, allowed us to seek to identify the concerns of undergraduate pre-service teachers at Iowa State University.

Conceptual Framework

Aside from the stages of teaching, the concept of Andragogy (Knowles, 1980, 1984) served to guide this study. Based on the self-directed concept of andragogy, an important factor in determining the training needs of pre-service teachers is pre-service teachers themselves. Moreover, literature has highlighted the importance of adult learners diagnosing their own learning needs (Merriam, Caffarella, & Baumgartner, 2007; Waters & Haskell, 1989). The areas of identified training needs will influence to focus of pre-service teacher preparation and professional development events. The self-directed concept of Andragogy, operationalized by an agricultural education needs assessment, served as a means to determine the most imperative training needs of agricultural education pre-service teachers at Iowa State University.

Purpose and Objectives

Aligning with Research Priority Five of the AAAE Research Agenda (Roberts, Harder, & Brashears, 2016), the purpose of this study was to evaluate the agricultural education training needs of pre-service teachers at Iowa State University, based on the Iowa Governor's Council on Agricultural Education General Program Standards. The following research objectives guided this study:

1. Determine the pre-service training needs of agricultural education pre-service teachers at Iowa State University related to Program Design and Management, by grade classification.

2. Determine the pre-service training needs of agricultural education pre-service teachers at Iowa State University related to leadership and SAE development, by grade classification.

Methods

The target population (*N* = 97) for this study was agricultural education pre-service teachers currently enrolled in the Iowa State University teacher preparation program. Of the 97 pre-service teachers which were recruited for this study, a total of 69 pre-service teachers responded to the instrument, yielding a response rate of 71.1%. The average pre-service teacher was an upperclassman (junior, *n* = 26, 37.68%; senior, *n* = 21, 30.43%), female (*n* = 50, 70.4%) had an average age of 20.70 (*SD* = 2.77), and was involved in four years of high school agricultural education.

The training needs of the Iowa State University agricultural education pre-service teachers were assessed using a modified version of the Borich Needs Assessment Model (Borich, 1980). Similar to previous studies (e.g., Duncan, Ricketts, Peake, & Uesseler, 2006; Joerger, 2002), the survey instrument provided the needs constructs of school-based agricultural education (SBAE) teachers. Modifications were made to align the items with the Iowa Governor's Council on Agricultural Education Program Standards.

The final instrument contained 29 items. The first 25 items were Likert-type scale items which sought to identify the training needs of the pre-service teachers. Two five-point scales accompanied each item. One scale regarding importance (1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*) and one associated with the pre-service teachers' perceived knowledge (1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*) regarding the issue. Based on recommendations from Dillman, Smyth, & Christian (2009), the items were grouped into two categories (i.e., program design / management [12 items] and leadership / SAE development [13 items]). Four items were included to identify the pre-service teachers' demographics and background characteristics.

The demographic and background items were analyzed using IBM's Statistical Package for Social Sciences (SPSS©), and the mean weighted discrepancy scores (MWDS) were calculated using the Excel-Based MWDS Calculator (McKim & Saucier, 2011). To assess the reliability of the instrument, Cronbach's alphas were calculated for both the importance (α = .97) and knowledge scales (α = .97). The calculated alpha coefficients were considered to be at a tolerable level for establishing reliability (Ary, Jacobs, & Sorensen, 2010). The content validity of the items were assessed by way of a panel of experts. The panel, consisting of two agricultural education faculty members, evaluated each item and made recommendations to enhance readability and eliminate double-barreled items.

Pre-service teachers were recruited by way of a recruitment email, which included the link to the Qualtrics online survey instrument. Along with the initial email, three reminders, sent in five-day increments (Yun & Trumbo, 2000), were sent to the pre-service teachers. Sixty-nine (71.1%) pre-service teachers responded after the four iterations.

Findings

The MWDS were used to represent the training needs for the pre-service teachers at Iowa State University. From a broad lens, training needs were indicated for all 25 topics included on the survey instrument, with MWDS ranging from 9.05 to 2.29.

The program design and management items with the highest overall training needs were: completing annual FFA report (MWDS = 9.05), utilizing an advisory committee to promote the local agricultural program (MWDS = 7.61), repairing and maintaining laboratory equipment (MWDS = 7.52). From a grade classification standpoint, there were differences and similarities. Freshman indicated the highest training needs associated with utilizing an advisory committee to promote the local agricultural program (MWDS = 9.38) and sophomores reported the highest needs regarding the ability to use the local advisory committee to acquire resources (MWDS = 4.28).

Organizing a local alumni/agricultural booster program served as the highest reported area of need for both juniors (MWDS = 10.74) and seniors (MWDS = 9.12). Graduate students' highest reported needs (MWDS = 11.52) were completing annual FFA reports and utilizing an advisory committee. Conversely, the item "organizing fund raising activities for the local FFA chapter" was reported as the lowest area of need for freshmen (MWDS = 1.37), sophomores (MWDS = -0.59), juniors (MWDS = 4.38), and seniors (MWDS = 0.61). Moreover, sophomores had an item with a negative MWDS—indicating they have no training needs regarding fundraising. The area which graduate students indicated the lowest level of training needs was with the item of planning banquets (MWDS = 2.40).

The second objective sought to determine the pre-service training needs of pre-service teachers related to leadership and SAE development. The leadership and SAE development items with the highest overall MWDS were related to the development of Research SAEs (MWDS = 8.79), School-Based Enterprise SAEs (MWDS = 8.34), Ownership/Entrepreneurship SAE (MWDS = 8.09), Service Learning SAEs (MWDS = 7.91), and Placement/Internship SAEs (MWDS = 7.30). The items with the lowest overall training needs for the pre-service teachers were preparing students for Leadership Development Events (MWDS = 6.06), Career Development Events (MWDS = 5.41), and conducting local FFA chapter activities (MWDS = 5.29). The levels of needs varied between students of different grade classifications. The highest indicated leadership and SAE training needs pertained to the development of research (sophomore MWDS = 7.41; junior MWDS = 8.40), service learning (sophomore MWDS = 7.41), and school-based experience SAEs (senior MWDS = 8.51) and the preparation of proficiency (freshmen MWDS = 11.93) and FFA degree (graduate MWDS = 11.20) applications.

Conclusions

The pre-service teachers reported some level of training need for all program design and management items. Pre-service teachers expressed the need for training regarding advisory committees. In fact, all three items pertaining to advisory committees exceeded a MWDS of 6.00. Aside from the development and involvement with local advisory committees, the pre-service teachers indicated the need for more education on other agricultural education program support systems (e.g., booster clubs, advisory councils, agricultural agencies, or school staff). These aspects are important due to the strong influence of local communities and stakeholders on the direction of the agricultural education program (Roberts et al., 2009; Taylor et al., 2017).

Repairing and maintaining laboratory equipment (Overall MWDS = 7.52) was also a high-rated training need in this needs assessment study, which coincided with findings of previous research (Saucier & McKim, 2011). Teacher educators should examine course content related to laboratory management (e.g., equipment operation, maintenance and repair) to ensure pre-service teachers receive a holistic learning experience. Furthermore, the relevancy and importance of these skills and areas of knowledge should be stressed to pre-service teachers accommodating the adult learners' desire to link the learning activities to the immediacy of application (Knowles, 1980).

The aforementioned needs related to program development and design are strongly tied to another reported area of high training need, which is the evaluation of the local program using the National Quality Program Standards (NQPS; MWDS = 6.66). According to the Council for Agricultural Education (2016), the NQPS serves as a guide for the delivery of high quality SBAE programs. The NQPS can serve as a resource for the Iowa State University pre-service teachers to enhance their understanding on aspects related to program design and management. This will assist in further familiarizing the pre-service teachers with the content and application of these standards. These standards can also be cross-walked with the Iowa teaching standards.

The areas of need related to program design and management might be areas of the SBAE program which the pre-service teachers had no exposure to at the secondary level. Ninety-three percent ($n = 66$) of the pre-service teachers reported previous involvement in secondary agricultural education. Unlike aspects of the agricultural education program (e.g., FFA), the items related to program design and management (e.g., advisory committees or NQPS standards) might be unfamiliar based on their previous roles as students.

Overall, the pre-service teachers expressed high levels of training needs regarding various aspects of SAE development and FFA advisement. The lowest leadership and SAE development training need area, conducting local FFA chapter activities, had a MWDS of 5.29—representing a high need for training. The top five items overall of the leadership and SAE development items were all regarding developing SAE opportunities for students.

The pre-service teachers indication of training needs associated with SAE development coincide with previous findings in agricultural education research (Wilson & Moore, 2007; Wolf, 2011). Teacher educators should make SAE development a strong area of focus in the required coursework, and use supplemental teaching tools (e.g., SAE For All [Council for Agricultural Education, 2017]) to enhance the pre-service teachers' understanding on the development and application all SAE types. Field experiences should be fine-tuned to address the pre-service

teachers' perceived areas of training need. A systematic process should be used to pair students with cooperating teachers who have extensive experience with SAE programs and program design / management. Aside from coursework and field experiences, teacher educators should explore other options (e.g., summer workshops or periodic seminars) to supplement the pre-service teachers' preparation.

The presence of these required courses and field experiences in the agricultural education teacher preparation program should not be construed as comprehensive education on these need areas. Furthermore, the high indication of training needs by the pre-service teacher presents a strong need to re-evaluate the current teacher preparation curriculum. These expressed needs should be cross-walked to the existing curriculum and teacher educators should determine ways in which all need areas can be further emphasized in the program.

Agricultural Education and Studies faculty members should continuously evaluate the pre-service teachers' training needs. This should take place by conducting periodic needs assessments of the pre-service teacher preparation program. Future needs assessments of the pre-service teachers should take a narrower look into other aspects of FFA and SAE. This will assist teacher educators in fine-tuning the agricultural education courses and field experiences.

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Iowa School-based Agricultural Education Teachers' Perceived Professional Development Needs Associated with Teaching, Classroom Management, and Technical Agriculture

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Introduction

Currently there is a huge teacher shortage and many school-based agricultural education (SBAE) teachers are leaving the profession within their first five years (Daniel, 2015; Milliard, 2015; Sutcher, Darling-Hammond, & Carver-Thomas, 2016; Tippens Ricketts, Morgan, Navarro, & Flanders, 2013). First year SBAE teachers are more likely to leave the profession due to a variety of challenges they face (Myers, Dyer & Washburn, 2005). These challenges are associated with: (1) classroom management, (2) advising FFA, (3) lesson planning, (4) curriculum development, (5) managing the amount of paperwork and finances, and (6) working with parents, teachers, and administrators (Myers et al., 2005). Mid-career SBAE teachers' biggest challenge was lack of time along with challenges such as course planning and self-motivation (Smalley & Smith, 2017). There are also several factors that contribute to teacher which include: (1) family issues, (2) school staffing actions, (3) personal issues, (4) pursing another job opportunity, and (5) dissatisfaction with the career (Ingersoll, 2003; Tippens et al., 2013). To start closing the gap in the teacher shortage, mitigation of teacher attrition is needed (Wilkin & Nwoke, 2011).

Based on previous literature, professional development and in-service training can serve as a resource to support teachers and lessen teacher attrition (Touchstone, 2015). Professional development needs vary based on the teacher's stage in their career and their experiences (Smalley & Smith, 2017; Sorensen, Lambert, & McKim, 2014). Beginning teachers' professional development may need to include mentoring programs (Touchstone, 2015) and the professional development should focus on classroom instruction, classroom management and motivating students (Sorensen et al., 2014). According to Sorensen et al. (2014), beginning teachers also need professional development in areas such as grant writing, using their advisory committee, being able to use AET system for record keeping, training Career Development Event (CDE) teams for competition, and being able to balance work and life. According to Smalley and Smith (2017), mid-career SBAE teachers desire a variety of outcomes from professional development events such as networking, being able to be reenergized, and understanding how to handle stress.

Conceptual Framework

The conceptual framework utilized in this study to guide the needs assessment was Knowles (1980) Theory of Andragogy. According to Knowles (1980), Andragogy is "the art and science of helping adults learn" (p. 43). The theory of andragogy is driven by: (1) the learner's need to know, (2) the image of oneself, (3) previous experiences, (4) eagerness to learn, (5) orientation to learn, and (6) how motivated the individual is to learn (Knowles, 1984; Knowles,

Holton, & Swanson, 2015). The more an adult learner feels they will personally gain from the learning situation, the more motivated they are to learn (Knowles et al., 2015).

Purpose and Objectives

The purpose of this study was to evaluate the professional development needs of Iowa SBAE teachers related to teaching, classroom management, and technical agriculture. The following three research objectives served as a guide for this needs assessment study:

1. Determine the background characteristics of Iowa SBAE teachers.
2. Assess Iowa SBAE teachers' professional development needs associated with teaching and classroom management.
3. Determine the technical agriculture professional development needs of Iowa SBAE teachers.

Methods

Population

A census was attempted on all SBAE teachers ($N = 263$) in Iowa. At the conclusion of data collection, 147 SBAE teachers responded on the survey instrument, yielding a response rate of 55.89%. The average Iowa SBAE teacher who participated in this study was female ($n = 79$, 54.5%), had an average age of 37.45 ($SD = 12.19$) and an average teaching experience of 13.32 ($SD = 11.79$) years. The SBAE teachers reported having an average of 94.33 ($SD = 59.12$) unduplicated students in their program. In regard to the teachers' highest level of education, 92 (62.59%) teachers reported earning a bachelor's degree and 55 (37.41%) earned a master's degree.

Instrumentation

Researchers utilized a modified Borich Needs Assessment Model to evaluate the needs of SBAE teachers. Researchers used the General Program Standards created by the Iowa Governor's Council on Agricultural Education to crosswalk with previous studies (Garton & Chung, 1997; Joerger, 2002).

Based on recommendations posited by Dillman, Smyth, and Christian (2009), the items on the online needs assessment instrument were divided into two categories. The teaching and classroom management category had 20 items and the technical agriculture category had 13 items. Each needs assessment item was paired with two Likert-type scales. One scale assessed the teachers' perceived importance associated with the different topics (1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important),* and the other scale evaluated their perceived knowledge on the topic (1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable)*.

Data Collection

       The contact information of the SBAE teachers was obtained using the publicly available state SBAE teacher website. The target population was sent a recruitment email asking for their participation in the study. Data was collected by using a Qualtrics online survey instrument. Researchers sent three follow up email reminders in five-day increments to non-respondents (Yun & Trumbo, 2000).

Data Analysis

       Descriptive statistics (e.g., background characteristics) were analyzed using IBM's Statistical Package for Social Sciences (SPSS©). The data related to the second and third objectives was analyzed by mean weighted discrepancy scores (MWDS). McKim & Saucier's (2011) Excel-Based Mean Weighted Discrepancy Score Calculator was used to calculate the MWDS for the needs assessment.

Mean Weighted Discrepancy Score Formula

$$MWDS = \frac{\text{(importance rating - knowledge rating) x importance rating}}{\text{number of observations}}$$

       To account for reliability, Cronbach's alpha coefficients for the importance ($\alpha = .97$) and knowledge ($\alpha = .97$) were calculated and met the tolerable threshold for reliability (Ary, Jacobs, & Sorensen, 2010).

Findings

       The first objective sought to determine the background characteristics of Iowa SBAE teachers regarding their professional development and in-service training. Teachers indicated their primary sources of professional development were agricultural teachers' association workshops ($n = 100$, 68.03%), school in-service events ($n = 99$, 67.35%), university workshops ($n = 45$, 30.61%), professional organization workshops ($n = 37$, 25.17%), and graduate coursework and ($n = 4$, 2.72%; see Table 1).

Table 1
Background Characteristics of Iowa SBAE Teachers Regarding Involvement in Previous Professional Development

Characteristic	f	%
Primary Source(s) of Professional Development ($n = 147$)		
Agricultural teachers association workshops	100	68.03
School in-service events	99	67.35
University workshops	45	30.61
Professional organization workshops	37	25.17
Graduate coursework	4	2.72
CASE Certifications ($n = 146$)		
Introduction to Agricultural, Food, and Natural Resources (AFNR)	95	65.07

Principles of Ag Science-Animal (ASA)	51	34.93
Principles of Ag Science-Plant (ASP)	49	33.56
Natural Resources and Ecology (NRE)	28	19.18

The teachers reported involvement with the Curriculum for Agricultural Science Education (CASE) to further their professional development. In fact, of the 146 SBAE teachers who responded to this item, only 38 (26.03%) teachers reported having no CASE certifications. Introduction to Agricultural, Food, and Natural Resources (AFNR; n = 95, 65.07%), Principles of Ag Science-Animal (ASA; n = 51, 34.93%), Principles of Ag Science-Plant (ASP; n = 49, 33.56%), and Natural Resources and Ecology (NRE; n = 28, 19.18%) were the CASE certifications attained by the greatest number of Iowa SBAE teachers.

Of the 20 teaching and classroom management items presented to the teachers, only *conducting parent/teacher conferences* (MWDS = -0.03), was considered to be an area with no need for professional development. *Motivating students to learn* (MWDS = 4.32), *teaching in land laboratory* (MWDS = 3.97), *proper implementation of IEPs for students with disabilities* (MWDS = 3.97), *teaching students decision-making skills* (MWDS = 3.96), and *developing performance-based assessment instruments* (MWDS = 3.96) were the teaching and classroom management items which the SBAE teachers expressed the highest perceived levels of professional development needs (see Table 2).

Table 2
In-service SBAE Teachers' Perceived Professional Development Needs Related to Teaching and Classroom Management, Using the Borich Needs Assessment Model

Item	n	MWDS
Motivating students to learn.	147	4.32
Teaching in land laboratory.	147	3.97
Proper implementation of IEPs for students with disabilities.	146	3.97
Teaching students decision-making skills.	147	3.96
Developing performance-based assessment instruments.	146	3.96
Conducting parent/teacher conferences.	146	-0.03

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. Knowledge Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

The Iowa SBAE teachers reported some level of professional development need for all 13 items included in the technical agriculture category (see Table 3). The items with the highest perceived training needs were *teaching knowledge and skills in biotechnology* (MWDS = 5.24), *integrating current advances in agriculture technology into the curriculum* (MWDS = 4.70), *teaching knowledge and skills in agribusiness* (MWDS = 4.01), *and teaching about public issues regarding agriculture* (MWDS = 4.00).

Table 3

In-service SBAE Teachers' Perceived Training Needs Related to Technical Agriculture, Using the Borich Needs Assessment Model

Item	*n*	MWDS
Teaching knowledge and skills in biotechnology.	145	5.24
Integrating current advances in agriculture technology into the curriculum.	145	4.70
Teaching knowledge and skills in agribusiness.	145	4.01
Teaching about public issues regarding agriculture.	145	4.00

Note. MWDS = Mean Weighted Discrepancy Score. Importance Scale: 1 = *Not Important*, 2 = *Slightly Important*, 3 = *Moderately Important*, 4 = *Important*, 5 = *Very Important*. Knowledge Scale: 1 = *I have no knowledge on this issue*, 2 = *Slightly Knowledgeable*, 3 = *Moderately Knowledgeable*, 4 = *Knowledgeable*, 5 = *Very Knowledgeable*.

Conversely, the technical agriculture items with the lowest reported levels of training needs were associated with *teaching knowledge and skills in horticulture* (MWDS = 2.62) and *animal sciences* (MWDS = 1.53).

Conclusions, Implications and Recommendations

This study evaluated the professional development needs of Iowa SBAE teachers related to teaching, classroom management, and technical agriculture. Educators have to engage with their school in-service professional development, but also engage elsewhere for professional development events in order to be a successful teacher. A large majority of participants in this study had been part of a CASE institute. It is evident CASE curriculum is sought highly by SBAE teachers as a professional development event.

In order for professional development to be engaging and successful, the professional development event needs to ensure the form of the event correct for the audience, the duration is not too long but not too short to allow for engagement, and there is room for participation (Birman, Desiomne, Porter, & Garet, 2000). Professional development events play into a teacher's experiences, which allow them to learn, and plays into Knowles (1980) Theory of Andragogy.

The SBAE teachers in this study indicated the need to better understand student motivation, which was congruent with findings reported by Duncan et al., (2006). Other areas which teachers expressed the need for professional development were associated with land laboratory use, IEPs, teaching decision making skills, and utilizing and developing performance-based assessments. Educators found value in association and workshop professional development however, educators need experience and additional professional development in the areas of agriculture technology and biotechnology. Duncan et al., (2006) found in-service educators struggled with integrating and utilizing the current agricultural technology advances into their classroom curriculum along with teaching biotechnology. Professional development should be focused on how to make biotechnology more practical in the high school classroom.

Future research should be conducted to find out what in-service teachers want in regard to professional development with advances in agriculture technology are specifically needed. In-

service teacher needs should also be researched regarding skills and needs when teaching biotechnology. Teacher educators can work with associations and conference planning groups to develop and provide specific professional development. Considerations should be given to the undergraduate teacher preparation program as to the needs of teaching during their preparation.

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#TeachAgChat: Creating a Digital Community of Practice for Agricultural Educators Using Twitter

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Introduction

In 2015, pre-service agricultural teacher candidates created #TeachAgChat as a way for agricultural educators to connect and engage with one another using Twitter. The primary goal of this project was to utilize Twitter to provide opportunities for inclusively connecting geographically disparate individuals and fostering productive, professional dialogue. Multitudes of other Twitter chats had been organized around different educational subject areas prior to 2015, but one did not exist for agricultural education. This presented an opportunity for student development and professional service, and thus #TeachAgChat was born.

The rationale for #TeachAgChat is rooted in the issue of agriculture teacher retention. The United States is currently facing a shortage of agriculture teachers (Foster, Lawver, & Smith, 2016), and efforts are underway to increase retention of those teachers already in the classroom (Smalley & Smith, 2017). One major threat to the retention of secondary school-based agricultural educators is a sense of isolation from others within their field, and the lack of access to a community of practice.

A community of practice (CoP) describes a group of people "who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger, McDermott, & Snyder, 2002). CoPs can be established in person, or through technology. Collaborative web technologies can help cultivate an online community of practice for professional development. Gunawardena, Hermans, Sanchez, Richmond, Bohley, and Tuttle (2009), found that online CoPs facilitated by online social networks, such as Twitter, can result in increased social interaction among users after participating in sharing of ideas, resources, and knowledge. They also noted that an online CoP can also facilitate the sharing of knowledge, and encourage reflection to consider new knowledge gained and how that knowledge was influenced by the online social network.

A 2010 study by Ebner, Lienhardt, Rohs, and Meyer found that Twitter had great potential to expand teaching and learning beyond the classroom through a digital community of practice and could connect those who were geographically separated. Twitter has seen a steady rise over the past seven years from having about 30 million active users in 2007, to having over 330 million active users at the end of 2017 (Statista). Previous research has shown the benefits of social media platforms in engaging educators through sharing ideas, which can be used in classrooms and to improve their professional practices (Gonzales, 2015; Wesley, 2013, Veletsiano, 2011). Risser (2013) found that teachers use Twitter to communicate with other professionals, to get updates on the latest news in education, and to share resources with each other. A 2017 study by Colwell and Hutchinson found that using a specific hashtag helped to group all tweets in the same location on Twitter, ensured that users could easily locate each other's tweets, and allowed

tweets to display with other similar disciplinary posts that educators or disciplinary experts might view.

Wenger (2007), also studied online CoPs and found that the use of an electronic CoP through Twitter can provide teachers with an opportunity to build relationships and learn from each other. Additional evidence has shown that communities of practice have been developed through Twitter in many different educational areas to connect peers that do not work near each other to increase informal learning in career fields (Dolan, 2013; Kim & Canvas (2013). Twitter has also shown to be beneficial with pre-service teachers as well. Paulsen, Anderson, and Tweeten (2015) explored the use of a Twitter-based community of practice with pre-service agriculture teachers and found it to be very helpful in connecting with other agricultural educators.

Conceptual/Theoretical Framework
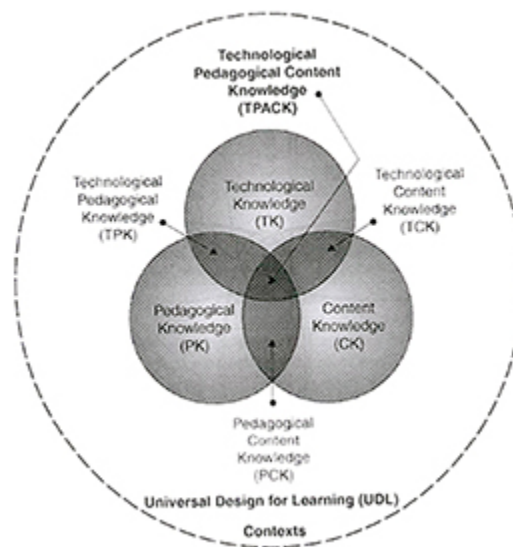
Figure 1: TPACK Model

The framework for the digital community of practice established by #TeachAgChat is supported by the technological, pedagogical and content knowledge (TPACK) model, see *Figure 1*, that was developed by Kohler (Kolher & Misra, 2009). The TPACK framework builds on Shulman's descriptions of PCK to describe how teachers' understanding of educational technologies and PCK interact with one another to produce effective teaching with technology (1987, 1986). The TPACK model involves complex interactions between content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK).

A 2015 study conducted by Liu, Tsai, and Huang adapted the TPACK model so that the technological content knowledge (TCK) refers to knowledge of how to use technology in order to develop innovative ways of teaching content, and the technological pedagogical knowledge (TPK) attempts to understand how teaching and learning can change when technologies are used in specific ways. The overall TPACK model can be applied to create a digital community of practice that incorporates and shares the knowledge required by teachers to integrate technology

in the classroom for specific content areas and to provide the foundation for effective teaching by using technology (Koehler & Mishra, 2009).

Purpose

The purpose of this study is to examine the different types of engagement that occurred on Twitter during #TeachAgChat sessions over a two year period of time, and which states #TeachAgChat participants resided in. The research questions that guide this study are:

1. What types of participation occurred on Twitter during #TeachAgChat sessions?

2. Which states had the greatest amount of participation in #TeachAgChat sessions?

Methodology

#TeachAgChat sessions are held twice a month during the fall and spring semesters. The sessions are facilitated by teacher candidates and other groups involved in agricultural education from all over the United States. The chats are held on a specific weekday and a specific time. Each #TeachAgChat sessions has a predetermined theme to guide discussion and interaction among participants. The group hosting each #TeachAgChat session writes the questions in advance, and the questions are then peer reviewed for clarity and relevancy to the topic. The questions are then posted at five to ten minute intervals on Twitter during the hour-long #TeachAgChat session. Participants in each session are asked to respond to the questions and use the hashtag #TeachAgChat in their response.

Current and historical data from distinct #TeachAgChat sessions facilitated by teacher candidates and other groups was gathered using the advanced social media monitoring software Keyhole. Keyhole is a real-time hashtag tracker for Twitter, Instagram and Facebook. The data for each #TeachAgChat session was organized into data sets by semester. Within each data set, there were individual chat participation statistics grouped by week, month, and the series as a whole. Analysis of the tweets, including users, location, overall number of tweets, level and type of participation was conducted for each data set. This analysis helped to group the data within each set by date, number of posts, number of users, user location, reach, and impressions.

Findings

Data was collected on the first five semesters in which #TeachAgChat was conducted. The data was sorted by number of posts, number of users, reach, and impressions. The number of posts represents the number of individual tweets posted with the hashtag #TeachAgChat. The number of users corresponds to how many people posted a Tweet with the hashtag #TeachAgChat in it. The reach represents the number of unique users who saw a tweet with the hashtag #TeachAgChat. The impressions correlate to the number of times that users saw a post with the hashtag #TeachAgChat. See Table 1.

Table 1

#TeachAgChat Engagement Organized by Semester and Type of Participation

Semester	No. of Posts	No. of Users	Reach	Impressions
Fall 2015	2,234	132	176,616	2,374,515
Spring 2016	2,996	255	1,610,410	5,177,559
Fall 2016	3,272	225	327,268	3,950,473
Spring 2017	2,234	243	379,576	4,973,373
Fall 2017	1,846	159	106,770	1,326,008
Total	12,591	1,014	2,600,640	17,801,928

Data was collected on the locations of participants for the five semesters in which #TeachAgChat was conducted. The data was sorted by total number of participating states, as well as the top five states with the most participants. The states were identified by their two letter abbreviations. See Table 2.

Table 2

#TeachAgChat Engagement Organized by Semester and Type of Participation

Semester	No. of States	1	2	3	4	5
Fall 2015	21	PA	TN	GA	NJ	NE
Spring 2016	32	PA	KY	TN	IA	ID
Fall 2016	27	PA	KY	NJ	TN	OH
Spring 2017	30	PA	TN	NJ	IA	KY

Conclusions

The usage of the #TeachAgChat community of practice is designed to correlate with the collegiate fall and spring semesters. The data shows a peak in usage during the spring 2016 series in terms of the numbers of users, reach, and impressions. Participation between the spring 2016 through spring 2017 series tended to indicate that a flat line occurred. With the decrease in reach and impressions in subsequent semesters, there is a possibility that as this community of practice has been used, more and more users have begun following each other which in turn would stabilize the total usage of the chat as well. This supports the findings of Gunawardena et al. (2009) that online CoPs are facilitated by online social networks, such as Twitter, and result in increased social interaction among users after participating in sharing of ideas, resources, and knowledge.

The usage of the #TeachAgChat community of practice has also helped to connect agriculture teachers from all over the United States. The data shows that the majority of #TeachAgChat series include participants from at least half of the states in the United States. It should be noted that Pennsylvania has the highest number of participants during each series due to a mandatory participation requirement as part pre-service agriculture teacher programming. The top five states

for each series This supports the work of Ebner et al. (2010) that Twitter can be used to establish a digital community of practice to connect those who were geographically separated and of Paulsen et al. (2015) that found that a Twitter-based community of practice can be very helpful in connecting agricultural educators.

Discussion

Since #TeachAgChat was introduced in the fall of 2015, the series has been curated and hosted by a wide ranging of entities from all over the United States including different universities, professional organizations, and teacher groups. #TeachAgChat has continued beyond the initial single classroom assignment with different stakeholder groups hosting regular bi-weekly chats throughout both the fall and spring semester. While over half of the states in the United States have been represented by #TeachAgChat participants, questions remain on how to engage agricultural educators from states that have traditionally not participated. In addition, the same states consistently have the most #TeachAgChat participants, and with the exception of Pennsylvania, little information if available on what causes agricultural educators from these states to consistently participate more than those from other states. Further research is needed to determine the causation of why this is occurring.

The most recent #TeachAgChat series has shown decreased overall participation compared to other series which raises the question of why a decrease in users and overall participation is occurring. With the decrease in reaches and impressions there is a possibility that as this community of practice has been used, more and more users have begun following each other, which in turn would stabilize the total usage of the chat as well. While Wenger's 2007 study of online CoPs that found that the use of an electronic CoP through Twitter can provide teachers with an opportunity to build relationships and learn from each other, further research is needed to see whether or not this still holds true.

In addition, the fluctuation in overall usage of #TeachAgChat also indicates that continued research needs to be done to determine if the decrease of participation of the Twitter community of practice is a trend or if it is an outlier. With the hashtag being used most often when a #TeachAgChat is occurring, the time, day, and frequency of #TeachAgChat should be explored. Future research questions include: could a different day of the week or a different time help?

The decrease in total amount of people reached also seems to indicate that as more and more people participate, they are also following each other, which could be resulting in the decrease of reach and impressions of the Twitter chats. This supports future research into what types of communication on Twitter occurs as participants talk with each other outside of the #TeachAgChat community of practice.

Future conversations on utilizing the #TeachAgChat experience to cultivate digital leadership and grow digital citizenship, as well as how it can be used to enhance and expand professional learning networks is anticipated. It is hoped that through interacting on Twitter, improvements could be made in the communication in the career field of agricultural education through the United States and that #TeachAgChat can continue to help connect those in the agricultural education field who are geographically separated from others.

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Let's Review: Types Of Feedback Given In An Agricultural Writing Intensive Course

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Introduction/Conceptual Framework

Employers and the media call for college graduates to be effective communicators (Fischer, Meyers, & Dobelbower, 2017; White, 2015), yet 85% of students across disciplines are at a basic writing level (Cho & Schunn, 2007). Written text serves as the end-product in many organizations (Brandt, 2005) and students' ability to produce quality written work is related to success in the workforce (Leggette, 2015) which presents an impetus for students to become competent writers. Geiser and Studley (2001) posit students' competence in writing serves as the greatest predictor of success during their first year of undergraduate course work.

Universities are adopting writing intensive courses to increase student-writing skills. Although institutions may differ in requirements, writing intensive courses commonly comprise a small student-teacher ratio, involve a required amount of writing, focus on revision, and apply writing techniques (Grauerholz, 1999). At Oregon State University required writing intensive courses are discipline-specific to prepare student writers for future careers within their field ("WIC Learning Outcomes," 2011). A common technique utilized in writing intensive courses is feedback through peer reviews.

Researchers identify revision and rewriting from feedback as critical to improve writing (Schriver, 1990; in Cho & Shunn, 2007). However, the time required to provide quality feedback on student writing is challenging for instructors (Kellogg & Raulerson, 2007). A solution is the inclusion of peer reviews, "…an instructional method which requires learners to specify the quality of a product … or to evaluate the performance of other similar-status learners," (Cheng, Liang, & Tsai, 2015, p. 78). Peer reviews alleviate the burden of exclusive provision of feedback from instructors, while also providing additional advantages. Including peer review provides writing practice, cultivates content knowledge, builds community, and alleviates instructors' feedback load (Cho & Schunn, 2007; Ertmer et al., 2007). However, peer reviews also present challenges for students including anxiety, reliability, little critical thinking, and the possibility for inaccurate feedback (Cho & Schunn, 2007; Ertmer et al., 2007). Without feedback, though, students surrender opportunities to improve their writing (Cho & Schunn, 2007).

There is evidence the advantages of utilizing peer review in a writing intensive course eclipse the potential challenges, although previous research indicates the quality of feedback provided by students in peer reviews varies (Cheng, Liang, & Tsai, 2015). Students may be unfamiliar with how to compose helpful reviews and receive no training on how to do so (Cho & Schunn, 2007). Instructors in writing intensive courses utilizing peer reviews should support students in contributing exemplary feedback and continually analyze their courses for effective feedback among their students.

This study sought to understand current types of feedback during the peer review process to inform instructional practices using learning activities as the conceptual framework. Vermunt (1996) defines learning activities as "…ways in which students learn," (p. 25). Three types of learning activities are affective, cognitive, and metacognitive (Vermunt, 1996). Affective learning activities focus on feelings (positive or negative) present during learning, cognitive activities revolve around processing knowledge, and metacognitive learning coordinates the

affective and cognitive activities which result in new ideas (Vermunt, 1996). Prior studies of peer reviews have utilized qualitative methods to identify types of feedback, including research by Cheng et al. (2015) which utilized the three types of learning activities (affective, cognitive, and metacognitive).

Research Questions

The purpose of this study was to describe the types of feedback used by students in an agricultural writing intensive course. This purpose aligns with AAAE research priority three: "Sufficient scientific and professional workforce that addresses the challenges of the 21st century," specifically addressing question three: "What competencies are needed for an agriculture and natural resource workforce?" (Roberts, Harder, and Brashears, 2016). The following research questions guided the study:

- To what extent are Agricultural Science students at Oregon State University using affective, cognitive, and metacognitive feedback?
- How does the frequency of affective, cognitive, and metacognitive peer review feedback change over an academic term in a writing intensive course?

Methods

This study utilized a content analysis to describe the types of feedback from students during peer review. According to Leedy and Ormond (2016), "A content analysis is a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes, or biases," (p. 257). The population for the study included all 13 students enrolled in an on-campus agricultural writing intensive course. The class uses an iterative feedback process over ten weeks to develop a final writing product. Students provide peer reviews during each of the ten weeks of the course. Researchers utilized feedback from the full rough draft peer review conducted during the first week of the term and the second full draft peer review conducted during the tenth week of the term for this study.

A content analysis decomposed feedback from peer reviews into individual statements for initial analysis. Using the coding scheme from Cheng et al. (2015), individual statements were coded as "affective" (supporting or opposing), "cognitive" (direct correction, personal opinion, or guidance), "metacognitive" (evaluating or reflection), or "irrelevant" (extraneous to the three feedback domains). Both researchers coded 351 statements to validate the coding scheme, and a 6% difference was reconciled. Analysis of compiled coding used descriptive statistics to identify the differences in frequencies between the rounds of peer review. Due to the categorical nature of the data relative to the objectives, no further statistical analyses were appropriate.

Findings

Of the 351 feedback messages, 143 were associated with the first draft and 208 with the second draft. One student did not complete a review of the second draft. Table 1 shows initial and final feedback by category and subcategory. "Supporting" feedback (affective) was present most frequently in both the first and second round of peer review ($n = 44$, 31%; $n = 84$, 40%). "Personal opinion" (cognitive) was the second most frequent for both rounds ($n = 33$, 23%; $n = 55$, 26%). The lowest feedback type given in both rounds was "negative" (affective) ($n = 2$, 1.4%; $n = 2$, 1%).

Table 1
Initial and final feedback by category and sub-category

	Initial Feedback		Final Feedback	

	(*n* = 143)		(*n* = 208)	
	n	Percent (%)	*n*	Percent (%)
Affective	46	33	86	41
Supporting	44	32	84	40
Negative	2	1	2	1
Cognitive	43	30	82	39
Direct Correction	0	0	12	7
Personal Opinion	33	23	55	26
Guidance	10	7	13	6
Metacognitive	22	15	26	13
Evaluating	12	8	12	6
Reflecting	10	5	14	7
Irrelevant	32	22	14	7

Affective feedback (supporting and negative feedback) was most commonly present in both rounds of peer review. Cognitive feedback messages (direct correction, personal opinion, and guidance) were found the next most frequently. "Metacognitive" feedback accounts for approximately 14% of the feedback given. The only feedback type that substantially decreased between rounds of peer review was "irrelevant" feedback (decreased 15%).

Conclusions

This study sought to describe the types of feedback (affective, cognitive, and metacognitive) used by seniors in a Writing Intensive Course within an undergraduate Agricultural Sciences degree. In addition, this study quantified a change in peer-review feedback over the course of an academic term. Students used each type of feedback throughout the duration of the course, but relied heavily on affective and cognitive feedback (63% and 80% of combined feedback between both categories in initial and final feedback, respectively). Increases in both of these categories of feedback may be a result of the increased amount of feedback rather than a substantial change in directing messages to peers over the course of the term.

Students offered limited negative and direct correction feedback to their peers. While students may see the value in this type of feedback for their own writing, they seem hesitant to provide constructive feedback to others. Cho and Shunn (2007) identify peer review as a means to improve writing, allow additional writing practice, and as an aid toward developing content knowledge. However, little writing improvement can occur if students are not constructively critical of their peers' work. In addition, current anecdotal evidence suggests underdeveloped peer review equates to a waste of time as students focus solely on instructor review toward making revisions. Cheng, Liang, and Tsai (2015) conclude feedback in the cognitive domain is most effective toward the revision process. To that end, supplementary efforts are necessary to integrate supports within the curriculum to encourage cognitive feedback at critical stages of the writing process.

This study serves as the first evaluation of feedback in communication coursework within a writing intensive course in this department. Further efforts are necessary to provide direction and rigorous evaluation in the writing intensive course. These efforts should work to develop strong peer reviewers. Given the emphasis on revision in the course evaluated, additional work is necessary to ensure revisions based on peer feedback can be effective. This aligns with an industry call for effective communicators (Fischer, Meyers, & Dobelbower, 2017; White, 2015).

Continued research is necessary to examine instructional strategies in place and to provide a more thorough evaluation of the peer feedback structures in place. Furthermore, efforts should focus on peer feedback in different course settings (distance courses compared to on-campus). Finally, additional studies may seek to clarify the role peer feedback plays in the revision process toward developing writing ability based on feedback. Efforts to understand the benefits of quality peer feedback as a critical component of the revision process should facilitate effective practice in writing courses within agriculture and agricultural education across the country.

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Agriculture, Food, and Natural Resources Education: Inspecting the Pipeline

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Introduction

Maintaining a professional workforce supply requires educational pipelines train an adequate number of competent and motivated individuals. Educational pipelines include, among others, secondary career and technical education programs, postsecondary degree programs, and trade schools. Postsecondary agriculture, food, and natural resources (AFNR) education programs, have the added responsibility of training individuals who, themselves, will directly support educational pipelines. However, a persistent, nationwide shortage of qualified AFNR educators exists (Smith, Lawver, & Foster, 2018). Retention of students within postsecondary AFNR education programs is essential to addressing this problem. Identifying program factors leading to student retention would empower program faculty to adjust efforts and better meet the needs of students. Therefore, the aim of the current study is to evaluate important constructs related to student retention within postsecondary AFNR education programs.

Theoretical Framework

In 2005, Terenzini and Reason proposed a "comprehensive model of influences on student learning and persistence" (p. 22). Since its inception, this model has been used to explore postsecondary student success with an emphasis on student retention (Smith & Garton, 2008; Smith, Garton, Killingsworth, Maxwell, & Ball, 2010). Terenzini and Reason proposed precollege experiences influence the college experience, and together the experiences influence learning, development, change, and persistence. In the current study, this model was operationalized to explore the college experiences of students in AFNR education and their relationship to major commitment. In coordination with the theory, college experiences were broken into two categories, (a) learning community, a construct measuring how the major met the learning needs of students and (b) social community, a construct measuring how students felt connected to peers and faculty within the major.

Literature Review

In postsecondary instructional settings, a sense of community is a key factor influencing student achievement, satisfaction, academic performance, attitudes, and persistence (Hofman, Hofman, & Guldemond, 2001; Rovai, 2002; Vavala, Namuth-Covert, Haines, Lee, King, & Speth, 2010). In contrast, students who lack a feeling of community are more likely to drop out and experience feelings of isolation and burnout (Liu, Magjuka, Bonk, & Lee, 2007; Tinto, 1987). Research has generally concluded there are two connected concepts of community, learning and social (Reich, 2010; Tartaglia, 2006).

Rovai (2002) suggested a *learning community* consists of four basic elements: (a) spirit, (b) trust, (c) interaction, and (d) learning. A strong sense of learning community has many benefits, including increased retention and academic success as well as decreased negative student behaviors (Barber, Eccles, & Stone, 2001; Henry, Stanley, Edwards, Harkabus, & Chapin, 2009). It is likely AFNR education students who feel a part of the learning community will have greater persistence, more connectedness, and be more academically successful than students who do not feel similar levels of learning community. Overlapping the concept of learning community is *social community* (Reich, 2010). The notion of social relationships being an important component of sense of community is rooted in Maslow's (1943) hierarchy of needs, in which social needs are labeled as essential for human development, preceded only by safety and physiological needs. Maslow described social needs as relationships with people for a place in the group; in other words, a sense of belonging.

While literature has suggested more research examining the postsecondary student community (Cuba & Hummon, 1993), little to no research exists examining the sense of community among AFNR education students and the relationship to major commitment. Therefore, to address the AFNR teacher shortage (Smith et al., 2018) and maintain the educational pipeline that trains individuals for the professional workforce, it is critical to examine the relationship between perceptions of community and major commitment.

Purpose and Objectives

The current research evaluated the postsecondary element of the AFNR education pipeline. Inspecting the pipeline was accomplished by evaluating three important constructs within student retention; namely, social community, learning community, and major commitment. Understanding these variables is expected to illuminate areas for growth within postsecondary AFNR education programs. The purpose was accomplished via two research objectives, (a) compare social community, learning community, general self-efficacy, and major commitment by year in school and (b) explore the relationship between year in school, social community, learning community, and major commitment.

Methods

Survey methodology and correlational research design (Privitera, 2017) best addressed the established objectives for this exploratory research.

Population and Sample

The population for the current analysis included all students studying AFNR education at the postsecondary level during the 2017-2018 school year. A purposefully selected group of seven postsecondary institutions were recruited to participate. Importantly, due to the purposive sampling procedures, data are not to be generalized beyond respondents.

Instrumentation

Data were collected via an online survey instrument, called the Teacher Education Program Retention Assessment (TEPRA). The TEPRA includes four sections used in the current analysis, (a) a ten-item social community construct, (b) a ten-item learning community construct, (c) an eight-item major commitment construct, and (d) seven demographic questions. The constructs measuring social and learning community were adapted from the Classroom Community Scale (Rovai, 2002) and the major commitment construct was adapted from the professional commitment scale (Blau, 1985). All constructs were measured from 0 (*strongly disagree*) to 10 (*strongly agree*) with an anchor point of five (*neutral*). To complete the research objectives, the only demographic question utilized was year in school to control for anticipated differences in major commitment by year in school.

The TEPRA was pilot tested during the 2016-2017 school year among 32 students studying AFNR education at Michigan State University and Utah State University. Results indicated a reliable instrument, with social community (Cronbach's Alpha = 0.93), learning community (Cronbach's Alpha = 0.90), and major commitment (Cronbach's Alpha = 0.78) meeting the expectations for reliability (Fraenkel & Wallen, 2000; Nunnally & Bernstein, 1994). Face and content validity were evaluated by a panel of experts that included six faculty in AFNR education.

Data Collection, Analysis, and Reporting

The seven programs distributed surveys to 332 potential respondents, with 170 (n = 170) providing useable responses for a 51.20% response rate. Data were collected from January to April of 2018. Each institution utilized multiple points of email and in-person contact to elicit responses. Due to differences in data collection methods by institution, a check for non-response bias was not feasible (Lindner, Murphy, & Briers, 2001). Research objective one was completed via an ANOVA with effect sizes set at "small effect," $\eta = .100$; "medium effect," $\eta = .243$; and "large effect," $\eta = .371$ (Cohen, 1988). Objective two was completed using multiple linear regression. Prior to completion of objective two, data were checked to evaluate the assumptions of multiple linear regression (e.g., linearity, multivariate normality, absence of multicollinearity, homoscedasticity), in which no violations of assumptions were found.

Findings

In research objective one, social community, learning community, and major commitment were compared by year in school (see Table 1). Analysis of differences in major commitment yielded statistically significant results (F-value = 4.03; p-value = .004), suggesting year in school had a medium effect (Cohen, 1988) on major commitment ($\eta = .31$). Within major commitment, statistically significant differences were found between freshmen ($M = 8.63$) and juniors ($M = 7.53$), freshmen and seniors (i.e., 7.09), and sophomores ($M = 8.23$) and seniors.

Table 1

Social Community, Learning Community, and Major Commitment by Year

Variable	Year in School				*F*-Value	*p*-value	Eta (η) effect size
	Freshmen	Sophomore	Junior	Senior			
Social Community	7.92	7.52	7.71	7.65	0.20	.940	.07
Learning Community	8.05	7.92	7.33	7.59	1.15	.336	.17
Major Commitment	8.63[a]	8.23[ab]	7.53[bc]	7.09[c]	4.03	.004	.31

Note. Items scaled from 0 "Strongly Disagree" to 10 "Strongly Agree." Graduate students not included in comparison to maintain institutional anonymity. Post-hoc mean comparisons analyzed via Least Significant Difference (LSD) test with differences in superscripted letters representing significant differences between groups.

In research objective two, the relationship between year in school, social community, learning community, and major commitment was explored (see Table 2). Results indicated the model was statistically significant (*F*-value = 18.79; *p*-value = <.001). In total, the three independent variables predicted 27% of the variance in major commitment (R = .52; R^2 = .27). Within the model, two independent variables were statistically significant predictors of major commitment, year in school (β = -.24; *p*-value = .001), a negative predictor of major commitment and learning community (β = .38; *p*-value = <.001), a positive predictor of major commitment.

Table 2

Model of Major Commitment

Predictors	Dependent Variable: Major Commitment					
	Zero-order correlation (*r*)	*p*-value	*B*	*SEB*	β	*p*-value
Year in School	-.28	<.001	-.37	.11	-.24	.001
Social Community	.30	<.001	.11	.08	.11	.161
Learning Community	.46	<.001	.41	.08	.38	<.001

Note. R = .52, R^2 = .27, *F*-value = 18.79, *p*-value = <.001. Items scaled from 0 "Strongly Disagree" to 10 "Strongly Agree."

Conclusions and Discussion

There are three limitations to the current research important to discuss before the findings. First, purposive sampling was used, limiting generalizability beyond study participants. Second, non-response bias was not evaluated due to variability within data collection methods between participating institutions. Third, perceptions-based data were collected and are vulnerable to error, such as social desirability bias. Acknowledging limitations, the current analysis provides an exploratory look at important constructs within postsecondary AFNR education.

Findings from research objective one reveal freshmen perceived elements of community higher than their peers. The upside of this finding is it appears participating AFNR education programs are attending to the social and learning community needs of students early in their programs, while the downside is perceptions of community weaken as students continue into their program. Relatedly, major commitment was highest among freshmen students and declined among sophomore, junior, and senior students. As with career commitment (Ingersoll, 2001; Kirby & Grissmer, 1993), novices tend to report the highest level of commitment as they have just made the decision to commit. However, unlike career commitment, major commitment does not appear to increase toward the end of the experience, which is alarming, assuming a correlation between major commitment and career intentions, as seniors are nearing career decisions. A few variables may have influenced the lower major commitment perceived among seniors, however, such as timing of data collection (i.e., early in their student teaching when students typically struggle with new obligations, challenges, and pressures) and differing coursework (e.g., technical AFNR [freshmen and sophomore] vs. pedagogy [junior and senior]). Results in objective two indicate learning community was a significant contributor to major commitment, supporting the theoretical framework (Terenzini & Reason, 2005) and reinforcing the importance of establishing a positive learning culture throughout the postsecondary experience as a means of strengthening the AFNR education pipeline.

Recommendations

Research objective one identified two interrelated areas of future inquiry to understand better the postsecondary element of the AFNR education pipeline. First, research is needed exploring the evolution of community *needs* as students move through AFNR education programs and, second, research is needed exploring the impact of student teaching on major commitment. In research objective two, the importance of learning community to major commitment was identified. Follow-up research among a randomly selected sample of all postsecondary students in AFNR education, and research among a larger sample of institutions, are recommended to compare the findings to the population of interest as well as explore the relationships between programmatic elements, learning community, social community, and major commitment.

From a practical standpoint, building learning community within AFNR education programs appears to be critical to major commitment and, potentially, other essential outcomes. Potential ways of increasing learning community include offering opportunities for AFNR education students to enjoy spending time together as a community of learners; offering trust-building experiences among students; providing sustained opportunities for interaction between smaller groups of students; and providing opportunities for students to collaboratively make decisions, plan, and set goals (Conrad, 2002; Rovai, 2002).

The teacher shortage within AFNR education can only be addressed through a combination of intentional effort and acquisition of pragmatic knowledge. The current study sought to contribute knowledge of the AFNR education pipeline by exploring learning community, social community, and major commitment among postsecondary AFNR education students. Continued effort, within research and practice, is needed to reinforce and improve the complete AFNR education pipeline.

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Analysis of Online Educational Resource Preferences of [STATE] Agricultural and Science Educators

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Abstract

Understanding teacher adoption and integration of curriculum can help producers, disseminate resources to better serve teachers' needs. Educators face challenges in selecting, adapting, and delivering curricular content. Teachers utilize social media platforms to share and locate resources but express a need to have better organization and classification of resources. Teaching preservice teachers to better utilize curricular resources could save time and improve pedagogy. Further research into the utilization of curriculum by current and preservice teachers is needed.

Introduction

Curriculum planning is perhaps the most important task a teacher must perform before instruction (Maull, Saldivar, & Sumner, 2010). Educators looking for resources have an array of choices from online sources. However, specific content may be difficult to find, requiring teachers to create original materials with limited prior content experience. The Next Generation Science Standards, which many dual-certified agriculture and science courses are required to meet, leave teachers with challenges locating curriculum. Understanding how and where teachers look for curriculum is a vital step to improving instruction.

Curriculum is a core component of teaching and learning contexts (Fishman et al., 2013). In the first years of teaching, teachers decide where to find curriculum resources. Technology changed the way teachers interact with curricular resources (Avery, 2013). Teachers in rural settings utilize technology to teach a wide variety of classes, some which they have limited experiences or comfort in teaching, causing teachers to go online for resources to deliver effective instruction to their students.

Kerr (1981) reported that curriculum models do not match actual utilization. Kerr concluded that teachers frequently first think of activities and other elements of teaching before considering objectives. Ball and Cohen (1996) suggested that selecting and adapting curriculum to individual students creates gaps between what curriculum developers intend and what is actually taught in the classroom. Further, Taylor et al. (2015) suggested that teachers' selective use of curricular materials led to fragmented understanding and duplication of materials in courses. Schneider and Krajcik (2002) found prior content and pedagogical differences impacted both the degree of utilization and types of resources teachers utilized with some teachers focusing instruction on teaching to the assessments contained in the curriculum, and some teachers not seeing the larger picture or direction of the curriculum.

Conceptual Framework

The conceptual framework for this study was adapted from the work of Charalambous and Hill (2012) in mathematics and Newcomb, McCracken, Warmbrod, and Whittington's (2004) factors influencing decisions about instruction. Charalambous and Hill posited that effective teaching is a combination of curriculum and teacher knowledge, which we generalized to Curricular Knowledge for Teaching (CKT), which encompasses the knowledge needed to teach content including understanding the available curricular resources. Newcomb et al. suggest that in addition to teacher knowledge and skill, standards, organization, and knowledge of the clientele to be taught also play a factor in curriculum utilization. This combined framework suggests curricular decisions are a combination of both prior content knowledge and prior content specific pedagogical knowledge of the teacher with additional influence coming from the community and educational standards.

Purpose and Objective

The purpose of this study was to explore agriculture and science teachers' perceptions of online curricular resources. The specific research objectives were to:

1. Determine agriculture and science educators' perceptions and usage of online curriculum resources including web-based curriculum resources.
2. Determine methods science and agricultural educators utilize to locate and evaluate web-based curricular resources.

Methods:

This study utilized survey methodology. All the science (all disciplines 7-12) and agriculture teachers ($N = 391$) with publicly available email addresses in [STATE] were contacted to participate in an electronic survey designed to collect data related to online curriculum preferences. Science and Agriculture teachers were both included due to their related content, similar issues in regard to distance from other teachers teaching the same discipline, and the fact that agriculture teachers in the region commonly teach science courses and several science teachers are teaching agriculture courses for CTE credit.

A questionnaire was developed specifically for use in this study. Teacher educators in the fields of agriculture, chemistry, physics, and biology evaluated the instrument for face and content validity. The first section included demographic variables which included years of teaching, courses taught, school and community size, dual credit (science and agriculture) for courses, biological sex, and grade levels taught. Due to the limited information available about the population, the majority of the second section included open ended questions concerning where they looked for curricular resources, how they evaluated them, and the use of social media to locate curriculum. The third section included 11-items which teachers were asked to rate as to their importance when selecting curriculum, and impact on selection of specific topics in their courses. Listed items were operationalized from the factors influencing decisions about instruction described by Newcomb et al. (2004). Statements included comfort with the topic, experience with the topics, relevance to community and students, ties to state and national standards, and comprehensiveness of the resources including lesson plans, presentations, and lab activities.

Responses (*n* = 107) were collected for three weeks with weekly reminder emails. Removal of incomplete responses left 85 usable responses for a response rate of 21.7%. Early (*n* = 36) and late (*n* = 49) responses were compared and no significant (*p* = 0.21, *d* = -0.28) differences were found for the demographic variable "years of teaching" (Lindner, Murphy, & Briers, 2001).

Results

Survey respondents were predominantly female (59.15%, *n* = 42), from rural communities (61.19%, *n* = 41), and 60.27% (*n* = 44) reported teaching at a school of more than 301 students. Respondents reported teaching an average of 16.38 years, *SD* = 11.10.

Over 58% of teachers reported using social media for educational purposes (see Table 1). Using social media for educational purposes one to three times a month was the most common with no teacher reporting using social media daily for educational purposes.

Table 1
Respondents Educationally-based Social Media (n = 85)

Frequency	*n*	Percent
Never	35	41.2
Less than once a month	15	17.6
2-3 times a month	15	17.6
Once a week	8	9.4
Multiple times a week	12	14.1

Respondents reported using a variety of social media applications for educational use with Facebook communities the most common (see Table 2). Other applications reported included Google, Pinterest, and Edmodo.

Table 2
Respondents Educationally-based Social Media Usage (n = 85)

Application	*n*	Percent
Facebook	36	42.4
Online Professional Learning Communities	29	34.1
Twitter	14	16.5
Snapchat	14	16.5
Blogs	13	15.3
Instagram	9	10.6

Note: Numbers are not exclusive or cumulative

The key components teachers reported looking for included ease of use, adaptability, ability to interest or engage students, and degree related to their current content. Other factors included

completeness, relevance to standards, current local facts and connections, inclusion of labs or activities, and visuals.

Factors teachers consider when evaluating credibility included reliable sites with multiple teachers reporting looking for curriculum on sites with .edu, .gov, or .org before resorting to .com sites. Teachers reported frequently checking author affiliations and credentials, sponsoring organizations, inclusion of facts with activities, and the citation of references. Teachers frequently mentioned avoiding sites whose information didn't align with the majority of other sites they checked or those that appeared to have slants or agendas.

Teachers were asked to rate the importance of selected factors on both their curriculum selection (see Table 3) and specific content in the curriculum (see Table 4). Additionally, teachers were asked the five locations they visited most frequently in selecting new curriculum content for their courses. The most frequent response was Google, and second among agriculture teachers NAAE's Communities of Practice. Other locations included other teachers (both free and pay sites like Teachers Pay Teachers), professional organization websites, publisher websites, government websites (NASA and USDA), university websites, Extension, PBS, Ted Talks, journal articles, and YouTube. Traditional print sources were also mentioned with books, magazines, and conference handouts being the most popular.

Table 3
Importance of Selected Criteria in Curriculum Choices

Statement	n	Mean	SD	No Importance 1–2	3–4	5–6	Great Deal of Importance 7–8	9–10
Relevance to your students	82	8.72	1.72	2	0	5	23	52
Relevance to your community	82	8.01	1.73	2	2	4	37	37
Resource Comprehensiveness	83	7.75	2.11	3	4	7	34	35
Degree of content comfort	83	7.41	1.93	3	2	15	35	28
Tied to state standards	80	7.09	2.52	5	8	13	25	29
Prior personal content experience	83	6.86	2.30	5	6	16	36	20
Tied to national standards	82	5.83	2.70	12	15	12	31	12

Table 4
Factors Impacting the Selection of Content in Respondents' Curriculum

Statement	n	Mean	SD	No Impact 1–2	3–4	5–6	Great Deal of Impact 7–8	9–10
Topic prior experience	82	7.16	2.01	4	4	17	34	23
Topic Comfort	82	7.09	2.05	2	4	24	29	23
Listed in standards	82	6.79	2.38	4	9	19	27	23

Conclusions

While teachers use many sources for creating curriculum, Googling a topic was the most common way teachers reported finding curriculum. This suggests that for teachers to impact learning most effectively, they will need CKT to be able to quickly assess the quality of the resources they locate and high-quality sources of information that are credible. Teachers reported that prior experience and comfort were important in selecting curriculum, but not as important as standards. Both experience and standards were not considered as important as relations of resources to the students and communities in which the teachers were located. When asked about the specific topics they included, personal experiences and knowledge of the subjects rated higher than relation to standards. Coupled with teachers reporting that adaptability was one of the primary qualities they looked for in resources, this finding is in alignment with the work of Schneider and Krajcik (2002) who posited that prior content and pedagogical knowledge played a prominent role in the way teachers utilized and adapted curricular resources. This also aligns with Newcomb et al.'s factors but suggests that not all factors have equal influence on teachers' curriculum decisions.

Use of social media to distribute curriculum resources has potential. Teachers (42.4%) reported using Facebook, more than they reported using professional learning communities. More detailed assessments of social media platforms to determine where overlaps occur and what unmet needs exist could benefit teachers. Research into methods for better utilization of both platforms, metadata and other tagging processes, and improved searchability is needed.

Teachers reported that they look for different things in a curriculum as compared to the individual lesson content they included. Standards played a larger role in their curriculum selection, while prior experiences played the largest role in the individual lesson content. In addition, teachers reported that they needed fast access to adaptable, engaging activities related to the content they currently teach. Teachers are searching more for targeted enhancement activities than a complete curriculum. Curricular resources need distributed through credible sites that include references and visuals. While COP has the ability to add tags to uploaded content, requiring standardized tags, or even standards-based tags would aid in the speed of locating resources and add a more defined structure to the way content is organized.

Teachers reported relevance to their existing curriculum and state standards as primary factors in resource selection. Resources published for teachers must show clear relevance to students and be aligned to state and national standards. State standards were more important than national standards to teachers in this study. Since many states publish separate standards from those published nationally, it is important that any curricular resources intended for national audiences include the ability to be tagged for both state and national standards, or that state teacher associations create crosswalks which clearly delineate for teachers which national standards are equivalent to their state standards, and those be listed on the same sites the resources are posted on to further eliminate the need for teachers to go to multiple sites to meet their curriculum needs.

Helping preservice teachers gain a deeper understanding for the process may lead to time conservation in developing curriculum, improved content, and enable more time to focus on pedagogy. Taylor et al. (2015) suggest that teacher professional development in concert with research-based curriculum be considered as a standard and should improve pedagogy. Providing early interventions targeted at preservice teachers' utilization of existing curricular resources and

modification to local needs could enable them to assimilate the practices of their profession more effectively while avoiding Taylor el al.'s fragmented incoherent non-sequential instruction. Teacher preparation programs which explicitly teach preservice teachers more effective methods to locate and modify resources will help them save time and locate resources better aligned to their content and pedagogical approach.

Recommendations

1. Teaching preservice teachers how to more effectively utilize existing curricular resources while spending more time on pedagogy will improve both the quality of teaching and student outcomes.
2. Further research on teacher utilization of social media for curriculum is needed.

Further research is needed to determine the level of influence and the degree of inter-relatedness of the factors teachers consider when selecting curriculum and individual lesson content. Due to the inter-dependent yet individual nature of the factors and the key role prior knowledge and skill of the teachers plays in curriculum selection, future research should examine these factors both together as a system, and independently to further clarify where and how teacher educators should utilize pre-service educational efforts and in-service professional development opportunities for teachers.

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Engaging Underrepresented Populations in Food and Agricultural Sciences through Urban Agriculture

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Presentation Format: Research Poster

Introduction and Need for Research

As fewer students come into the classroom from production agriculture backgrounds, our strategies continue evolving to keep students interested and engaged in agricultural curriculum, postsecondary education and career pathways. Interest in urban agriculture has continued to rise in and around cities as populations seek to address food insecurity, poverty and underutilized city lots (Hynes & Howe, 2004). The practice of urban agriculture has great potential to combat food insecurity, and impact economic, social and ecological environments (Hynes & Howe, 2004). However, urban secondary students often do not see viable opportunities for themselves in agricultural careers, especially students from an ethnic minority (Talbert, 1997, 1999; Wiley, Bowen, & Bowen, 1998). Historically urban students and underrepresented populations have negative perceptions of agriculture careers, viewing them as lacking prestige, substantial income and advancement (Esters & Bowen, 2004). Change is needed to increase the number and diversity of students pursuing education and career paths in agriculture. To instigate this change, project-based learning and urban contexts were used to create curriculum interventions that engage students in their urban environments. While much curriculum exists to teach traditional food and agricultural sciences, there is a lack of curriculum using urban contexts to engage diverse, urban youths in agriculture. Using real world examples and production techniques applicable to the constraints and opportunities of the urban environment, students are able to perceive relevance in the subject for themselves. Past research has shown that curriculum taught in agricultural education programs located in urban areas needs to be student centered (Warner & Washburn, 2007) and emphasize the food, agribusiness and science aspects of agriculture and its careers (Trede & Russell, 1999). Urban focused curriculum interventions used by this study created student-centered ways to produce, harvest, market and sell agricultural products by utilizing project-based learning, urban resources and constraints, all without leaving the city. This work is supported by the SPECA Challenge Grant Program Accession Number 1000393 from the USDA National Institute of Food and Agriculture. This grant made it possible to partner with Arsenal Tech High School in Indianapolis and provide funds for the agricultural educator there to keep bees and chickens as well as produce salsa ingredients in a greenhouse setting and in raised beds. Respondents to this study were directly involved in the growing, marketing and selling of these agricultural products on school grounds and in community markets. Tailored career, agribusiness, natural resources and plant and soil science modules worked in tangent with classroom projects to create urban focused project-based curriculum interventions. To test the effectiveness of these curriculum interventions a survey sought to answer the question; what influence does curriculum have on the career interests of students? Answering this question meets the American Association for Agriculture Educators (AAAE) National Research Agenda priority three: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century.

Methodology

The target population consisted of underrepresented populations receiving instruction in the food and agricultural sciences at the secondary level. A convenience sample was taken from Arsenal Tech High School, an Indianapolis public school where 83% of the student body are eligible for free and reduced lunch. The data collection was administered after one school year of urban focused project-based curriculum as ninth graders in an Introduction to Agriculture, Food and Natural Resources class. Curriculum interventions included modules that emphasized agricultural careers that were available in a city like Indianapolis, agribusiness and their role in the economy, natural resources and their conservation in urban environments, and plant and soil science with a special emphasis on growing agricultural products in a greenhouse. A 28 question career aptitude survey was adapted from a similar study that measured attitudes toward agriculture and agricultural careers (Talbert, 1997) and used a five point Likert-scale where one = strongly disagree, two = disagree, three = neutral, four = agree, and five = strongly agree. The career aptitude survey had three objectives: (1) gauge self-reported urban agriculture literacy, (2) gauge interest in agriculture related postsecondary education, and (3) gauge interest in agriculture related careers. Questions were scaled into constructs that corresponded with each objective, see Table 1. Survey constructs were tested using Cronbach's alpha and were all reported at acceptable thresholds ($\alpha > .6$). The survey consisted of 4 demographic questions, 3 future plans questions, 6 questions measuring urban agriculture literacy, 4 questions measuring interest in pursuing postsecondary agricultural education and 11 questions measuring interest in agricultural careers. The survey responses were confidential and utilized identification numbers in lieu of student names.

Results

Table 1 describes the construct means of student responses of each objective. Analysis of the data was completed using SPSS 24. Survey data were collected from a sample of 34 ninth grade Introduction to Agriculture, Food and Natural Resources students. The ethnic and racial make of the population consisted of 15 Hispanic students, seven African American students, six multiracial students and six White students. All 34 of the responses were complete and usable. Overall, construct means of student respondents were neutral or slightly above neutral. Students had the highest means for the constructs of "I know there are careers available to me in agriculture" ($M= 3.94$) associated with objective three and "I have a general understanding of what urban agriculture entails" ($M= 3.84$) associated with objective one. The construct of "I can envision myself involved in an agriculture career" ($M= 3.04$) associated with objective three had the lowest mean. "I am interest in the correlation between postsecondary education in agriculture and career success" ($M= 3.59$) was associated with objective two. Results indicate awareness of opportunities and urban agricultural literacy related constructs had higher mean scores than interest in agricultural education and career opportunities.

Table 1

Construct Means of Student Responses Reported by Objective (n=34)

Objective	Survey Construct	Questions Scaled	Cronbach's α	*M*
Urban Agriculture Literacy (1)	I have a general understanding of what urban agriculture entails.	6	.74	3.81
Interest in Agricultural Education (2)	I am interested in the correlation between postsecondary education in agriculture and career success.	4	.63	3.59
Interest in Agricultural Careers (3)	I am interested in agricultural careers.	3	.71	3.27
	I can envision myself involved in an agriculture career.	2	.93	3.04
	I know there are careers available to me in agriculture.	3	.67	3.94
	I am capable of obtaining a career in agriculture.	3	.69	3.35

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

Conclusions and Recommendations

Previous studies have demonstrated urban and minority students often do not see agricultural careers as prestigious or as viable options for themselves (Esters, 2004; Talbert, 1997, 1999; Wiley, Bowen, & Bowen, 1998). With that in mind, the urban focused curriculum was presented in a familiar context so that informed decisions could be made based on more than preexisting bias about agricultural education and career fields. A specific focus on career options in the curriculum interventions may have had an effect on the results from this study's career aptitude survey. Although the means in Table 1 are near neutral, they are more positive than expected when working with urban populations. Results show some indication of curriculum intervention engaging these urban students in making connections with the food and agricultural sciences. The instructor has plans to keep using these curriculum interventions and to expand on them by adding projects such as an aquaponics set up that produces fresh water shrimp and lettuce varieties. This was an exploratory study conducted at a single school, therefore generalizations cannot be made beyond that specific population. The outcome and scope of this project calls for further generalizable research to be done to increase the amount of respondents that go beyond literacy and interest to 'envisioning themselves in an agricultural career.' The next steps for this area of research should be to replicate this study with a larger, representative sample consisting of multiple schools from multiple states. The curriculum interventions created in this project are shared on an NAAE Community of Practice Space entitled Urban Agriculture. Lesson plans, project ideas and general materials created from this project are easily transferable to other urban-based agriculture programs for future research. =Evaluating the impact of focused curriculum provides key data to understanding the motivations of targeted students that will

allow us to fulfill the AAAE research priority: to increase the number and diversity of students pursing agricultural career paths to meet the demands of a 21st century workforce.

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An Exploration of Land-Grant Faculty's Engagement in Echo Chambers when Communicating Science

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Introduction

University scientists are the most trusted sources to communicate science to the public (Brewer & Ley, 2013), and engagement in science communication can help address knowledge gaps (Bennett & Iyengar, 2008). Unfortunately, scientists have been accused of being out of touch with the needs of their stakeholders due to a lack of communication between universities and the public (Besley & Tanner, 2011). Part of this issue may stem from the perception that one of the strongest influences on tenure and promotion has been publishing in top-tier, academic journals (Barham Foltz, Agnes, & van Rijn 2017). Faculty will need to communicate with those outside of the academic community to be truly effective in their communication efforts (Heleta, 2017). This is particularly true for tenure-track faculty at land-grant institutions who are expected to engage in some form of teaching, research, and Extension (National Institute of Food and Agriculture [NIFA], n.d.). The latter of those three, Extension, often refers to public engagement in science communication from experts in the field. Therefore, the purpose of this study was to explore land-grant faculty's engagement in echo chambers when communicating about science. This research supports priority number one of the national research agenda (Enns, Martin, & Spielmaker, 2016) and can provide guidance for how agricultural communicators can help land-grant faculty engage in science communication.

Conceptual Framework

This study was guided by the concept of echo chambers, which is a theory that emerged in recent years to explain how information is shared on the internet and social media (Jasny, Wagle, & Fisher, 2015; Prior, 2007). For the purpose of this research, echo chambers have been defined as participation in homogenous networks that limit exposure to alternative views and beliefs (Colleoni, Rozza, & Arvidson, 2014). The phenomenon can be broken down into two distinct parts – the echo and the chamber. An echo is defined as the message that repeats and reinforces the views of participants in the conversations. The chambers are the mechanism through which the chamber itself travel and consists of a speaker, a receiver, and a mediating actor (Jasny et al., 2015).

The most concerning effect of echo chambers has been the increasing gaps in knowledge among the public because they are only engaging in information they trust that aligns with their views (Bennett & Iyengar, 2008) and they no longer see the validity in opposing views (Huckfeldt, Mendez, & Osborn, 2004; Price, Cappella, & Nir, 2002). The discussion of echo chambers has largely been in the context of politics, but they likely also exist in science contexts as well, such as vaccinations (Nguyen, 2018).

While limited peer-review research has been conducted on echo chambers amongst university faculty, the echo chamber still likely exists. Heleta (2017) suggested that faculty's research is mostly published in an echo chamber, or homogenous network, of academic journals that are read by peers. As a result, the public has remained largely unaware of the research conducted at universities. Literature has already concluded the members of the public can reside within an echo chamber, but it is critical to assess how land-grant faculty may be engaging in echo chambers themselves. In order to help faculty fulfill the land-grant mission (NIFA, n.d.), there is a need to further explore the development of echo chambers in academia (Jasny et al., 2015). For the purpose of this paper, the faculty are assumed to be the speaker in the chamber, but their receiver (audience) and mediating actor (communication channel) will determine the degree to which faculty engage in echo chambers.

Purpose and Objectives

The purpose of this study was to explore land-grant faculty's engagement in echo chambers when communicating science. The following research objectives guided the study:

1. Describe participants' audiences when communicating science.

2. Describe participants' communication channels when communicating science.

Methods

Qualitative data were collected to fulfill the purpose of the study. Hour-long, semi-structured interviews were conducted with 13 tenure-track faculty ($n = 13$) in the University of Florida, Institute of Food and Agricultural Sciences (UF/IFAS) in February 2018. This type of data collection is appropriate to use when not much is known about the phenomena in question (Creswell, 2013), like echo chambers. While the findings from the study are not generalizable, they do provide valuable insight into how faculty are engaging in echo chambers (Robinson, 1999).

This research was part of a larger study investigating land-grant faculty's engagement in science communication that was conducted in two phases. Phase one was quantitative and phase two was qualitative. The results of the present study stem from the qualitative phase of the project. Science communication was defined to participants as "when researchers engage in meaningful communication with the public about their science." The interview participants were purposively sampled based on their answers to a survey that measured engagement in effective science communication to represent low, moderate, and high science communicators. The survey was distributed online to a census of tenure-track, UF/IFAS faculty and 180 ($n = 180$; 31.6%) completed the survey. Level of *effective science communication* was determined by transforming a *frequency of science communication* variable and a *quality of science communication* variable. To measure *frequency*, respondents were asked how often they had participated in 15 different types of public engagement in the past 12 months (*never* = 0, *1-2 times* = 1, *3-4 times* = 2, *5-6 times* = 3, *7-8 times* = 4, *9-10 times* = 5, and *11+ times* = 6). The responses were transformed into a count variable that could range from 0 to 105. The public engagement examples given to respondents included delivering a formal presentation, using social media, hosting a webinar, and speaking at a science café to name a few.

Quality of science communication was measured with a 9-item, 5-point Likert-type scale (Cronbach's α = 0.77) with the following labels: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree not disagree*, 4 = *agree*, and 5 = *strongly agree*. The statements were adapted from the American Association for the Advancement of Science (AAAS, 2017) recommendations for science communication and included statements like, "I removed scientific jargon from my presentation," "I considered my audience's demographic characteristics (e.g. age, gender, SES)," and "I provided interactive opportunities with my audience." Respondents were also given the option to select "Not Applicable" and these responses were omitted from analysis.

The variables for *frequency of science communication* and *quality of science communication* were transformed to create the variable *effective science communication.* The variables were multiplied together to create the variable for effective science communication, and the scores could potentially range from 0 to 525. The range for the survey sample was 0 to 181.56, and the mean was 55.72 (*SD* = 38.16). Groups for low, moderate, and high science communicators were categorized based on the mean response of the sample. Low science communicators had scores below one standard deviation of the mean (*M* < 17.56, *n* = 26) and high science communicators were above one standard deviation of the mean (*M* > 93.88, *n* = 32). Moderate science communicators were categorized as those having a mean between 17.56 and 93.88 (*n* = 104).

The participants of the qualitative portion of the study, presented in the present article, were purposively sampled to match the demographic characteristics of the low, moderate, and high communicators. Thirty-one potential participants were invited for an interview, and 13 from 10 different departments/units agreed to participate (41.9% participation rate). The majority of the interview participants were tenured, in applied science fields, male, and their highest appointment was in research. The demographics of the interview participants in the three communication groups can be found in Table 1.

Table 1
Description of interview participants

	High Communicators (*n* = 5)	Moderate Communicators (*n* = 5)	Low Communicators (*n* = 3)
Rank			
Assistant Professor	2	1	2
Associate Professor	1	0	1
Professor	2	4	0
Administrative Role[a]	2	3	0
Discipline			

Social Science	2	2	1
Basic Science	1	0	1
Applied Science	2	3	1
Average Appointment			
% Teaching	30	33	40
% Research	35	41	60
% Extension	25	32	0
Gender			
Female	3	1	2
Male	3	4	1

[a] Participants with administrative role could be any rank.

The majority of the interviews were conducted in person and lasted between 45 and 84 minutes; most interviews lasted one hour. Two interviews were conducted through a video conference call because the faculty worked at an experiment station away from main campus. All interviews were recorded, and an external company transcribed them. Analysis for this study used *a priori* coding to examine themes related to echo chambers that emerged in the interviews (Kuzel, 1999). Specifically, the researcher looked for themes related to the audience and communication channel the participants used for science communication to align with Jasny et al.'s (2015) description of "chambers". The computer program MaxQDA was used to aid the researcher in coding the interview transcripts and memos were kept to record coding decisions.

Validity and reliability were accounted for by the use of an audit trail, peer debriefing, and member checking (Creswell, 2013; Thomas & Magilvy, 2011). Merriam (1988) recommended clarifying researcher bias as an additional way to establish credibility. The primary investigator for this research has three degrees from UF and an interest in science communication, which may have influenced the interpretation of the findings.

To aid in the transferability of the findings, context of the institution and participants has been provided (Merriam, 1988). UF is a land-grant university, and UF/IFAS home to 51,000 students and 569 tenure-track faculty in 33 departments (UF/IFAS, 2013).

Findings

Engagement in echo chambers, or homogenous, closed networks in academia, were explored through interviews. The themes of *audiences* and *communication channels* emerged related to echo chambers in science communication.

Audiences

Participation in echo chambers was evident through the audience the participants were communicating to about their research. Some participants expressed the need for faculty to expand their audiences beyond those involved in academia. "I think the days of just sitting in the ivory tower and doing good science for the sake of good science are over," explained Participant 154 (moderate communicator). These participants believed it was necessary for academics to also engage with the public to stay in touch with the needs of their stakeholders. Participant 158 (high communicator) believed communicating with the public was essential to understanding problems in society:

> I learn so much from being out there and talking to some of the people that do this day in and day out [practitioners], that don't sit in the ivory tower like we do and sit here and we'll research it to death, but we don't know what the actual [problem is].

However, as the interviews progressed, it became evident that the participants were communicating with people similar to themselves. "Usually, they're all really well-trained scientists," explained Participant 155 (low communicator). "I mainly interact with the agency scientists, sometimes the upper administration in agencies. I find them all to be incredibly reasonable individuals."

Similarly, another low communicator (Participant 133) was discussing her science communication efforts of presenting research at an outreach event but reported mostly talking to people who approached her to ask "questions or they introduce themselves because they're doing something similar [in research]."

High communicators also demonstrated some participation in echo chambers when it came to their social media use specifically. Participant 88 (high communicator) explained the success of his Twitter account, but when asked who his followers were, he replied that most of his "followers were [University Agricultural Institute] employees." Participant 5, another high communicator with a Twitter account, had a similar social media audience.

> I follow scientists, scientists follow me. It's more of a public science community rather than a non-scientific community. The non-science community I probably, unfortunately talk to the least just because of the type of events I attend and get invited to. It's usually people with a scientific interest that I end up communicating with.

The emergence of echo chambers through the communication audience was evident despite some participants' intent and interest to communicate with the public. Some participants may have realized they only talked to other like-minded individuals, but they did not indicate an interest in interacting with other members of the public. Other participants believed they were engaging the public, but further probing revealed their audiences consisted of academics, scientists, and industry professionals.

Communication Channels

Aside from who the participants were communicating to about science, how they were communicating also appeared linked to echo chambers. Participants indicated they realized their

communication channels for research contributed to echo chambers and expressed an interest in utilizing different channels to break the echo effect. Many participants brought up the idea that "no one is going to read [my research] in a journal," (Participant 155 – low communicator). "I think we need to really get away from this model of publishing these papers and have that be our sole focus. Finding other ways to communicate about what we do is, I think, really important," reasoned Participant 37 (low communicator).

Others had also noted the need to shift away from this traditional mode of publishing research. Participant 93 (high communicator) explained why he decided to start engaging more in science communication and develop a podcast.

> Well, our research goes and hides in a journal that nobody can find. We've had taskforces. We've had grant teams. We've had all these committees to do it, and I just decided I was at a point in my career that I was just going to do something and ask for permission later.

Another high communicator discussed how she emphasized sharing science through different popular media channels with her students:

> We had that discussion in my class before this interview. [Students] were pulling up websites on these people and it's these people who have no science base that have the social media followers and all that type of thing. In order to combat [misinformation] at that level, [scientists] will have to not be just communicating proper science one-to-one, but they have to get on Morning America or whatever it is. They have to be there. They have to be doing the major media stuff or else they can't combat what's out there. It's up to them. (Participant 17 – high communicator)

Overall, participants appeared to not always recognize their contribution to echo chambers through who they communicate to, but they have identified how the communication channel for presenting research is related to this closed system. Additionally, participants expressed an interest in finding ways to overcome the echo chamber effect and communicate to the public through appropriate channels.

Discussion & Implications

This research supported Heleta's (2017) conclusion that university faculty likely communicate in homogenous networks, or echo chambers. Participants' participation in echo chambers was evident in who their science communication audience was and the communication channel they used. High communicators described how academia needed to get out of their "ivory towers" and communicate with the general public. The participants' inclination to engage more with the public indicates a possible shift in science communication for the future.

While most of the participants indicated they wanted to engage more with the public, they appeared to mostly communicate with those in academia or researchers with graduate degrees in similar fields. Even high communicators who believed they were utilizing social media to communicate to the public admitted their audience was actually other scientists. This use of Twitter likely reflects the participants' lack of understanding for best practices when using social media to reach people outside of academia. Besley and Tanner (2011) suggested that many

scientists were out of touch with how the public view science, which may be the result of a lack of communication between scientists and members of the public. The findings from this research could be problematic if faculty are not exposed to the diversity of needs and opinions of their stakeholders (Huckfeldt et al., 2004; Price et al., 2002).

Participants also discussed a need to move away from the traditional model of communicating research in academia via research journals. Participants believed engaging in more popular forms of communication, like podcasts or televisions interviews, were necessary to provide the public with factual information about science. Faculty may continue to struggle to communicate through these popular media channels if publishing in top tier journals remains one of the strongest influences for tenure and promotion (Barham et al., 2017).

Recommendations

Agricultural communicators should work with land-grant faculty to help them effectively engage members of the public in science communication and break through the academic echo chamber. Utilizing communication research to understand the needs of the target audience and their preferred communication channels can help ensure faculty's communication can reach intended audiences. The participants in the study never indicated that they viewed their stakeholders' views of science as invalid, instead they reported simply not engaging outside of their homogenous network. This type of chamber can easily be disrupted by helping faculty engage with appropriate audiences utilizing effective channels. Practitioners can help faculty in science communication by providing professional development opportunities about best practices for different communication platforms, like Twitter, and how to develop a communication program that can reach and resonate with stakeholder groups. Researchers should conduct a content analysis of high science communicators' social media accounts, podcasts, science blogs etc. to gain insight into who their audience actually is and if they are still only communicating to those in academia. To better understand the environmental influences on the development of echo chambers, future research should also explore faculty engagement in echo chambers at other land-grant institutions.

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Examination of the effects of Co-Teaching during their Student Teaching Experience
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Introduction

Teacher preparation programs require students to complete experiences in the classroom. Early field experiences allow students to gain valuable experiences while observing an agriculture teacher (Retallick & Miller, 2007; Smalley & Retallick, 2012). Student teaching is an integral part of teacher preparation programs (Krysher, Robinson, Montgomery, & Edwards, 2012). This experience happens in the final semester of the teacher preparation program (Roberts, 2006).

One of the most crucial relationships student teachers identified was being with their cooperating teacher (Young & Edwards, 2006; Smalley, Retallick & Paulsen, 2015). According to Torrez and Krebs (2012) "cooperating teachers are referred to as "master teacher" and have dual roles of supervisor, and mentor" (p. 487). Through mentoring the student teacher to demonstrating, and coaching, the cooperating teacher plays a huge role in the student teachers' development (Jones, Kelsey, & Brown, 2014). During the student teaching process, the cooperating teacher and the student teacher should be involved in co-teaching (Cook & Friend, 1995). For beginning teachers, the relationship with their cooperating teacher is similar to a mentorship relationship (Jones et al., 2014; Koermer, Rust, & Baumgartner, 2002). The role of a mentor is to provide support to new employees and supporting their instruction (Jones et al., 2014).

Co-teaching is defined as "two or more professionals delivering substantive instruction to a diverse, or blended, group of students in a single physical space" (Cook & Friend, 1995 paragraph 5). Teachers have identified co-teaching as a strategy which aids in "assistance in the development, delivery, and evaluation of effective instructional programs" (Walther-Thomas, 1997 p. 396). Co-teaching is utilized in schools to address the increased diversity of learning demands and varying academic levels in a single class (Graziano & Navarrete, 2012). For co-teaching to happen successfully there needs to be administrative support, volunteerism, planning time, training, and compatibility (Scruggs, Mastropieri & Mcduffie, 2007).

Several strategies can be used when teachers wish to co-teach materials in the classroom. These strategies include but are not limited to: one teach one observe, one teach one assist, station teaching, alternative teaching, team teaching, and parallel teaching (Goodnough, Osmond, Dibbon, Glassman & Stevens, 2009; Graziano & Navarrete, 2012). The strategy one teach, one observe is utilized when one teacher leads the instruction and the other teacher is watching how students react (Friend, Cook, Hurley-Chamberlain, & Shamberger, 2010). One teach, one assist is when there is a lead teacher and the other teacher flows around the room offering individuals assistance (Friend et al., 2010). Station teaching divides the instruction into three different groups, moving from station to station, allowing one station to be for independent work (Friend et al., 2010). Alternative teaching allows one teacher to work with the majority of students while the other teacher takes a small group of students and works with them either to

challenge them or to reteach a concept (Friend et al., 2010). Team teaching allows both teachers to teach the entire class but allows them to show multiple ways to solve a problem or to show a different view of the lecture topic (Friend et al., 2010). The last strategy is parallel teaching. This teaching method allows the teachers to split the class in half while each teacher is presenting the same materials (Friend et al., 2010).

According to Scruggs et al., (2007) co-teaching has benefited individuals in professional development and teachers agree co-teaching makes them a better teacher. Some teachers even found that their students increased their cooperation in the classes where co-teaching was used (Scruggs et al., 2007). Another benefit to co-teaching is having the ability to discuss and share ideas with one another (Kamens, 2007). According to Walther-Thomas (1997) co-teaching benefited teachers by teachers having higher professional satisfaction, professional growth, and personal support. Another benefit included an increase in collaboration between colleagues due to co-teaching.

Students can also benefit from co-teaching as teachers can rely on one another for instruction during class to reach every student (Mastropieri et al., 2005). According to Walther-Thomas (1997), there are five benefits that students gained from co-teaching. Students whose teachers utilized co-teaching in their classroom increased their academic performance. Another benefit was that the teacher to student ratio was decreased as two teachers were in the room and could easily provide more attention to the students in the class. Co-teaching also aided students in strategies for studying skills and improvement in social skills. The final benefit found was the classrooms using co-teaching created a more inclusive community for students. According to Mastropieri and Scruggs (2001) there is a lack of research which is relative to inclusion at the secondary level and even more of lack relating of student teachers co-teaching during their teaching experience.

Conceptual Framework

The conceptual framework utilized in this qualitative study was factors known to affect the co-teaching model (Takacs, 2015). These factors include: the teachers' abilities, teachers' belief and attitudes, and school context (Takacs, 2015). The teachers' ability is information relative to age, experience, professional development opportunities, and training. The teachers' beliefs and attitudes are expressed by their self-efficacy, grade level taught, and student's cognitive abilities. The school context regards information about administrations support and logistics. All factors relate to how willing a teacher is to try co-teaching in their classroom.

Purpose and Objectives

The purpose of this qualitative study was to determine the student teachers' perceptions and understanding on co-teaching during their student teaching experience. The objectives for this study are:
1. To describe how co-teaching occurs with a cooperating teacher during student teaching.
2. Describe the benefits student teachers found while co-teaching with their cooperating teacher.

Methods

Researchers chose a basic qualitative constructive epistemological approach to address the objectives above. The constructive epistemological approach allowed researchers to preserve the participant's views and voice through open-ended questions (Creswell, 2012). Purposive sampling was utilized because this allows researchers to compile student teachers based on experiences (Merriam, 2009). The criteria included students who were student teachers from [UNIVERSITY], who co-taught during their student teaching experience, and who had student taught during spring 2018. Pseudonym were utilized to keep student's identities and thoughts confidential.

A list of potential students was compiled from the students involved in student teaching during the spring of 2018. The researchers sent personalized emails to students explaining the study. Of the 13 possible candidates, 11 student teachers agreed to participate in the research study. Researchers created an instrument utilizing 12 open ended questions about the student teachers co-teaching experience. The questionnaire gathered information about the participants' student teaching placement, their cooperating teacher, the agriculture classes offered, and questions focused on co-teaching. Focus group interviews were conducted and recorded with a basic audio-recording device and data field notes were taken. Researchers transcribed interviews verbatim to ensure trustworthiness and reliability.

Trustworthiness, credibility, and reliability was established through Lincoln and Guba (1985) suggestions of peer review of data and member checks. Researchers utilized Braun and Clark (2006) theoretical analysis to analyze the data. The researchers analyzed and identified themes of the data separately and then came back together to compare themes (Braun & Clark, 2006).

Findings

The purpose of this qualitative study was to determine the student teachers' perceptions and understanding on co-teaching during their student teaching experience. Of the students who participated five were male and six were female. All students were in their final semester and completing their student teaching experience. Participants in this study were student teaching in various school demographics. School size ranged from 80-1,000 students in the high school. The student teachers saw a range of 10-300 students enrolled in agricultural classes. The findings are separated into four themes.

Participants were asked what they thought co-teaching was and identified an understanding of co-teaching. Participants all defined co-teaching as two teachers who work together to deliver a lesson.

Anne said co-teaching is, "Two teachers working together to deliver lessons to students." Joyce stated,

> Co-teaching is two or more teachers working together to present a lesson/unit. The purpose is to draw on the strengths of multiple individuals to enhance content presentation. Co-teaching across content areas helps draw meaning from and build skills in multiple academic areas.

Kylie emphasized that co-teaching was "Teaching with another person, whether that be a teacher or someone in the industry."

Participants explained how they prepared for co-teaching and how they co-taught within the classroom. All participants utilized the one teach, one observe and then moved to team teaching and then the student teacher became the full time teacher.

Wayne said,
> At the beginning I was just observing, seeing how the labs were ran and he kinda split them up on different tractors or lawn mowers. As I got comfortable I wanted more independence he gave me a group of students and work with them hands-on and split the class into two.

Joyce said, "We split up the purpose/introduction and the procedures to present individually and then we were both available to facilitate labs." Andrew said, "In the beginning phases of my experience, my cooperating teacher would be teaching a lesson or activity, and I would circulate the room to help students."

Participants discussed the benefits from co-teaching and reported utilizing co-teaching can be used in multiple jobs and reflection should be utilized. Participants also indicated students getting a maximum benefit from co-teaching.

Kyle said,
> No matter where you work, you will be in a position where you have to work with others and I think it is a good experience for learning to work with others and picking up what vibe others are giving off about what you are doing individually and as a group. I think those are important skills.

Joyce stated, "It has taught me how to ask for help. I know we won't have a CT in the real world but how to go to someone and ask for help, I have gotten a lot better at that."
When discussing benefits for students, Travis said, "True benefits are that the students get a maximum benefit out of teachers each using their style to help out the lesson." Allison explained, "Students were able to get material explained in different ways if they didn't understand it. They were also able to get more one on one as well." Hailey noted,
> I think the biggest benefit of co-teaching is the added student connections. The students are given more resources in terms of instructors and allowed students to make more connections haven been given more context and one teacher may be able to make a different connection in way the other might not, and vice versa depending on the subject.

Kylie stated, "Students get a lot more one on one attention, which helps them learn more quickly." Andrew said, "One benefit included more monitoring of students performance, thus limiting issues with behavior as well as helped keep students on the same step of the task."

Participants were asked about their challenges with co-teaching. Participants identified the major challenge was their cooperating teacher struggling with transitioning the teaching role to the student teacher.

Hailey stated, "When my cooperating teacher jumps into help and he mentions a point that I was going to get to that he might have thought I wasn't going to hit it and that bugs me." Travis also stated, "The cooperating teachers know so much, and they want to make sure you hit on that

point and they don't realized that you are just doing it in a different order than they would." Kyle explained, "Because roles weren't really defined sometimes it was challenging to know when to step in a first." Allison agreed, "It's challenging to know whether or not it's the appropriate time to interject and state my opinion/knowledge." Wayne stated, "Respecting boundaries is the biggest challenge I see." Anne explained,

> I am teaching a leadership and development course, and we were supposed to do an activity where each of the students gets a headband with a word and that is how they are supposed to be treated while having the discussion, so it's a stereotyping activity. I had no idea what it was supposed to look like as the lesson plan was vague. My CT asked if she could help because this was her favorite activity and I said sure and she ended up teaching the entire activity. There was no chance for me to jump in and talk even if I wanted to.

Participants were asked about their co-teaching experience relating to resources provided to them by their cooperating teacher. Resources given to the student teacher depended heavily on how the cooperating teacher wrote lesson plans and their expertise.

Kyle said, "The first class my CT gave me a huge binder with all of the stuff in it so I didn't have to do much, but then the last couple classes he didn't really give me anything and now I am drowning." Joyce explained, "When I started my CT gave me a flash drive on my desk. He had one lesson plan for the whole unit which gives me an idea of what I am supposed to cover but I am on my own to fill that space." Andrew explained, "I have a very hands-off CT and he just lets me take the classes and I was kind of on my own. It was like walking into a first-time teaching job with no experience."

Conclusions/Recommendations/Discussion

Participants all had a clear understanding of co-teaching and understood how to work with their cooperating teacher, other teachers in their school, student teachers, and agricultural teachers state-wide. Participants expressed the value of working together during their student teaching experience. The participants' definitions of co-teaching were consistent with the literature which stated co-teaching was two educators working together in a defined space to teach students (Cook & Friend, 1995; Friend et al., 2010).

All participants indicated their co-teaching experience started with one-teach, one-observe and then moved to team teaching and transitioned to the student teacher teaching the courses. One-teach, one observes works well for evaluating the abilities of the teacher. After the lesson is taught, both teachers analyze the lesson and can decide what went well and what did not (Graziano & Navarrete, 2012). Team teaching allowed student teachers to start sharing the teaching ability with their cooperating teacher (Scruggs et al., 2007; Goodnough et al., 2009; Friend et al., 2010; Graziano & Navarrete, 2012). Takacs (2015) co-teaching model indicated once the student teachers were confident in their abilities to teach, co-teaching came more easily. Student teachers agreed the transition time from observing to teaching allowed student teachers time to build confidence, awareness, and guidance. Having time to build confidence and awareness contributes to the student teachers' self-efficacy (Cheong, 2010).

Student teachers indicated by slowly taking over classes during student teaching they eased the transition of taking on a full teaching load. Co-teaching aided students by enchaining and crafting their skills during the student teaching process. This also allowed student teachers to gain several experiences which allowed them to understand co-teaching (Takacs, 2015). Co-teaching allowing for the student teacher to have support from their mentor and networking opportunities which helped develop self-confidence (Jones et al., 2014). According to Peiter, Terry and Cartmell (2005) "mentor teachers provides the greatest assistance to the first-year agricultural education teacher" (p. 18). The mentorship developed during student teaching is similar to programs schools have implemented for beginning teachers (Burris, Kitchel, Greiman, & Torres, 2006; Tummons, Kitchel, & Garton, 2016).

Many student teachers indicated they had challenges when transitioning to the teaching role. One main challenge was the student teachers did not understand the breadth and depth of the content involved. They also found it difficult to develop in-depth lesson plans for several different classes. Cooperating teachers struggled with transitioning away from the teaching role as student teachers explained their cooperating teacher would jump in during their lessons to express some of their experiences. Although student teachers appreciated their cooperating teacher providing materials for them to use, many students wanted to develop their own materials. Akerson and Montgomery (2017) found when student teachers utilized their cooperating teacher's lesson plans, they had a hard time understanding them.

These results cannot be generalized to a larger population. More research should be conducted to see if similar results are found with a larger population. Future research should be conducted regarding the cooperating teacher's view of co-teaching with their student teachers. Research should be conducted about the mentorship relationship created during student teaching to see if this increases the rate of retention of student teachers entering the profession after completion of student teaching. It is recommended teacher educators be introduced to co-teaching during their teacher preparation program to allow for a deeper understanding and practice with the different co-teaching methods.

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Undergraduate Student's Motivation to Pursue a Career as an Agricultural Education Teacher

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Introduction

The shortage of teachers in public schools has increased not only from an increasing population in America, but due to retirements and teachers leaving the profession (Flynt & Morton, 2009). New teachers are leaving the profession because of staffing actions, family, to pursue other opportunities, and because they are dissatisfied (Ingersoll & Smith, 2013). The main reason new teachers are dissatisfied was due to the salary and their ability to manage students (Ingersoll & Smith, 2003). Solely recruiting more teacher will not fix the gap in teacher shortages due to the quick turnaround rate of teachers (Ingersoll & Smith, 2003).

Schools and administration need to be willing to assist in implementing strategies to retain teachers (Ingerson & Smith, 2003). Schools and institutions are enticing industry professionals to enter the teaching profession by creating alternative ways to become certified as a teacher (Hirsch, Koppich, & Knapp, 2001). States are doing their part to make teaching an easier career to pursue, it is up to individuals to be motivated in becoming a teacher.

People are motivated differently based on their experiences and goals for their futures. There are different factors which motivate people to become teachers (Bruinsma & Jansen, 2010). Both intrinsic and altruistic motivators are highly involved when one decides to become a teacher (Klassen, Al-Dhafri, Hannok, & Betts, 2011; Landrum, Guilbeau, & Garza, 2017). Motivations include; job stability, liking the subject matter, and being able to work with children (Bruinsma & Jansen, 2010; Swortzel, 1998). Other motivations include; how the individual sees the career fitting with their goals, personal life, and financials (Landrum et al., 2017; Richardson & Watt, 2005).

Deciding on a career does not happen overnight, as it is an integral process involving many people and decisions. This process begins when individuals are in high school (Thieman, Rosch, & Suarez, 2016). Agricultural education is one facet of the high school curriculum where students can fully experience different aspects of the industry (Thieman et al., 2016). According to Thieman et al., (2016) factors affecting a student's decision to pursue a career in agricultural education includes parental support and their high school agricultural teacher. Once students have made the decision to continue to a pursue post-secondary education, several factors influence their decision to continue to pursue education in their desired career (Thieman et al., 2016), which include job security, being intellectually challenged, contributing to society, being in a respectable career, and high earnings (Elfers, Plecki, John, & Wedel, 2008). When choosing a career in teaching, students placed less emphasis on financials and were more concerned with the career providing intellectual challenges and teaching being a rewarding experience (Elfers et al., 2008).

Theoretical Framework

The theoretical framework utilized in this study was the expectancy-value model of achievement (Wigfield & Eccles, 2000). The expectancy-value model of achievement is influenced by positive and negative aspects of different tasks (Eccles & Wigfield, 2002). Both the expectations and values have a direct influence on performance, persistence, and the different task choices (Eccles & Wigfield, 2002). The ability of success displayed by the individual is based on the individual's beliefs and explications about the upcoming task in both the immediate or long term future. Wigfield and Eccles (2000) model focused on the individual's particular beliefs highlighting choice, persistence, and performance on a task or decision. Individuals make decisions based on the belief on how well they can perform the task at hand which in turn affects the decision-making process. Based on the individual's performance during these tasks and their beliefs, the individuals makes their decision about their future career.

Purpose and Objectives

The purpose of this quantitative study was to determine what motivates students at Iowa State University to pursue a career as an agricultural education teacher. The objectives are:
1. Identify motivators for undergraduate and graduate students to pursue a career in agricultural education.
2. Identify perceptions of undergraduates and graduate students to pursue a teaching career in agricultural education.
3. Describe the expectation of undergraduates and graduate students regarding their future teaching career.

Methods/Procedures

The population for this quantitative study was undergraduate and graduate students at Iowa State University enrolled in the teacher certification program (N=98) which were identified by utilizing departmental records. The instrument was adopted Bakar, Ismail, and Hamzah (2014). This instrument contained demographic questions, 35 questions regarding motivation, 9 statements discussing perceptions about teaching, and 10 questions regarding expectations. According to Mattell and Jacoby (1971) "reliability and validity are independent of the number of scale points used for Likert-type items" (p. 666). Bakar et al., (2014) conducted a pilot test of their instrument to ensure consistency (Nunnally & Bernstein, 1994). A five point Likert-type scale was used (i.e. 1= not very important, 2= not important, 3= moderately important, 4=important, and 5= very important). Researchers did not provide any definitions of the scale as the student were self-reporting their motivations, expectations, and perceptions about teaching. To maintain confidentiality an anonymous link was utilized when sending out the survey.

Dillman, Smyth, and Christian (2009) tailored design was followed to develop the electronic survey and with data collection procedures. The survey was sent through a personalized email containing the link to the survey through Qualtrics. To ensure maximum response rates were collected, personalized emails including the researchers along with an embedded link to the electronic survey was sent (Monroe & Adams, 2012). Reminder emails

were sent out three times over three weeks at different times each day. The usable response rate was 75% (*n=*74). Surveys that were partially completed were calculated into the nonusable response rate and were discarded. Early and late responses were compared to address nonresponse error (Linder, Murphy, & Briers, 2001) and no statistical significance was found. Data was analyzed by utilizing descriptive statistics and were reported in table format.

Results

The purpose of this study was to determine what motivates students to pursue a career as an agricultural education teacher. Of those who chose to participate in this study, 20 were males and 54 were females. Participants ranged in age from 18 to 40 years. From the participants listed, 6% were freshmen, 17% were sophomores, 36% were juniors, 32% were seniors and 8% were classified as graduate students. Eighty-nine percent of participants came from a school that had a high school agricultural education program while 11% did not have a high school agricultural program. Participants indicated their years of involvement in their agricultural program with 1.33% involved for one year, 4% involved for 2 years, 9.33% involved for 3 years and 74.67% involved all 4 years, while 10.67% of participants were not involved.

Participants were first asked 29 statements about what motivates them to teach. Participants indicated one of the most important factors motivating them to teach was that they wanted to help adolescents learn followed by they were interested in teaching and they liked teaching (Table 1).

Table 1
Motivations about a Teaching Career

	n	f	%	f	%	f	%	f	%	f	%	M	SD
		Not very Important		Not important		Moderately Important		Important		Very Important			
I want to help adolescents learn.	74	0	0.00	0	0.00	5	6.76	29	39.20	40	54.10	**4.48**	0.62
I am interested in teaching.	74	0	2.70	1	1.40	3	4.05	25	33.80	43	58.10	**4.43**	0.62
I like teaching.	74	0	0.00	1	1.40	5	6.76	29	39.20	39	52.70	**4.43**	0.68
Teaching will allow me to influence the next generation.	74	0	0.00	0	0.00	5	6.76	32	43.20	37	50.00	**4.43**	0.62
Teaching is a career suited to my abilities.	74	0	0.00	0	0.00	5	6.76	33	44.60	36	48.70	**4.42**	0.61
Teaching is a fulfilling career.	74	1	1.35	0	0.00	8	10.81	26	35.10	39	52.70	**4.38**	0.78

Note. Item mean is shown in boldface. Scale: 1= Not very important, 2= Not important, 3= Moderately important, 4=Important, 5= Very important.

Table 2 depicts participants' perceptions about a career in teaching. Participants were asked nine statements regarding perceptions. The statements which ranked highest were dealing with skills, work ethic, and knowledge. The highest-ranking statement was participants think teaching is a highly skilled occupation followed by teaching is hard work.

Table 2
Perceptions about a Teaching Career

	n	f	%	f	%	f	%	f	%	f	%	M	SD
		Not very Important		Not important		Moderately Important		Important		Very Important			
I think teaching is a highly skilled occupation.	74	1	1.35	3	4.05	14	18.98	29	39.20	27	36.49	**4.05**	0.92
I think teaching is hard work.	74	1	1.35	4	5.41	14	18.92	28	37.80	27	36.49	**4.03**	0.95
I think teachers have high morale.	74	0	0.00	3	4.05	15	20.27	39	52.70	17	22.97	**3.95**	0.77

Note. Item mean is shown in boldface. Scale: 1= Not very important, 2= Not important, 3= Moderately important, 4=Important, 5= Very important.

Participants were asked 11 statements regarding their expectation about pursing a teaching career. Of the statements participants indicated feeling delighted by pupil's achievement was very important followed by believing they would be doing a socially worthwhile job (Table 3).

Table 3

Expectations about a Teaching Career

	n	Not Very Important		Not Important		Moderately Important		Important		Very Important		M	SD
		f	%	f	%	f	%	f	%	f	%		
I feel delighted by pupil's achievement.	70	0	0.00	1	1.40	8	11.43	30	42.90	31	44.29	**4.30**	0.72
I believe that I will be doing a socially worthwhile job.	70	0	0.00	2	2.90	9	12.86	32	45.70	27	38.57	**4.20**	0.77

Note. Item mean is shown in boldface. Scale: 1= Not very important, 2= Not important, 3= Moderately important, 4=Important, 5= Very important.

Conclusions/Recommendations/Limitations

The purpose of this quantitative study was to determine what motivates students at Iowa State University to pursue a career as an agricultural education teacher. Caution should be utilized as results from this study should not be generalized. Overall, students were motivated to become an agricultural teacher because they wanted to help people learn. Participants expressed they enjoyed teaching and were allowed the ability to impact a student's learning which made teaching a fulfilling career for participants.

Participants also deemed teaching as a career with a high skill set and choosing a teaching career was going to be hard work. Administrators should recognize this as a motivator and keep it in mind when hiring individuals to retain teachers within the profession. According to Kalme and Dyer (2000) high school principals were in favor of having agricultural programs and courses in their schools. Principals also indicated there are many benefits for students who take agricultural courses while in high school and educators teaching those courses should be of high quality (Kalme & Dyer, 2000).

Participants also indicated they are choosing teaching as a career because they want others to succeed. According to Johnson and Birkeland (2003) educators find their career as a teacher rewarding even though the classroom is very unpredictable. Changing the working conditions allows teachers to increase not only their success but their students' success in the classroom (Johnson & Birkeland, 2003). When the teacher can connect and build positive relationships with their students, the success of both the teacher and the students increases (Johnson & Birkeland, 2003).

Recruiting to agricultural education might be more effective if we understand what motivates undergraduates to pursue a career in agricultural education in the first place. Motivators may include teaching in a similar school or location to where they grew up (Ronfeldt, Reininger, Kwok, 2013). Providing undergraduate students with opportunities to teach or assist with local boys and girls clubs and 4-H clubs may help in keeping students motivated. Another way institution can increase student motivation to continue to choose agricultural education as a career would be through early field –based experiences.

Future research should be conducted with a larger population to see how motivations differ. Future research should also be conducted to follow undergraduates throughout their teaching career to see how motivations change based on the stage of where they are at in their teaching career. Understanding how motivation changes throughout a teaching career can aid in teacher retention.

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The Awareness and Implementation of the SAE for All Framework in Kansas

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Abstract

In 2017, the National Council for Agricultural Education introduced new types of SAE programs through the SAE for All Framework. There are five foundational components in the framework; career exploration, career readiness, personal finance, workplace safety, and agricultural literacy (which splits into five areas). Kansas is one of the first states to adopt the SAE for All Framework. Therefore, research was needed to determine how the guide is being utilized. The purpose of this study was to investigate the awareness and implementation of the SAE for All Framework in Kansas. An instrument specific to agricultural education in Kansas was developed. Seventy-three teachers responded (31% response rate). The level of implementation varied, but those who were aware of the framework strongly agreed that the framework and supporting materials are helpful. Research is needed to investigate the impact of the new framework on quantity and quality of SAE programs in the state. Additional training to increase the level of awareness and implementation is recommended.

Introduction

Supervised Agricultural Experience (SAE) programs have been an important component of the 3-part agricultural education model since Rufus Stimson's work in the 1940s. Several types of SAE programs exist including placement, entrepreneurship and research. Most agricultural educators believe all students should have a SAE program (Rank & Retallick, 2017).

In 2017, the National Council for Agricultural Education introduced new types of SAE programs through the *SAE for All* framework (2017). The change is intended to increase student involvement in SAE programs and allow every student to develop a program. Currently the *SAE for All* S*tudent* framework describes agricultural education SAEs by five foundational components which are career exploration, career readiness, personal finance, workplace safety, and agricultural literacy. Five immersion SAE categories (placement, ownership, research, school-based enterprise, and service learning) ranging across three levels of motivation extend from the agricultural literacy foundation level (SAE for All Framework, 2017).

Kansas is one of the first states to adopt the *SAE for All* framework. Two trainings were offered to teachers in 2017-2018 to assist them in implementing the new model. Research on this topic is warranted in an effort to determine how the guide is being utilized and the amount/type of teacher professional development needed to increase the impact of the new framework. Therefore, the purpose of this study was to investigate the awareness and implementation of the *SAE for All* framework in Kansas in an effort to influence the success of the new model.

Conceptual Framework

Lange, Kruglanski, and Higgins (2012) state that human behavior is performed rationally from the information available. Humans make decisions on what they believe they can get out of it. If they will receive something or earn something positively then it is reasonable to participate. If there is punishment or something negative involved then it is not reasonable to participate (Skinner, 1938). Teacher's use of the information they may or may not have could influence their implementation of the *SAE for All* framework.

Methods

This study aimed to investigate teachers' implementation of and recommendations for improvement of the *SAE for All* framework. Three research questions were developed to guide the study. RQ1. How many teachers in the state are aware of the *SAE for All* framework? RQ2. How do teachers plan on implementing the framework into their classrooms? RQ3. What advice do teachers have for improvements of the *SAE for All* framework?

An instrument specific to agricultural education in Kansas was developed which consisted of 18 multiple choice and short answer questions. Content validity was established by content experts prior to distributing the Qualtrics-hosted survey via email. Dillman's Tailored Design Method (Dillman, Smyth, & Christian, 2014) was used to maximize survey response rates (Rosenbaum & Lidz, 2007). This descriptive survey was distributed to 238 high school agriculture instructors in the state on April 9, 2018. A reminder email was sent out a week after for those who had not yet completed the survey. Data was analyzed using descriptive statistics.

Findings

After a three-week data collection period, 73 Kansas agriculture teachers had completed the survey (31% response rate). One-third of the respondents (36%, $n = 26$) were between the ages of 26 and 35. Almost 40% ($n = 29$) of the teachers have been teaching for less than five years. The majority of teachers (84%, $n = 61$) work in a single teacher program. There was almost an even split in gender with 47% male ($n = 34$) and 53% female ($n = 39$).

The first research question sought to measure the awareness of the *SAE for All* framework in Kansas. Only 58% ($n = 41$) of the respondents were aware of the *SAE for All* framework. There were a number of respondents who indicated they *might* be aware of the framework ($n = 17$). Seventy percent ($n = 31$) of the teachers learned about the framework through the Kansas Department of Education (KSDE) agricultural education program leader.

Teachers who indicated they were aware or might be aware of the framework ($n = 57$) were asked additional questions. Only nine teachers (16%) attended the SAE Summit in August 2017 with an additional 16 (n = 28%) participating in the the SAE Summit in January 2018. Research question two investigated how teachers plan to implement the framework. Again, only those who were aware of the framework were asked these questions ($n = 58$). Almost all of the respondents (91%, $n = 50$) agree that the framework can be helpful in their classroom. Eighty percent ($n = 44$) of teachers agreed that the framework allows projects to be more personalized. Seventy-four percent ($n = 40$) of teachers believe that the student and adviser guides are both helpful tools (see Table 1). The majority of teachers (60%, $n = 46$) plan to implement the framework in their 9th grade class.

Table 1

Questions related to SAE For All Framework Implementation

Item	Strongly Disagree		Somewhat Disagree		Neither Agree nor Disagree		Somewhat Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
Could be helpful in my classroom[1]	1	1.82	1	1.82	3	5.45	26	47.64	24	43.64
Allows projects to be more personalized[1]	0	0.00	1	1.82	10	18.18	27	49.09	17	30.91

Item	n	%	n	%	n	%	n	%	n	%
Will improve students employability skills[1]	1	1.82	1	1.82	10	18.18	24	43.64	19	34.55
Helpful for students applying for FFA proficiency awards[2]	1	1.85	3	5.56	15	27.78	20	37.04	15	27.78
Learning outcomes in the framework are clear and easy to understand[3]	0	0.00	1	1.89	18	33.96	27	50.94	7	13.21
Framework will fit well in to my classroom[3]	1	1.89	4	7.55	22	41.51	18	33.96	8	15.09
Student guide/advisor guide are helpful[2]	0	0.00	2	3.70	12	22.22	23	42.59	17	31.48

Note: [1]n=55; [2]n = 54; [3]n = 55

Teachers indicated they still would like to receive additional training on the SAE for All framework with 66% (n = 36) indicating they still have questions and recommend another SAE Summit to learn more about the new model (see Table 2).

Table 2

Teacher Need for More Training (n = 54)

Item	Strongly Disagree		Somewhat Disagree		Neither Agree nor Disagree		Somewhat Agree		Strongly Agree	
	n	%	n	%	n	%	n	%	n	%
I still have unanswered questions about the SAE for All framework	1	1.85	6	11.11	11	20.37	24	44.44	12	22.22
I would like there to be another summit on the SAE for All Framework	2	3.70	1	1.85	15	27.78	20	37.04	16	29.63

The final research question asked teachers to provide advice for improving the implementation and use of the framework. Only 25 teachers attended educational training provided by the Kansas Department of Education and Kansas FFA focused on the new framework. When asked about resource format, 74% of respondents (*n* = 40) would like it to be made available in additional formats such as; PowerPoint slides, videos, and an interactive mobile app. A majority (*n*=36) of teachers use Google Classroom to teach students and would appreciate resources in a compatible format. Just about all of the teachers who use Google classroom (97% *n* = 34) think it would be helpful to have the framework in a compatible format.

Conclusions

The results of this exploratory survey help to justify further training opportunities and support for teachers as they implement the new framework. While the response rate was lower than ideal, it does help to provide some insight into how the *SAE for All* framework is beginning to be

implemented in Kansas. The demographic makeup of the respondents is representative of Kansas agriculture teachers, young teachers, single programs, and almost evenly split by gender. While there were a large number of teachers who were aware or slightly aware of the new framework, there were others who were not aware (17%, n = 12). This is a sign that the promotion of the *SAE for All* framework was not permeating the consciousness of all the state's agriculture teachers. Increasing the number of teachers who are aware and receive training to implement the *SAE for All* framework could help increase the implementation (Lange, Kruglanski, & Higgins, 2012).

Of the teachers who were aware of the framework, the majority of them had not attended either of the SAE summits offered in the 2017-2018 school year. There are many reasons why they may not have attended, but at least they were aware of the new framework. The vast majority of teachers found the SAE for All framework and curriculum as helpful, but they requested additional training on how to implement.

There was a small number of respondents who did not believe the framework will be helpful in their classroom. This framework is a shift in how SAE programs have been taught and structured therefore some teachers may not be willing to adopt this new SAE model. Other teachers may believe it will take more effort to learn the new framework or do not value SAEs enough to implement them in their program.

Recommendations/Implications

As Kansas continues to implement the *SAE for All* framework, results from this study should be shared with Team Ag Ed, which includes the State FFA Advisor, Executive Secretary, university agricultural education staff, and current agriculture teachers.

Further research is warranted to see how well the state is using this framework and continue to answer teachers' questions. Research on the impact of this new framework on quantity and quality of newly developed SAEs and the type of SAEs being carried out is also needed. A longitudinal study to follow students through their educational career to see if their SAE program, using the new framework, led to an increase in collegiate agriculture students, graduates, and eventually agricultural professionals.

Recommendations for practice revolve around additional training and professional development. KSDE state staff, Kansas Association of Agricultural Educators (KAAE) leadership, university faculty, and National FFA staff can each play a part in promoting the new framework. Follow-up surveys and measurements to evaluate the impact of the trainings on student achievement, motivation, and teacher's ease of use are also recommended.

The *SAE for All* framework has the potential (and intent) to encourage more students to receive hands-on agricultural experience and find a passion within the agriculture industry. This framework is also being implemented within other surrounding states with similar goals of receiving improved student involvement. Results of this research and the efforts taken in Kansas can serve as an example of how to get teachers aware, trained, and eager to implement the *SAE for All* framework across the country.

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Preservice Teachers' Conceptualizations of Agricultural Mechanics

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Introduction

Career and technical education's (CTE) primary purpose is to "develop the knowledge and skills required for successful employment in a given industry" (Roberts & Ball, 2009, p. 82). CTE teachers must focus on content to meet industry needs (Lundry, Ramsey, Edwards, & Robinson, 2015; Pearson, Young, & Richardson, 2013; Roberts & Ball, 2009). CTE courses and programs, including school-based agricultural education (SBAE), provide the students the opportunity to explore different skill areas and technical career options (Lundry et al., 2015). Within SBAE, a popular coursework area is agricultural mechanics (Burris, Robinson, & Terry, 2005).

Agricultural mechanics is a widely chosen career for students and has traditionally been one of the highest areas of enrollment (Missouri Department of Elementary and Secondary Education, 2003; Tummons, Langley, Reed, & Paul, 2017). Enrollment in agricultural mechanics courses allows students many opportunities to practice mechanical skills and knowledge used in modern industry (McKim & Saucier, 2013). Agricultural mechanics allows teachers to be flexible with their curricula based on community needs (Miller, 1991; Parr, Edwards, & Leising, 2006, 2008, 2009).

Preservice teachers view agricultural mechanics as a vital part of a successful SBAE program (Burris et al., 2005), but may not feel they are fully prepared to teach students in an agricultural mechanics setting (Leiby, Robinson, & Key, 2013). Although these students find agricultural mechanics to be a vital part of a successful SBAE program, students develop anxiety when thinking about their abilities to teach agricultural mechanics (Hainline, Sorensen, & Chumbley, 2018). According to Hainline et al. (2018), preservice teachers are fearful in their perceptions regarding their knowledge and abilities to teach agricultural mechanics courses.

Theoretical Framework

Boud, Keogh, and Walker's (1985) Model of Reflection was used to guide our study (see Figure 1 below).

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Figure 1. Model of Reflection (Boud et al., 1985).

The model depicts how individual experiences are based on behaviors, ideas, and feelings. From experiences, individuals go through the reflection process, where they must analyze their feelings and re-evaluate the experience. Outcomes following the reflective process include new or different perspectives on the experience, change in behavior, commitment to action, and readiness for application (Boud et al., 1985).

Graphic organizers served as tools for us to understand the reflective process and investigate the outcomes associated with retrospective evaluation of individual student's experiences. At the beginning of the semester, we asked students to create graphic organizers regarding their conceptualizations of agricultural mechanics. At the end of the semester, students were asked to re-evaluate these graphic organizers. Students were asked to reflect back on the course and bridge the representations of their previously held conceptualizations of agricultural mechanics with their course experiences. Students were interviewed about the changes to their organizers to gain information about individual student outcomes.

Purpose & Objectives

The purpose of this study is to investigate changes in students' conceptualizations of agricultural mechanics throughout enrollment in the AgEdS 488: Methods of Teaching Agricultural Mechanics (AgEdS 488) course at Iowa State University (ISU). The following objectives were used to guide our study:

1. Describe the agricultural mechanics-related backgrounds of preservice teachers taking the AgEdS 488 at ISU.
2. Describe preservice teachers' previous conceptualizations regarding agricultural mechanics.
3. Describe changes in preservice teachers' conceptualizations of agricultural mechanics.
4. Describe preservice teachers' formal and informal learning experiences in agricultural mechanics prior to enrolling in the AgEdS 488 course.
5. Describe whether preservice teachers' experiences with agricultural mechanics influence their willingness to teach agricultural mechanics content in the future.

Methods

The participants in the present study were preservice agricultural education teachers enrolled in the AgEdS 488 course at ISU during the Spring 2018 semester. Two types of graphic organizers and an interview-based formative assessment provided qualitative data for this study. During the first course meeting, AgEdS 488 course students were asked to create a concept map illustrating their current conceptualizations of agricultural mechanics content along with a three column Know-Want to Know-Learned (K-W-L) chart representing what preservice teachers knew, wanted to know, and learned regarding agricultural mechanics content. All graphic organizers were scanned into gray-scale format and saved in a locked filing for the remainder of the semester. During the final week of class meetings, the AgEdS 488 course students were re-administered their graphic organizers and asked to fill in the last column of their K-W-L charts. Changes and additions made to concept maps were noted by a blue ink pen that reflected their conceptualizations of agricultural mechanics following their course experiences (see Figure 2). Students explained their concept maps and K-W-L charts in the interview process.
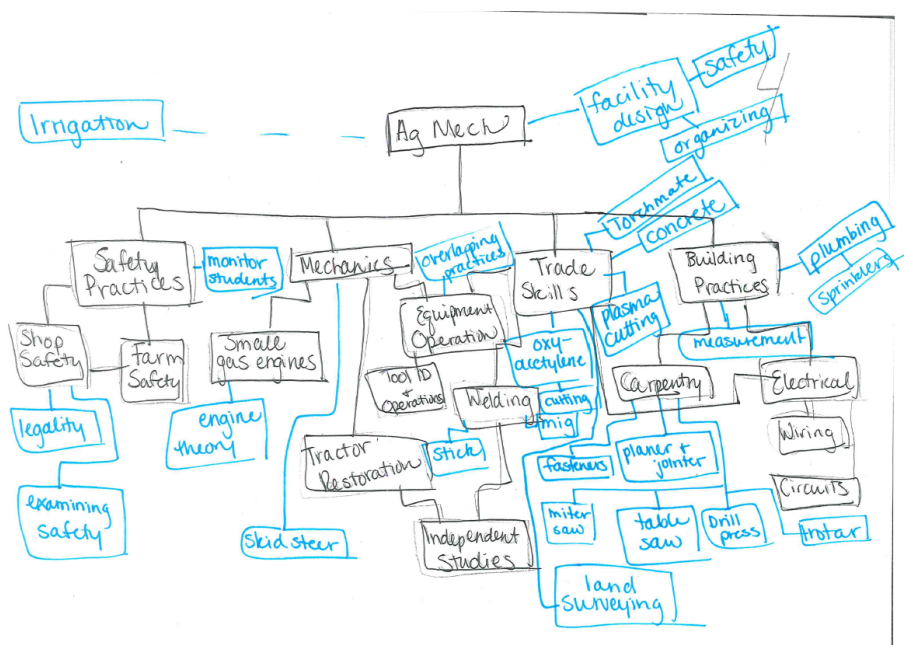

Figure 2. Concept Map Alterations

Immediately following completion of the graphic organizers, the AgEdS 488 course students were asked to partake in a private five to 10-minute interview. A 10 open-ended questionnaire instrument was used to collect data about the course students' previous experiences related to agricultural mechanics, their educational backgrounds, and their perceived relevance of agricultural mechanics content to their anticipated future experiences. Interviews were recorded using a digital recorder. Observational field notes were taken during each interview and were subsequently stored in a secure location. We followed the guidelines established by Lincoln and Guba (1985) to ensure trustworthiness, credibility, and reliability of the data by conducting

research logs, peer review of data, and member check procedures. We transcribed interviews and identified, analyzed, and established themes (Braun & Clark, 2006).

Findings

The findings identified from the triangulated artifacts are separated into themes listed in bold. Demographic data were collected during the face-to-face interviews (see Table 1).

Table 1

Participant Demographic and Background Information

Characteristic	f	%
Biological Sex		
Female	9	52.9
Male	8	47.1
Hometown Description		
Rural	16	94.1
Urban/Suburban	1	5.9

Eight ($n = 8$) AgEdS 488 course students had previous experience in agricultural mechanics or industrial technology education (ITE) coursework.

Informal Background: Upbringing and Vicarious Learning Experiences

Students indicated their upbringing played a part in their previous exposure to agricultural mechanics. Andy stated, "My family does a lot of wood working so I'm really familiar with woodworking. Growing up on the farm we would do different things. I'd help my dad work on the truck, tractors, and four-wheelers."

Students reported they gained experiences through vicarious leaning experiences. Donna said, "I've had minimal experience helping my dad, but usually in those situations I just watched my dad do the work." Leslie explained, "My oldest brother, Matt, built the cart that the oxyacetylene was on step-by-step." Ben stated, "I've done some woodworking and my dad will do random things around the house, so working with miter saws and a table saw." Gayle went on to explain that, "My Dad's an agricultural teacher, so I watched him have students in the shop."

Formal Background with Agricultural Mechanics

Several students stated they had prior exposure to agricultural mechanics through formal learning experiences. Marlene stated,

I remembered the woodworking, welding, and small engines right off the bat. I remembered that with each of these in high school we always kind of introduced it and then we introduce the materials that were going to be used.

Gayle explained, "I kind of had an idea through my shop classes in high school that the big factors are safety, wood, electricity, small engines and plumbing." Tom indicated, **"We actually had the opportunity to go up to the community college and take other classes. I took my welding and another friend of mine did carpentry and you could also do automotive."**

Motivations to Perform: Intrinsic Motivation, Extrinsic Motivation, and Desire to Learn More

Several students indicated their desire to perform in this class was from intrinsic motivation factors. Leslie indicated, "I like to be confident in my abilities, so doing the best that I can really kind of pushes me to be able to demonstrate that in the future." Ron further explained, "Definitely the aspect of how this is stuff I've always wanted to learn about and I would like to be good at and have experiences with." Mona-Lisa stated "I feel sometimes personal interest and drive isn't always there, but for this class it's really cool brand new stuff."

Students also indicated extrinsic motivation factors played a role in their performance in this course. Andy stated, "Around Iowa, some of the agricultural teaching jobs are more agricultural mechanics-centered, so being able to excel in and know what I'm doing will help me find a job when I graduate." Ben explained, "Probably just the fact I will probably have to teach this at some point in my life and it's good skills to have and know how to do."

Tom pointed out, "Probably having my friends in here is super helpful, especially when a friend and I drive out here so we can talk about how you do different things and go over what we need to know." Wendy indicated, "I think for a rural school it's more common to have a teacher that will teach the production side, horticulture and then also have an agricultural mechanics class, and I really want to be in a smaller school."

The desire to learn more was another motivator which pushed students to perform in the course. Ron stated, "I do wish we would've been able to spend more time on welding because it is something that doesn't just come naturally to many people and we only got to spend two weeks on it." Leslie stated, "I would've liked to have more time applying our skills with some of this stuff." Tom stated,

Just knowing how to better teacher because I feel that was one of the lessons we didn't have a lot of time to spend on. We could've delved deeper into engines because I'm not as familiar with that and I think it would better help me teach.

Course Relevancy: personal growth, professional growth, and broadened perspectives

Students indicated the AgEdS 488 course allowed them to grow in their personal lives. April stated, "I know this course material will be applicable, but definitely in teaching and just learning those real life experiences." Ben explained, "Now I know all the tips, tools, and

different techniques for certain shop activities that I'm going to need to know." Ann stated, "I think now with the experiences I have, I'll definitely be more willing to teach it [agricultural mechanics]." Jerry indicated, "I feel a lot more comfortable about standing up and teaching about it now than I did before I came." Marlene explained, "I think it's only made it more of a desire for me to get into the classroom just because I love being able to get students into those hands-on opportunities."

Throughout the AgEdS 488 course, students also indicated they grew professionally. Wendy indicated, "I think learning more about engines and plumbing and operating other types of woodworking tools has been really helpful and I'll definitely be able to take that into a shop setting." Sebastian explained, "Just being comfortable in teaching the different shop techniques. It's kind of nerve wracking to have 20 some kids out there messing with welders. So just giving us that experience was helpful in letting us be comfortable with welders." Leslie stated, "I feel before this class I wouldn't have wanted to take a teaching job if I had to teach agricultural mechanics, but now I'd be willing to try it out." Mona-Lisa stated,

> Before I kind of had always told myself that it really wasn't even a possibility for me to be able to teach in a program where it was a component of the classroom, but now I would say that I would consider teaching an agricultural mechanics class.

Conclusions & Discussion

Students' prior conceptualizations of agricultural mechanics were strongly influenced by informal experiences had while growing up. Students who had completed agricultural mechanics or ITE coursework prior to the AgEdS 488 course depicted a wider range of content areas when they initially completed their graphic organizers at the start of the course. Coursework experiences broadened students' perspectives of agricultural mechanics content areas. Content area specific to these early experiences consistently made up the majority of concepts written within initial concept maps and *Know* columns of the K-W-L chart. This is part of the reflection process as students had to return to the experiences had in the course to gather what perceptions changed (Boud et al., 1985).

All but one student indicated their high schools offered agricultural mechanics and/or ITE courses, but under half indicated they had taken one or more of these courses. Likewise, only two of the 17 students had exposure to formal agricultural mechanics and/or ITE coursework. Motivations to learn came largely from the extrinsic expectation that students may be required to teach this content in a high school setting. Students were also motivated to learn by intrinsic interest in the content, as they foresaw practical applications using course knowledge outside of professional education. Students revealed their confidence increased in their ability to effectively teach in an agricultural mechanics laboratory setting. This disjoint between the preservice teachers' motivations to learn and the lack of prior formal training in agricultural mechanics illustrated the need for increased support for preservice teachers' agricultural mechanics content-related knowledge and skill development.

Recommendations & Implications

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Further evaluation and assessment of preservice teachers' and early career educators' conceptualizations of SBAE content are advised. Longitudinal studies of these individuals' conceptualizations as they move from the preservice teacher phase into the early career phase could yield further information about the current status, possibly even the effectiveness, of agricultural teacher education programs. Results from this study cannot be generalized beyond this particular population. Preservice teachers experienced positive change in their personal abilities and confidence regarding agricultural mechanics. Increasing student efficacy in these skill areas will help to grant them the ability to be effective and independent problem-solvers. The results of the present study highlight the need for support of these courses in high school programs and support for preservice teacher efficacy building opportunities, especially while prospective SBAE teachers are enrolled in high school.

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Perceptions of Agricultural Educators Entering the Profession through Alternative Means

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Introduction

Effective teaching has been a topic of research for more than 40 years (Rosenshine, 1976; McDonald, 1976; Young & Shaw, 1999; Wong & Wong, 2010). Research typically measured teacher's efficacy by student achievement and engagement of students (Rosoenshine, 1976; McDonald, 1976; Peterson & Fennema, 1985; Fisher et al., 1981). However, effective teaching is difficult to define due to its many in-depth factors including: perspective, methodology, type of class and information, size of class, and the students' abilities (Young & Shaw, 1999). Wong and Wong (2010) attempted to summarize past research relating to effective teaching. The three most significant characteristics of effective teachers are being exceptional at classroom management, knowing how to teach for learning and mastery of content, and having positive expectations for all students' successes (Wong & Wong, 2010).

Alternative certification pathways are designed for individuals who do not have a baccalaureate degree in education. "The individuals are often certified based upon work experience, completion of coursework, or completion of a baccalaureate degree in the subject area they were hired to teach," (Ruhland & Bremer, 2002a p. 2). Ruhland and Bremer (2002a) stated 28% of the 632 CTE teacher respondents indicated they were certified through alternative certification. While these educators have extensive knowledge in their fields, they tend to lack knowledge in pedagogy and instructional activities including lesson planning, objectives, explaining content, and navigating controversial topics (Roberts & Dyer, 2004b). With many agricultural educators lacking background in pedagogy, professional development opportunities with emphases on pedagogy and instructional activities should be provided for these alternatively certified teachers to increase the effectiveness of the teachers (Ruhland & Bremer, 2002a; Robinson & Edwards, 2012).

Alternatively, certified agricultural educators tend to struggle more with curricula development due to their lack of training in pedagogy (Robinson & Hayes, 2011). The inadequate knowledge in pedagogy can negatively impact the students' experiences despite the high technical knowledge that alternatively certified teachers possess (Robinson & Hayes, 2011). Providing training for alternatively certified teachers on various pedagogical practices could benefit all students. "By focusing on pedagogical practices that work with the most challenging and vulnerable students, it is possible to identify the critical elements of teaching that results in success for all children," (Entz, 2007, p. 2).

Theoretical Framework

Roberts and Ball's (2009) content-based model for teaching agriculture was utilized as the framework for this study. The content-based model proposes the agricultural industry feeds

into industry-validated curricula. Educators who have knowledge and experience in agriculture, such as schooling and "at least two years of on-farm experience" (Roberts & Ball, 2009, p.83). Agricultural experiences that alternatively certified educators possess enable them to effectively educate their students in agriculture. While in school, the industry-validated curricula and the experience in agriculture then lead to observable skill acquisition. As skilled workers, the students can apply the content and skills learned from agricultural education courses to further the agricultural industry, and thus restarting the cycle of the content-based model. Alternatively, certified educators are competent in the technical knowledge, but struggle with pedagogy (Robinson & Hayes, 2011).

Purpose and Objectives

This research study specifically focuses on how school-based agricultural education programs contribute to career and technical education (CTE) and broader educational initiatives?" (Thoron, Myers, & Barrick, 2016, p. 43). This qualitative study aimed to examine the self-reported perceptions of agricultural educators entering the profession through alternative means. The objective was to explore the decision and reasoning resulting from the choice to pursue a career in agricultural education.

Methods

The purpose of this study was to determine the perceptions of alternatively certified agricultural educators upon entering the profession and the context for their career choice. This study utilized interviews in which three main questions were asked to collect data from alternatively certified agricultural educators. The questions were open-ended and were not leading (Malhotra, 2006). Emails for participants were obtained from a list of alternatively certified teachers from the State Department of Education. Initial emails included the objectives, informed consent, and options for a phone interview time. Follow up emails were sent to non-respondents. Phone interviews were conducted, and a basic audio recording device was utilized to record the interviews. Field notes were taken during the interviews as well. After the interviews were conducted, the researchers transcribed interviews verbatim and were sent back to the participants to check for accuracy. The transcribed interviews were analyzed and coded individually by researchers (Braun & Clark, 2006). The transcriptions helped the researchers identify significant statements, develop descriptions, and recognize parallels among the participants and their responses (Creswell, 2013). Once researchers individually coded the data, notes were compared, and themes identified (Braun & Clark, 2006). Credibility, trustworthiness, and reliability were ensured by utilizing research logs, peer review of study data, and member checks (Lincoln & Guba, 1985).

Findings

There was a total of eight participants in this study. Four were males and four were females. Five participants had agricultural classes in high school. Four participants had career(s)

prior to teaching, while the other four began teaching agriculture in a middle school and/or high school after graduating. Participants were asked how and why they began teaching and as a result four themes emerged from the data. The themes are highlighted below:

No Plan to Teach but the Opportunity Arose

All eight participants stated they were not planning on teaching agriculture after graduating college. Participants indicated their main reason for choosing agriculture was because the opportunity arose. The opportunity presented itself in many ways, from family and community support to a life event that pushed them towards a high school agriculture position.

Spencer said, "I wasn't certified, but emailed the school and offered to be a long-term sub. The school worked with the state to get me started on alternative certification." Lisa recounted a similar situation and said, "My husband suggested I talk to the school to see if they would be interested in hiring me. After talking with a few people, I learned that I could get my teaching certification after college while working." Sarah explained, "I was heading back to my hometown after graduating college to work on the family ranch… I was then approached to teach." Wesley explained, "I had a rough week at [work] and when the principal called me, I had enough and went to teaching… I choose it because a door opened."

Enjoy Teaching

Despite not having a plan to teach agriculture and having not completed a formal agricultural education certification program in college, the participants felt satisfied with the decision to teach. Several of the participants explicitly stated they enjoyed teaching.

Adam recounted, "I could have earned more money doing anything else, but I wanted a job that I found interesting… I enjoy working with kids, and I really enjoy learning." Wesley and Ryan both individually said, "I love teaching," and Spencer stated, "I love what I do… This is my full-time job and passion." Lisa indicated, "…though [teaching agriculture] was not a plan of mine until [the school] offered me the job, I am extremely happy in the decision I made," and Emily stated, "I cannot imagine doing anything else."

Regret not Being Certification Sooner

The participants' enjoyment of teaching agriculture was also evident in their regret for not becoming certified to teach sooner. None of the participants initially finished a degree in agricultural education during college, and thus were not certified to teach agricultural education upon graduation. Participants clearly stated they regretted not becoming certified to teach sooner.

Ryan explained, "I knew it was something that always interested me, but I never made it my major in college. That is something I regret." He went on to say, "I like the career choice I made, and just wish that I had made that choice in college and not after I graduated." Spencer had previously majored in agricultural education prior to switching to agricultural business. He said, "I do regret not finishing out my ag ed degree. I have learned a lot in the six years I've taught and have worked hard to fill in the blanks on what I missed out on."

Passion for Youth and Agriculture

While the participants were not directly asked if they were passionate for youth and agriculture, all participants eluded to it. Regardless of the participants' backgrounds, teaching experience, and path to education, they all had a passion for youth and agriculture.

Sarah explained, "I've always been passionate about learning and agriculture although I never imagined teaching." Alex made the switch to agricultural education because he wanted to "have an impact on students and show them the opportunities that are out there." Adam said, "I choose [agricultural education] because I enjoy working with kids and … learning about plants, animals, and mechanics, and then taking that information and trying to distill it into something that students understand." When Lisa heard the local high school did not have an agricultural education teacher, she pursued the position. She said, "It was extremely important for the young people of such an agriculture-based community to get some agriculture education in high school."

<center>**Conclusion/Recommendations/Implications**</center>

The intent of this study was not to generalize the results to all teachers who have been alternatively certified. Discretion should be used to ensure that results are not generalized to a broader population. Overall, participants indicated they enjoyed teaching agricultural education despite not having the plan nor formal education to teach. Participants were glad they chose to pursue their passion for youth and agriculture by teaching agriculture once the opportunity to do so arose. However, many participants regretted not becoming immersed in the profession earlier in their careers. As indicated in the content-based model for teaching agriculture (Roberts & Ball, 2009), experience in the agricultural industry factors into the industry-validated curricula that is taught in agricultural classes. Alternatively, certified educators do have extensive knowledge and experience in the agricultural industry, which should aid them in creating industry-validated curricula for classroom and/or laboratory instruction.

While alternatively certified educators are very effective in the classroom and are needed to help decrease the current shortage of agricultural teachers (Smith, Lawver, & Foster, 2017), they should receive professional development that is tailored to them. These professional development experiences should provide alternatively certified teachers more background in pedagogy, especially classroom management (Schonfeld & Feinman, 2012) and incorporating areas such as shop and FFA into the agricultural classroom (Roberts & Dyer, 2004b).

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Alternatively, certified educators need opportunities to account for the lack of formal agricultural education, such as a professional development in the form of a mentoring program. Mentoring programs that "provide trained mentors who have the time and resources to plan lessons with candidates, share curricula, demonstrate lessons, and provide feedback after frequent classroom observations" are highly effective (Humphrey, Wechsler, & Hough, 2008, p.2). Support throughout the first few years of teaching has been shown to positively impact teachers' experiences in the profession (Ruhland & Bremer, 2002b).

Providing alternatively certified teachers with a formal mentor in another agricultural education program, as well as a local CTE educator as a supplemental mentor could be beneficial. The Texas Education Agency (TEA) has created the Career and Technical Education New Mentoring Program, which offers mentoring and professional development, such as "help with lesson planning, assessments, curricular materials, and classroom management, through year-long mentoring activities and just-in-time assistance" for new teachers (Resources for Learning, n.d., para. 1). There are Facebook communities provided through this program that connect new CTE teachers with each other to share information, advice, ideas, and more. This community creates a slightly similar atmosphere by providing a local mentor and allowing educators to make connections with other teachers.

Future research should be conducted in areas of pedagogy that alternatively certified teachers struggle the most with. A long-term mentoring program or induction program which lasts for at least five years could be beneficial for alternatively certified educators. While professional development is a great way to further improve both alternatively certified and beginning educators, professional development may need to be tailored differently to the two groups.

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Assessing the Longitudinal Impact of a Specialized Youth Training Program

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Introduction/Need for Research

One of the most important, if not the most important, aspects of a successful agricultural operation is water. In Kansas, like many states, we are keenly aware of the importance of having the right quantity and quality of water. The major source of water in western Kansas is the Ogallala Aquifer. According to the Kansas Department of Commerce, the Ogallala aquifer adds around $7 billion to the economy in Kansas alone (Kansas Department of Commerce, 2013). The ability to maintain irrigated agriculture and livestock production in western Kansas is directly linked to a community's ability to maintain its schools, hospital, and other critical quality of life elements (Wise, 2015). This large aquifer, which is a part of the High Plains Aquifer system and lies under portions of eight states, has become depleted over the last several decades due to overuse (United States Geological Survey, 2016).

Kansas is in need of more water conservation and education efforts. A team of several state agencies developed the Long-Term Vision for the Future of Water Supply in Kansas (Kansas Water Office, 2015), addressing the issue of water depletion. The Education and Public Outreach Supplement of the Vision specifically states, "Increase awareness and knowledge of Kansas youth on water-related issues through K-12 education and beyond-the-classroom opportunities (p. 72) " and "Develop partnerships between industry, community, and educational institutions that will promote and train for water-related careers" (p. 72). Action items directly stated in the supplement include, "Collaborate with youth-related organization leadership on water-related educational opportunities and establish sessions and experiences focused on water" (p. 75).

The Vision for the Future of Water Supply in Kansas validated the need for a youth water education conference. This conference sought to train a group of motivated high school agricultural education students to disseminate key information about water use and conservation efforts to communities across the State. Students who attended the conference became knowledgeable on water issues affecting the state and improved their public speaking skills. They were then tasked with educating their communities about water conservation, water management, and other key water-related issues impacting the state. The overarching goal of the conference was to train these young people to be advocates for water in Kansas.

The 2016 – 2020 AAAE National Research Agenda Priority Area 7: Addressing Complex Problems includes the question "How can formal and nonformal curriculum in Agriculture and Natural Resources address emerging complex issues?" (Andenoro, Baker, Stedman, Weeks, 2016, p.59). This training program was designed with the assistance of content experts, the Kansas Department of Agriculture, and agricultural education faculty. There are many components to the water issue in Kansas and it will take many individuals working together to

find a solution. This training program hopes to engage young people in the discussion to get them interested and motivated to have a positive influence in working toward a resolution to the water situation in Kansas.

Conceptual Framework

The conceptual framework for this research study involved retention and self-efficacy. Retention is a complex process in which long-term memory enables the learner to "locate, identify, and retrieve" (Sousa, 2017, p. 97) information for later use. Knowledge retention involves several components, but of most interest was the use of rehearsal. Rehearsal is the "continuing reprocessing of information" (Sousa, 2017, p. 97) and is necessary to move knowledge from the working memory to the long-term memory. Students were asked to apply and share their knowledge about water resources throughout the year as a form of 'rehearsal.' The ability to speak in front of others and do so well was assessed in terms of their public speaking self-efficacy. Bandura (1986) theorized four specific experiences that help build an individual's self-efficacy: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states (McKim & Velez, 2016). Students in this study were provided an opportunity during the training to practice their public speaking skills, watch each other write and present speeches, receive support from each other, and work to overcome any nervousness or anxiety. By learning the content and applying it via public speaking activities, the students will have the opportunity to positively impact the state water situation.

Purpose and Objectives

The purpose of this research study was to evaluate the impact of a water-focused educational workshop on the knowledge retention and public speaking self-efficacy of students.

The objectives of the study were to:

1. Identify the level of student knowledge on water-related topics and issues.
2. Identify the public speaking self-efficacy of students attending the conference.
3. Examine the retention of knowledge and public speaking self-efficacy after the conference.
4. Describe the water-related educational outreach activities the advocates participated in throughout the year.

Methodology

This study was a one group, pretest posttest design with multiple follow-up surveys throughout the year. The use of a panel study allows for follow-up with the same subjects over a period of time, but there are several challenges to this design including; awareness of the data collection instruments, dropping out, and differences in motivation of subjects (Gall, Gall, & Borg, 2007). On the other hand, this type of research is suitable for identifying individual changes (Gall, Gall, & Borg, 2007).

Participants were Kansas high school students enrolled in agricultural education courses who were recruited to participate in the inaugural conference. Eleven high school students attended the Kansas Youth Water Advocates Conference July 12-14, 2017, in Manhattan, KS. IRB approval was obtained in order to collect data from the students.

The knowledge assessment was researcher developed with 15 questions on the pretest and 22 questions on the posttest. It was examined by a panel of experts for content validity. The public speaking self-efficacy assessment was modified from another instrument (Arduini, 2011). It consisted of 20 questions on a Likert-type scale to assess students' perceived public speaking ability.

The knowledge and self-efficacy assessments were administered before and after the conference. All eleven students completed those instruments. The instruments were then sent out through Qualtrics three more times throughout the year; in October 2017, January 2018, and April 2018. Data was collected from each of these instrument distributions and compared to examine retention of knowledge and public speaking self-efficacy. Survey methods were used due to the instruments and desire to collect data from students throughout the year.

There are several major limitations to this study which need to be addressed. First of all, there was a small number of participants ($N = 11$) who attended the training. Additionally, the students did not have to complete the follow-up surveys to assess their knowledge retention and self-efficacy development. Therefore, only two students completed all four rounds of data collection. This was a specific training program targeting Kansas water issues and resources so generalizability to other states is cautioned.

Results & Conclusions

Students completed a pre and post assessment during the training conference. Three months after the training, students received a Qualtrics survey which included both the knowledge assessment and public speaking self-efficacy questionnaires, as well as asking them to report the work they had done so far connected to water.

Due to the small number of participants, research objectives 1, 2, and 3, will be presented together. Table 1 details the mean scores and number of respondents for each round of data collection for the knowledge assessment. The students reported a mean score of 8.64 (SD = 1.37) on the 15 question pretest. The conference posttest yielded a mean score of 17.27 (SD = 3.17) out of 22 points. The posttest scores for the three follow-up rounds never scored above the conference posttest mean, but it also did not decrease by more than a point for each administration. This is positive in that they did not lose their knowledge on water-related topics during the months following the training.

Table 1

Knowledge Assessment Scores

	N	Minimum	Maximum	Mean	SD
Conference Pretest[1]	11	6	11	8.64	1.37
Conference Posttest[2]	11	10	20	17.27	3.17
October Posttest[2]	6	16	17	16.67	.52
January Posttest[2]	6	12	20	16.50	2.88
April Posttest[2]	2	17	17	17.00	.00

The public speaking self-efficacy pretest yielded a mean score of 4.39 (SD = .31) where the maximum score was a 6.0 (Table 2). The post conference administration yielded a score of 5.18 (SD = .44) which demonstrated an improvement in their confidence to speak in front of audiences. For the next three rounds of data collection, the score remained above a 5.00 which was a good indicator that they were still confident to speak in public, but did not gain substantially in the perceived self-efficacy. The final round did yield the highest mean score, but there was only two respondents.

Table 2

Public Speaking Self-Efficacy Assessments

Administration	N	Mean	SD
Pre Conference	11	4.39	.31
Post Conference	11	5.18	.44
October	8	5.08	.44
January	6	5.13	.37
April	2	5.60	.19

Note: 0 = no answer, 1 = not at all true, 2 = not true, 3= slightly not true, 4 = slightly true, 5 = true, 6 = very true

We evaluated the change in scores on the two administrations in which all the participants responded. The knowledge assessment showed positive improvements from pre (M = 8.64, SD = .41) to post-conference (M = 12.18, SD = .66) when comparing the same 15 questions asked on both surveys. A paired-samples t-test showed both the knowledge assessment (t(10) = -9.63, p < .01) and the public speaking self-efficacy assessment (t(10) = -8.70, p < .01) were statistically significant. Due to the low response rate of the follow-up questionnaires, no further data analysis was conducted.

The final research objective sought to determine how students were applying the knowledge and skills they gained through the training. Students participated in the Kansas State Fair with a booth designed to share their water knowledge with youth and adults. They gave speeches in their high schools and college communication courses, taught lessons to their classmates and elementary age students, competed in the FFA Public Speaking CDE, wrote research papers for the Kansas Youth Institute, presented at local civic organization meetings, and worked an educational booth at a tradeshow. One student hosted the Governor during his tour of farms in [region/state] and four were present for the Governor's Water Conference in [city, state].

Students learned and become more efficacious from this educational training. The total number of people impacted by the advocates work is hard to estimate, but it was evident that the majority of students were working to share their knowledge throughout the year. Unfortunately, only two students completed all of the post-conference assessments which limited our ability to further analyze the data.

Implications/Recommendations/Impact on Profession

This was the first year that Kansas offered such a training opportunity for young people. While we had difficulty in getting students to complete the follow-up surveys, we were able to ascertain the impact of the program through the activities students were participating in throughout the year.

There are several recommendations for research specifically; assessing participants as to their behavior change, career choice, and impact on community decision making. The Kansas water vision document has been out for a couple of years now. This program was initiated as a specific way to meet one of the goals. It would be interesting to research how other components of the water vision are progressing and share best practices with each other.

Recommendations for practice include expanding the training program to have more time for knowledge-gain and skill development. This would allow the students to not feel rushed to learn and apply new content, but rather have the necessary time to reflect on what they are learning and how they can have an impact in the communities. Additionally, lessons learned from this training program should be shared with other states working on similar water-related issues. The engagement of youth in these key issues is vital to the sustainability and growth of our agricultural economy.

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Creating a Digital Ecosystem to Cultivate the Digital Leadership of Preservice Agriculture Teachers

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Introduction

Preparing teachers for the classroom involves not only preparing for today, but also preparing for tomorrow. It is highly unlikely that society will ever become less digital and that individuals will not be required to use learning technology as a part of their role as educator (Lindner, Rodriguez, Strong, Jones, & Layfield, 2016). Learning technology is already an integral part of educational practices, and to master its effective and innovative usage in the classroom, educators need to serve as digital citizens and digital leaders. To help prepare for success with current and future technology, pre-service teachers should be exposed to the types of educational technology that they will use in the classroom, learn to practice digital citizenship, and receive instruction in how to use a digital ecosystem to communicate and interact with others and to develop the characteristics of digital leadership.

The purpose of this study is to examine the engagement in a digital ecosystem by pre-service teacher candidates. A digital ecosystem is an interdependent group of people that share an established group of digital platforms for a mutually beneficial purpose, such as a common interest, and that is based off of the adaptive and sustainable processes from natural ecosystems (Brisco, Sadedin, & De Wilde, 2011). Within a digital ecosystem, certain digital platforms are used to communicate and share ideas. A digital ecosystem is governed by rules of digital citizenship and influenced by digital leaders.

The concept of digital citizenship is the development of the skills and knowledge to effectively use the Internet and other digital technology to participate responsibly in social and civic activities and to become a person who uses the Internet regularly and effectively (Casa-Todd, 2018). Through the usage of proper digital citizenship, positive digital interactions occur within a digital ecosystem. These positive interactions help agriculture teachers to engage in professional discourse with one another through the usage of digital technology. Digital citizenship can also lead to the development of digital leadership within the digital ecosystem.

Digital leadership is the process of exerting social influence through the usage of digital technology, which maximizes the efforts of others, towards the achievement of a goal (Franciosi, 2012). One goal of a digital ecosystem is to create, enhance, and promote digital leadership among the members of the ecosystem itself. Agricultural educators demonstrate this establishing and utilizing digital professional learning communities. Digital leadership also allows for positive change within the digital ecosystem and promotes additional usage of technology.

Conceptual and Theoretical Frameworks

According to Bandura's (1986) social cognitive theory, an individual's self-efficacy belief influences their choice of activities, how much effort they will expend, and how long they will

sustain effort in dealing with stressful situations. Wu and Wang (2015) found that the application of Bandura's social cognitive theory to teachers' technology self-efficacy is crucial and should be highlighted by teacher educators. It was recommended that when designing training programs for improving teachers' technology self-efficacy, teacher educators should pay particular attention to how to increase their use of sophisticated online educational technology, and that pre-service teachers should be guided to practice making use of their reflective abilities in technology-related tasks.
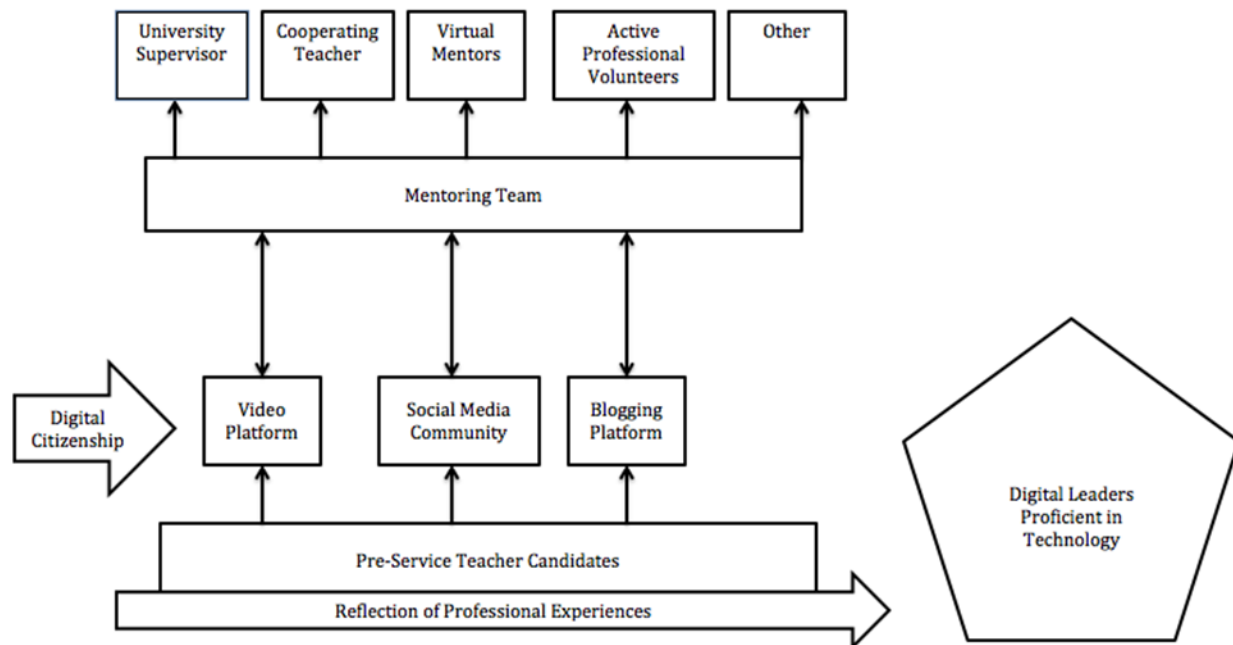

Figure 1: Conceptual model of a digital ecosystem

Figure 1 outlines the conceptual framework for the digital ecosystem in this study. The digital ecosystem is comprised of three platforms: video (Edthena), social media (Twitter), and blogging (Blogger). These platforms are used by the pre-service teachers to create and share reflections of professional experiences and to engage with professionals in the form of a virtual mentoring team. This process provides the pre-service teachers with feedback to help them continue to grow as digital citizens and to begin the transition process to becoming digital leaders.

Purpose and Research Questions

The purpose of this study is to examine the engagement in a digital ecosystem by pre-service teacher candidates. The research questions that guide this study are:

1.   What is the level of engagement by pre-service candidates on the three selected platforms of the digital ecosystem?

2.   What types of interactions occurred between teacher candidates and virtual mentors within the digital ecosystem?

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Methods

Creating a digital ecosystem for educators includes several components. Research conducted by Liu, Tsai, and Huang (2015) and Paulsen, Anderson, and Tweeten (2015) demonstrates that both pre-service teachers and mentor teachers develop professionally in relation to technology integration when they engage through different digital platforms. The platforms chosen for the digital ecosystem in this study involve blogging, social media, and video.

The use of blogging has its merits in building on and improving upon the educational technology skills of teachers and has the potential to be a transformational technology for teaching and learning (Williams & Jacobs, 2004). Farmer (2006) writes that blogging allows for the development of a digital community in order to empower the process of learning, while Montero-Fleta and Pérez-Sabater (2016) claim that writing blogs benefits teachers and learners in terms of enhancing their professional practices due to the factors of interactivity and realism existing in blogs.

Twitter has been shown to help enhance the educational technology usage of teachers at all stages of their career, and has been used a forum for professional communication to help expand teaching and learning beyond the classroom (Ebner, Lienhardt, Rohs, & Meyer, 2010). Paulsen et al. (2015) researched the use of a Twitter-based community of practice with pre-service agriculture teachers, while Wenger (2007) studied how an electronic community of practice via Twitter can provide pre-service teachers with an opportunity to build relationships and learn from each other.

Participating in video observations allows pre-service the capability to watch and reflect on their lesson, and enables them to experience virtual mentoring and practice giving and receiving virtual peer feedback (Murphrey, Rutherford, Doerfert, Edgar, & Edgar, 2014). van Es, Cashen, Barnhart, & Auger (2017) also found that videoing lessons can be a powerful tool for supporting candidates in developing skills at noticing and analyzing teaching in the context of a course

The population for the study involved pre-service agriculture teacher candidates and the virtual mentor teams. The data reviewed for this study was all secondary data sets collected from various digital platforms after the yearlong program across multiple courses.

As part of their coursework, students enrolled in a pre-service agriculture teacher preparation program were asked to engage and participate in a digital ecosystem through the usage of three digital, internet-based technology platforms: Blogger, Twitter, and Edthena. They also used these three platforms within the digital ecosystem to engage with a virtual mentoring team. Students were required to create specific numbers of blog posts, Tweets, and lesson videos for both the fall and spring semesters, which served as points to generate conversation and interaction with their virtual mentoring teams.

Secondary data on the number of Blogger blogs authored, Tweets posted, Edthena videos uploaded, and feedback comments left on Edthena videos were gathered and measured across two semesters. A specific course hashtag was created for Twitter and the amount usage of the

hashtag was recorded. Data on the usage of this hashtag was gathered using the advanced social media monitoring software Keyhole, which a real-time hash tag tracker for Twitter.

The data were then organized and sorted by platform usage and type of interaction for each semester, as well as overall. The data were also examined for trends in usage as well as levels of engagement to see which were most commonly used, and which were not used as often.

Findings

Throughout the course of the fall and spring semesters, pre-service teachers shared professional reflections through Blogger Edthena, and Twitter. The pre-service teachers authored blog posts on Blogger. The pre-service teachers also uploaded videos to Edthena for feedback from their virtual mentors. In the addition, the pre-service teachers also generated Tweets. See Table I.

Table 1

Fall and Spring Semester Digital Technology Usage of Blogger, Edthena, and Twitter by Pre-Service Agriculture Teachers

Semester	No. of Blog Posts on Blogger	No. of Video Lessons Uploaded to Edthena	No. of Tweets
Fall	271	125	1,047
Spring	268	32	979
Total	539	157	2,067

Data were collected on the interactions between teacher candidates and virtual mentors for both fall and spring semesters. The data were sorted by number of Edthena video lesson comments and different uses of the course hashtag. The number of users corresponds to how many people posted a Tweet with the course hash tag in it. The reach represents the number of unique users who saw a tweet with the course hashtag. The impressions correlate to the number of times that users saw a post with the course hashtag. See Table 2.

Table 2

Fall and Spring Digital Interaction Between Teacher Candidates and Virtual Mentors

Semester	No. of Video Lesson Comments on Edthena	No. of Twitter Users	Twitter Reach	Twitter Impressions
Fall	541	103	291,236	1,301,684
Spring	284	84	195,401	1,056,144
Total	825	152	454,459	2,357,828

Conclusions

The consistent number of blog posts authored by the pre-service teachers across both semesters demonstrates their willingness to use this tool as part of the digital ecosystem and in the cultivation of their digital citizenship and digital leadership. This also aligns with Farmer's (2006) recommendation that blogging empowers learning and Montero-Fleta and Pérez-Sabater's (2016) claims that writing blogs benefits teachers and learners in terms of improving their professional practices.

Twitter was the most frequently used platform within the digital ecosystem to demonstrate digital citizenship and digital leadership behaviors. The pre-service teachers consistently used Twitter as a form of communication between themselves and their virtual mentors during both semesters, as evidenced by the number of Tweets authored and the usage of the course hashtag. This supports research conducted by Wright (2010) and Risser (2013) on the usefulness of Twitter as a communication and mentoring platform for educators.

The utilization of Edthena during both fall semester, when it was required on a weekly basis, and the spring semester, when it was required on a monthly basis, allowed the pre-service teachers to experience virtual mentoring (Murphrey et al., 2014) through feedback comments left on their videos. The continued use of this platform throughout both semesters demonstrates the willingness of the pre-service teachers to participate in video lesson observation as part of their digital citizenship and digital leadership development. Using Edthena for these purposes supports van Es et al.'s (2017) findings that videoing lessons can be a powerful tool for supporting pre-service teachers in developing skills and analyzing teaching.

Discussion

Findings from this study indicate that pre-service teachers are able to demonstrate digital citizenship behaviors through their communication with other agricultural educational professionals using digital communication tools and COPs such as Blogger, Edthena, and Twitter These platforms, when used in combination in a digital ecosystem, also served as a springboard to start the cultivation of digital leadership behaviors among the pre-service teachers.

The findings of this study also align with prior research that demonstrated that both pre-service teachers and mentor teachers develop professionally when they engaged through different digital platforms, as it encourages both groups to practice digital citizenship and digital leadership (Liu, Tsai, & Huang, 2015). Based on this, the format of a digital ecosystem utilizing virtual mentors will continue to be used in future years with other cohorts of pre-service agriculture teachers. To improve the clarity of the digital ecosystem, a handbook was created for use with future groups of pre-service teachers and their virtual mentors to guide them in navigating and using the different platforms within the digital ecosystem. In addition, video conferencing meetings will be held between pre-service teachers and their mentors to provide instruction on the platforms within the digital ecosystem, the rules for digital citizenship, and the pathway for digital leadership development.

Risser (2013) suggests that as educational technology changes, it is important to provide innovative online electronic communities for educators. Given that changes in technology can present challenges to the success of a digital ecosystem, the platforms used within the digital ecosystem be evaluated on an annual basis to see if they are still viable and relevant, or if they need to be replaced by a new platform This review is necessary to continue provide a digital ecosystem comprised of relevant platforms for pre-service teachers to interact with one another and their virtual mentors.

Future research will be conducted on how to measure the strength and types of the interactions occurring across the platforms within digital ecosystem by both the pre-service teachers and their virtual mentors. It is also recommended to research and identify specific behaviors relating to digital citizenship and digital leadership within the digital ecosystem as well. Once identified and defined, digital citizenship and digital leadership traits of the different individuals within the digital ecosystem and how they change over time can be researched and measured.

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Study Abroad Community Development Project: Students' Experience
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Introduction
The U.S. higher education reached a consensus about including international component in college education (Dennis, 2004). The major trend of institutional internationalization allows author to focus on short-tern sojourns as a subject of study. Study abroad program provides valuable opportunity to enrich students' personal and professional experience however, the key question about experience of learning outcomes barely explored (Stronhorst, 2005). Students can receive much more experiential learning opportunities when the short-term study abroad program planned and implemented properly.

Theoretical Framework
The traditional educational experience is limited by classroom settings or distance learning. Coryell (2013) emphasized "a shift in learning facilitation is required from a passive learning experience to an active one. Instead of solely communicating knowledge to the learner, this method involves experiential learning, which requires students to solve real-world problems and devise solutions in context" (Coryell, 2013, p.11).

Kolb explained Experiential Learning Theory through a two-level approach; (a) four stage cycle of learning and (b) four separate learning styles (Kolb, 1984). However, this study adopted only first level to explain the student's experience and learning outcomes gained during the short term study abroad program. Kolb's (1984) four stage cycle of learning consisted of: (a) concrete experience, (b) reflective observation of new experience, (c) abstract conceptualization, (d) active experimentation or testing. Kolb (1984) emphasized that effective learning occurs when the learner tests all stages of the model. Therefore, experiential learning concept provides a solid theoretical framework and grounding to the practice of educational intervention – such as study abroad. Rodriguez and Roberts (2011) emphasized that through community involvement and extracurricular activities students gain international learning experience.

Sachau, Brasher and Fee (2010) studied two, six weeks service-learning trip abroad and they found that study abroad program helps students increase knowledge, shape attitude, and build confidence. Dewey (1938) identified service learning as a form of experiential learning based on combination of community service or volunteer work, and coursework. The service – learning study abroad programs help students better understand specific social problems in host country and gain confidence to travel (Clark, Flaherty, Wright, & McMillen, 2009). Doley, Doley, and Carranza (2008) noted that being overseas students' gain an understanding of local community through personal interaction with local citizens and their culture.

Study abroad program provides an important opportunity for young adults to absorb new information and learn throughout personal experience based on experiential learning theory. The experiential learning theory helped to provide three assumptions for this research: (1) During the short term study abroad experience students' intercultural competency and knowledge of agriculture in developing country will increase; (2) Study abroad experience will provide students' understanding of cultural diverse communities and enhance intercultural

communication skills that will affect students' perceptions, values and believes based on personal experiential learning; (3) The community development course learning outcomes will be gained throughout students' personal new experience, transformation experience, observation, reflection, active experimentation, conceptualization and new knowledge.

Purpose and Objectives

The purpose of this research was to describe students experience while conducting the community development projects in Honduras. The assessment for this program was based on the students' blog and was designed to provide the feedback for all stakeholders to improve future short-term study abroad sojourns. This study was led by one research question: What experience do students receive during the study abroad program in Honduras?

Methods

A qualitative approach was used to examine students' experiences and learning outcomes after study abroad Community Development projects in Honduras. A content analysis procedure was utilized to analyze students' perceptions and feelings based on their experience by examining the ACEL@Honduras–Summer 2014 blog record. The two-week study abroad tour took place during May session of summer semester 2014 in Choluteca, Honduras. Students were required to participate in writing a blog during their in-country experience. The ACEL@Honduras – Summer 2014 blog was created using the wordpress.com website (http://ACELHonduras.worldpress.com). Every day students wrote a blog and shared their personal observation, experience, learning outcomes, and feelings. Students' daily blog comments were coded as BD1-12. This study abroad program was facilitated by a faculty program director, chair of the academic department, graduate teaching assistant, and local community leader. Admitted participants were required to register in three-credit of Agriscience Education (ASE 5797) course during May session. Most of the participants of this program had a preceding course work such as: Extension Education in Developing Countries, Professional Development in Agriscience Education, and Experiential Learning in Agriscience Education, Leadership in Teams and Community Organizations, and/or Method of Teaching in a Non-formal Learning Environment. Students were asked to keep individual diary, journal or travel log to reflect their perceptions, feelings, and new knowledge based on their observation and experience. All students lived in local hotel in during their 15-day study abroad experience.

Participants

Among participants of study abroad program in Honduras were undergraduate and graduate students majoring in Agriscience Education, Agricultural Education and Extension, and Construction System Management ranging in age from 19 to 45 years. A total of 17 students participated, where five of them were graduate students. All students were required to attend two, two-hour pre-departure orientation programs where they were introduced to program details and expectations.

Findings

Phase 1: I reviewed students' blogs in terms of a set of text content. The blog text (content) was a total of twelve blogs by two students' comments daily. For phase two of analysis, themes and

subthemes were identified. The students' blogs were examined by utilizing an open coding approach. The unit of analysis was a word, sentence, and paragraph. Words, sentences, and paragraphs were coded as a reference to the theme and provided a preliminary examination. Six cross revisions and colleagues' panel discussions were conducted to identify the following domains: (a) travel, (b) culture, (c) academic aspects of learning-in-location, (d) practical learning-in-location, (e) adventure and enjoyment, and (f) instructors engagement–faculty relationship.

Identified domains we conditionally divided on the two broad themes namely, (1) educational tourism, and (2) learning-in-location. The "educational tourism" includes the following domains

1. The "travel" domain included student comments related to travel experiences (international air flights and local transport on bus, cars, taxi-cabs, and boats) hotel, professional and cultural tours, and Wi-Fi availability.
2. The "culture" domain included students' comments related to the food preparation, communication with local leaders and families, traffic and transportation, churches, sports, and vocational school system, Spanish language, local holidays' celebration, traditions, and music.
3. The "adventure and enjoyment" domain included comments about impromptu adventures, swimming in the ocean, holiday celebration, traditional city market, local modern mall, local church, restaurants, local dance, and communication with local families, adults, and children.

The "learning-in-location" theme included three major domains such as: academic aspects of learning-in-location; practical aspects of learning-in-location, and instructors' engagement – faculty relationship.

1. The "practical learning-in-location" domain contained a brief overview of projects and orientation. Projects activities such as agricultural curriculum development and delivery, welding, build the backdoor, creating portable gardens, and distributing the bulk foods, several discussions based on observation, projects work, and field trips (milk processing plant, local city operation, coffee mill, and coffee plant study tours).
2. The "academic aspect of learning-in-location" domain included the lecture and discussion held in a classroom setting and practicing Spanish as a second language.
3. The "instructors engagement –faculty relationship" domain contained project leadership, tour developing, project management, and viable communication between instructors, students, and local community leaders.

This research showed that students received significant cultural experiences throughout passive (85.7%) and active (42.9%) engagement in different activities such as community projects, study tours, cultural tours, adventures, tasting and preparing local foods, and communication with local communities and their leaders. For example, the student wrote:

> A noon time soccer game was held on the Honduras pitch, bare spots, no net on the goal, and other non-US conditions. Team Ohio State out kicked and out sweated a superior

time of local girls, many who preferred playing in bare feet. The cultural impact was important for all. This is certainly a labor of love experience" (BD4).

Another blogger wrote:

It was a really great experience because church services in Honduras are different than back in Ohio … In celebration of Mother's Day, the church service honored mothers by having their children show appreciation by coming up on stage and sharing what their mother have done for them (BD7).

And different blogger remarked:

*I*t is neat to think about the fact that the food that we were able to eat for dinner was prepared by us. From grinding the corn for the tamales, to rolling out the dough for bread, we realized the amount of work that these women go through each day to feed their families. We each had an amazing time today and have truly gained a deeper appreciation for the people of Honduras (BD6).

This study demonstrated that all students were actively engaged throughout "learning-in-location", especially for example when working on the vocational school project.

One blogger wrote:

Today we arrived at the Vocational School at 8:00 AM and worked on our projects until 4:00 PM, a long and hot eight hours of joyful labor ... This was hard, as we are very motivated to make the greatest positive impact for the amount of time we have (BD8)

Conclusion, Recommendations, and Implications

This study examined undergraduate and graduate students' experience while engaged in community development projects based on study abroad program in Honduras. The research design combined qualitative and basic aspects of descriptive quantitative approach to identify the main themes during the study abroad program based on students' perceptions, feelings and received knowledge. The results were based on overall, positive, and negative students' blog's comments. In addition, the student's experiences were analyzed using the passive and active engagement criteria and work with text population. Based on the results of content analysis of students' blog's comments I identified two major themes namely, educational tourism and learning-in-location. Education tourism included the three domains: travel experience, cultural experience, and adventure and enjoyment. Learning-in-location contained three domains: practical learning-in-location, academic aspects of learning-in-location, and instructors' engagement -faculty relationship.

According to Kolb (1984), learning is a "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" p.41. Passarelli and Kolb (2012) mentioned that study abroad program provides possibilities for transformative learning; when in another culture, program participants faced challenges and ambiguity. They emphasized that students "adopt new way of thinking, acting and relating in the world … study abroad experience … change their worldview, provide new perspective on their course of study" (Passarelli & Kolb, 2012, p. 3).

Neppel (1995) indicated that the short-term programs have lack academic aspects. However, other studies found that students who participate in this type of program is growing and gaining more than non-participated students (Anderson, Lawton, Rexeisen, & Hubbard, 2006). After cultural shock, students adapt and better understand other culture (Hutchings, Jackson, & McEllister, 2002). It is important that study abroad programs identify and articulate the goals of the program. Not all short-study abroad programs are associated with projects in-location. The results of this study showed that through the informal learning environment, cultural shock, and community projects work students received unforgettable and invaluable academic and non-academic experiences during the short-term study abroad program.

The major limitation of this study was the short interval (only a two-week duration) of the experience and associated blog writing. Only twelve days were analyzed from the student's blog. Final review for content and grammar was accomplished by the faculty member while in-country. This could certainly influence the students' final postings.

The educational experience during study abroad program were examined and two themes were identified - travel experience and learning-in-location. Future researchers can focusing on developing new instruments to measure student's experience and intercultural sensitivity across cultures and geographical locations. Also, the destination, students' gender, and study abroad program durations might be included in future study design.

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Model for Implementing Curriculum and Evaluating Fidelity

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Introduction

"The bridge between a promising idea and the impact on students is implementation, but innovations are seldom implemented as intended" (Berman & McLaughlin, 1976, p. 349).

Curriculum implementation research has been a field of study in education since the 1960s (Snyder, Bolin, & Zumwalt, 1992). In evaluating the impact of a curriculum on factors like student outcomes, change cannot be attributed to the newly implemented curriculum unless researchers can show the curriculum was implemented with *fidelity* and other confounding variables are acknowledged. Fidelity has been defined as the degree to which an intervention or model of instruction is implemented as it was originally designed to be implemented (Gresham, MacMillan, Beebe-Frankenberger, & Bocian, 2000).

In Agricultural Education, the research on curriculum has been limited in scope. A search of the key word curriculum in the *Journal of Agricultural Education* shows that, in many cases, research has focused on teacher perceptions (Blythe, DiBenedetto, & Myers, 2015; Stair, Warner, Culbertson, & Blanchard, 2016; Stubbs & Myers, 2016), attitudes (Park & Osborne, 2006), barriers to implementation, (Conroy, 1999) or experiences (Lambert, Velez, & Elliott, 2014) of a curriculum intervention. There are exceptions like the work of Graves, Hughes and Balgopal (2016) who attempted to fully assess implementation of a curriculum, but were limited to two teachers through case study approach. The few studies attempting to assess implementation were limited to pre and posttests of short term curriculum (Rusk, Brubaker, Balschweid, & Pajor, 2006; Ulmer et al., 2013). The few long-term assessments of curriculum outcomes (Parr, Edwards, & Leising, 2008; Young, Edwards, & Leising, 2009) were done in an experimental environment where teachers and students were self-selected and compensated, limiting generalizability. Across these studies, no consistent framework exists. The purpose of this study was to conduct a thorough review of the literature and compile a model of curriculum implementation and evaluation that can be used in Agricultural Education research.

Methods

Integrative literature review was chosen as the method to address this issue because there are existing models in other fields of study (i.e. public health), but no model offered in agricultural education for the evaluation of curriculum implementation. Torraco (2005) argues an integrative literature review is the proper method with "new or emerging topics that would benefit from a holistic conceptualization and synthesis of literature to date" (p. 357) and indicates the product should be a new model or conceptual framework.

In an integrative literature review, the author should indicate "how the literature was identified, analyzed, synthesized, and reported" (Torraco, 2005, p. 360), including information on which databases were searched and what keywords were used. Google Scholar was the source of the initial literature search. The initial terms searched included *curriculum fidelity*, *fidelity of implementation*, *fidelity in teaching*, and *adherence to curriculum*. The most robust work located

was by O'Donnell (2008). Additional items were added to the review through the snowball effect. Models offered by Ringwalt et al. (2003), Carroll et al. (2007), and Berkel, Mauricio, Schoenfelder, and Sandler (2011) were reviewed. These researchers offered their models from a paradigm of prevention and public health education and focused on evaluating intervention efforts. Elements were assembled into the proposed model for evaluating implementation of curriculum. Please note, this 2000-word abstract submission precluded a full review of all literature uncovered so here only the model is offered and unpacked.
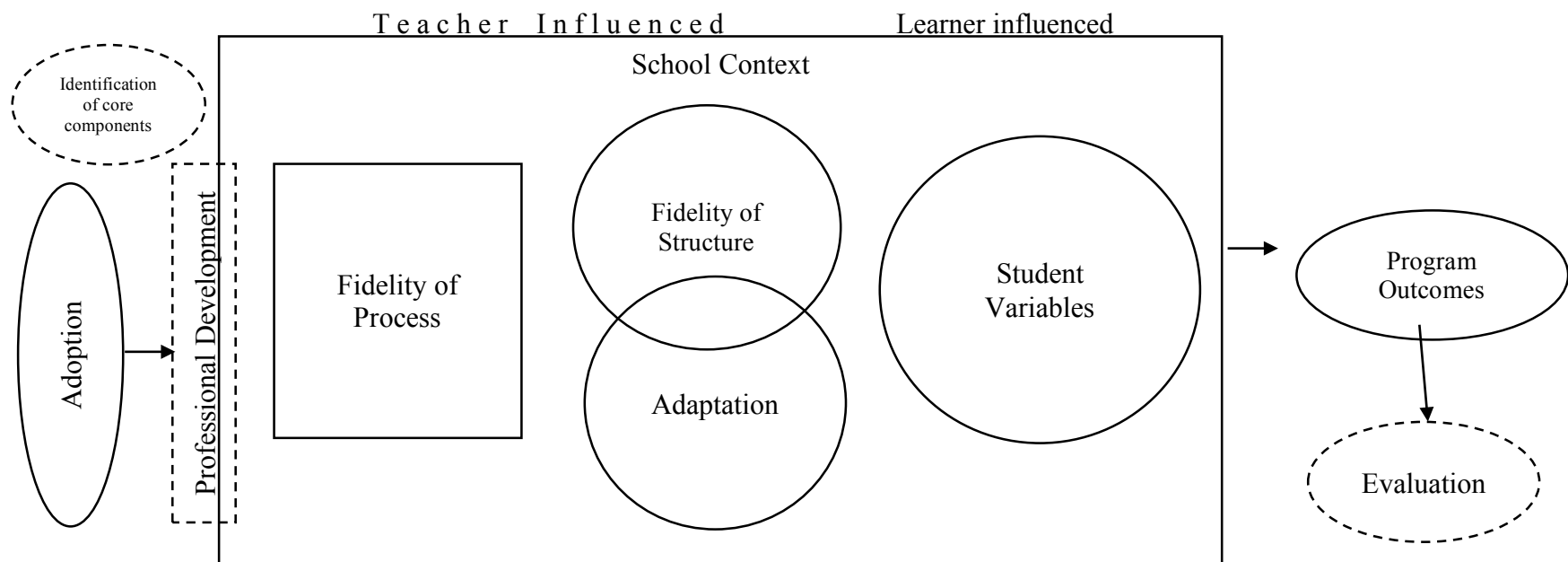
Findings: Proposed Model

Figure 1. Proposed model for curriculum implementation and evaluation

Unpacking the model

        adoption decision.
The decision to adopt a curriculum or innovation is complex. It is impacted by the teachers' beliefs and receptivity (Lotter, Harwood, & Bonner, 2007) which can create challenges when curricula are adopted without teacher input. Fullan (1982) identified factors which likely increase implementation with stronger perceived need, simpler innovations, and the implementer seeing the materials as practical, usable, and meeting a need. For a comprehensive list of factors impacting the implementation process compiled through meta-analysis, see Durlak and DuPre (2008).

As the decision to adopt is made, professional development may occur. If this is a school or district wide curriculum innovation, the professional development could occur within a school or district context. However, it may also be a teacher-specific PD occurring outside of the structure of the educational setting. Loucks-Horsley, Hewson, Love, and Stiles (1998) found teachers are more likely to use a new curriculum if they received professional development while Akerson and Hanuscin (2007) found that this professional development is more successful if it takes into account the contextual factors at play in individual situations. Additionally, ongoing professional support increases fidelity to new curriculum or teaching practices (Echevarria, Richards-Tutor, Chinn & Ratleff, 2011).

        school context.
From this point forward, almost all aspects of implementation occur within a larger school context. This includes big picture factors like boards, principals, teachers, and communities (Fullan, 1982) to smaller scale contextual factors like length of school day, school year, and class periods. The fact that context can vary quite a bit between educational settings can impact implementation and fidelity. In fact, Snyder et al. (1992) argued "the degree of fidelity may be a measure of the degree to which the context reflects an ideological perspective compatible with that of the innovation" (p. 416). Additionally, the teacher is responsible for enacting a new curriculum while also managing their own professional standards and curriculum, sometimes with overlapping or even competing classroom goals (Harn, Parisi, & Stoolmiller, 2013; Lakin & Shannon, 2015).

        two types of fidelity.
Educational research typically divides fidelity into two types: *fidelity to structure* and f*idelity to* process (Gersten et al., 2005; Harn et al., 2013; O'Donnell, 2008). After reviewing public health literature, O'Donnell (2008) argued for five variables related to fidelity implementation:

> "(a) adherence—whether the components of the intervention are being delivered as designed; (b) duration—the number, length, or frequency of sessions implemented; (c) quality of delivery—the manner in which the implementer delivers the program using the techniques, processes, or methods prescribed; (d) participant responsiveness—the extent to which participants are engaged by and involved in the activities and content of the program; and (e) program differentiation—whether critical features that distinguish the program from the comparison condition are present or absent during implementation" (p. 34).

O'Donnell (2008) further argued for categorizing duration and adherence as *fidelity to structure* and quality of delivery and program differentiation as *fidelity to process* with the variable participant responsiveness having characteristics of both.

fidelity to process.

The items related to fidelity of process could also be termed "quality". These include delivery, teacher characteristics, fidelity to the implementation strategies suggested by developers, and the impact of professional development. There is a challenge here for educational researchers to be able to tease out the difference between quality teaching and the quality teaching techniques attributed to the curriculum innovation (O'Donnell, 2008).

fidelity to structure vs adaptation.

Ringwalt et al. (2003) argued fidelity to structure and adaptation are antonyms while Fullan (2001) wrote of the "dilemma and tension running through the educational change literature in which two different emphases or perspectives are evident: the fidelity perspective and the mutual-adaptation or evolutionary perspective" (p. 40). This raises all sorts of justifiable curriculum questions which divide researchers. Pro-fidelity advocates argue that the result of unfaithful replication is ineffectiveness (Ringwalt et al., 2003) at worst or even "program drift" (McDonald, 2001) while pro-adaptation researchers argue that because of the complex contexts where implementation occurs, changes to the model are necessary (Emshoff et al., 1987).

Ringwalt et al. (2003) indicated teachers are adapting curriculum, further indicating the greatest predictor of adaptation was teacher discretion. If fidelity is paramount, administrators or authorities should stress the importance of strict adherence. Ringwalt et al. (2003) also acknowledged and cited multiple sources to indicate that not only was adaptation widespread and inevitable (Backer, 2001; Domitrovich & Greenberg, 2000), it might also be desirable with more adaptable innovations being adopted more quickly (Backer, 2001). Adaptation by a local teacher may increase his or her sense of local control and therefore their investment in the program (Arthur & Blitz, 2000; Glaser & Backer, 1977). Lakin and Shannon (2015) argue researchers and program developers need to have a way to track both the varying implementation of a program and why the teachers are choosing to vary.

What kind of adaptation appears to be beneficial and what kind appears to be problematic? First, if a curriculum is being evaluated in a research environment, particularly intervention research, fidelity serves as a control and is required to be able to attribute the change to the independent variable, the intervention itself (O'Donnell, 2008). If, however, it is an educational innovation ready for widespread release, adaptation may be acceptable. Adaptation can include both deletions or enhancements as well as changes to the format or extent to which a lesson is delivered (Backer, 2001). In one study (Mayer, Blakely, & Davidson, 1986) additions to the curriculum were less harmful than deletions or modification while another study (Parcel et al., 1991) concluded that adherence was more important for new teachers than experienced teachers.

student variables.

When implementing a curriculum, the intended audience will inevitably have an impact on any measures of effectiveness or fidelity. The factors of this group that could impact whether

intended outcomes are reached include attendance, participation and responsiveness, prior knowledge, and satisfaction.

Discussion

Program Outcomes and Evaluation

The model ends with two different types of assessment: outcomes of the program and evaluation of the curriculum innovation. Presumably, an educational intervention is being implemented with outcomes in mind whether they be educational gains or behavioral change. Teachers using a curriculum will evaluate whether the intervention helped them obtain the desired outcomes, and, depending upon the answer, may choose to increase adaptation of the intervention or abandon the intervention all together.

If the goal is to assess whether the program was implemented with fidelity, the first step is to identify the core components, preferably based on established program theory (O'Donnell 2008). The core components would include operational definitions of: "the context of the program; the core components; the active ingredients to operationally define the core components so they can be taught and learned and can be implemented in typical settings; and a practical strategy for assessing the behaviors and practices that reflect the program's values and principles, as well as the program's active ingredients and activities" (ASPE Research Brief, p. 1).

Once these core components are identified, you can begin to measure them. There are issues that naturally arise when trying to measure fidelity. If you rely on self-reports, research has shown you get data indicating higher levels of fidelity than are actually seen in observation (Emshoff et al., 1987) due to factors like social desirability effect. However, research has also shown that the use of observation can also be problematic because teachers might increase fidelity during observation (Wickstrom, Jones, LaFleur, & Witt, 1998), at least in the short term. Some researchers are now arguing that fidelity needs to be measured and reported on a continuum rather than an all or nothing scale (Ecchevarria et al., 2011) while Durlak and DuPre (2008) have reported programs with implementation rates of 60% fidelity have shown positive impact, suggesting less than 100% fidelity may be acceptable. See O'Donnell (2008) or Mills and Ragan (2000) for suggested guidelines for fidelity assessment.

"Without methodological consideration of the level of fidelity during implementation, researchers may have insufficient evidence to support the internal validity of an efficacy or effectiveness study" (O'Donnell, 2008, p. 35). This inability to attribute results empirically to the innovation may not only impede the ability to secure extramural funding for curriculum interventions, it also makes it nearly impossible to conduct research on those curriculums in any meaningful way.

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