Perceived Self-Efficacy of Pre-Service Agricultural Science Teachers toward Agricultural Mechanization

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Abstract

This study explored the perceived self-efficacy towards teaching agricultural mechanics of pre-service agriculture teachers in Texas. Two students from Texas Tech University were purposefully selected to participate based on their completion of agricultural mechanics coursework. Interviews were conducted and data were collected and coded from the transcribed transcripts. Four major themes, with six sub-themes emerged from the data: a) mastery learning and teaching experiences (i.e., experiences with technical agricultural mechanics content; and mastery teaching experiences); b) emotional arousal (i.e., fear and anxiety; and enthusiasm); c) content knowledge (i.e., lack of knowledge, experiences, and opportunities to learn; and confidence in the basics but apprehension towards subject complexity); and d) social persuasion. Overall, the participants felt confident in their ability to teach basic concepts within agricultural mechanics but expressed fear and anxiety to teach more complex topics and to manage the shop and safety. Much of the fear and anxiety was a product of the participants’ lack of experiences with the technical content of agricultural mechanics. Recommendations for practice and research are shared.

Keywords: Self-efficacy, agricultural mechanics, pre-service teachers
**Introduction**

The field of agricultural education is constantly evolving to stay relevant in the 21st century, and to meet the needs of the students. Many new courses have been added to the school-based agricultural education curriculum (SBAE) (i.e., veterinary medical applications, principles and elements of floral design, food safety, and technology), while other classes have remained unchanged over the years. One such facet of the SBAE curriculum, which has retained its popularity, and been a cornerstone of secondary programs, is agricultural mechanics. Nationally in 2009, 59 percent of the 11,000 agricultural education instructors in the United States taught agricultural mechanics in their local school system (National FFA Organization, 2010). In Texas, agricultural mechanization courses are an important component of the agricultural education curriculum across the state with five out of 25 total agricultural education courses being directly or indirectly involved with agricultural mechanization.

Despite the continued popularity and need for agricultural mechanics courses, SBAE and teacher preparation programs face many challenges in preparing teachers that are qualified to teach agricultural mechanics courses. One barrier is the restrictive undergraduate degree program; with so many credits required for the degree, the number of technical content courses continue to be reduced, including agricultural mechanization courses (Burris, Robinson, & Terry, Jr., 2005; Leiby, Robinson, & Key, 2013; Robinson, Krysher, Haynes, & Edwards, 2010). The lack of technical education for pre-service teachers can have a bearing on the quality of education provided to the students. According Phipps, Osborne, Dyer & Ball (2008), laboratory activities constitute a large part of most agricultural education programs. Agricultural laboratories serve many purposes and provide inquiry-based learning environments for students. Along with traditional agricultural mechanics laboratories, secondary agricultural programs utilize laboratories such as greenhouses, aquaponics centers, and livestock facilities. Each laboratory possesses unique dangers, but due to the nature of agricultural mechanics laboratories, injuries in these labs are commonplace. One aspect of agricultural mechanics which heightens the propensity for injuries is student-based construction.

Kennel (2009) stated “because teachers are the single most important influence on student achievement, teacher education programs need to provide learning experience for pre-service educators to impact their confidence to teach pertinent subject matter and their perceptions of self-importance” (p. 2). With the decline of required agricultural mechanics courses in pre-service education, a need exists examining pre-service educators' confidence towards teaching agricultural mechanics classes. The purpose of this qualitative research study was to determine the perceptions and self-efficacy of pre-service teachers towards teaching agricultural mechanics classes.

**Literature Review/ Theoretical Framework**

This study was viewed through the theoretical and conceptual lens of self-efficacy. The concept of self-efficacy was defined by Bandura (1986) as the “beliefs in one’s capabilities to organize and execute the course of action required to produce given attainments” (p. 3). Self-efficacy influences an individual’s actions, choices, amount of effort exerted, level of perseverance to obstacles, thought patterns, emotional reactions, resilience level, and the level of achievement (Bandura, 1986). Bandura (1977) initially indicated an individual's level of self-efficacy may be influenced by performance accomplishments, verbal persuasion, emotional arousal, and vicarious experience. More recently, Bandura’s (1997) research identified the four sources
which enhance the development of high teacher self-efficacy (i.e., mastery learning experiences, social persuasion, physiological and emotional states, and vicarious experiences).

Gavora (2010) defined mastery learning experiences for teachers (mastery teaching experiences) as “situations in which teachers demonstrate their own teaching success, thus providing that they are competent teachers” (p. 2). Furthermore, Bandura (1997) indicated this source (i.e., mastery teaching experiences) of teacher self-efficacy is the most influential source of self-efficacy information because “they provide the most authentic evidence of whether one can muster whatever it takes to succeed. Success builds a robust belief in one’s personal efficacy” (p. 80). If the teacher’s instructional activities are consistently successful, the self-efficacy of the teacher tends to rise. Conversely, if the instructional process ends in failure, a lowered level of self-efficacy is expected. The second source of teacher self-efficacy is social persuasion. Gavora (2010) indicated social persuasion “by colleagues and superiors that a teacher can teach successfully will enhance the teacher’s self-efficacy” (p. 3). More specifically, the emotional support rendered by others, bolsters a teacher’s belief in their teaching self-efficacy. Past research indicated coaching and encouraging feedback are actions likely to influence teacher self-efficacy, in a positive manner (Bandura, 1997; Gavora, 2010).

The third source of teaching self-efficacy, indicated by Bandura (1997) involves the physiological and emotional state of the teacher. Gavora (2010) added that “a teacher’s excitement and enthusiasm can provide cues about anticipated teaching success” (p. 3), whereas anxiety, stress, and other negative states “can lead to negative judgments of teacher abilities and skills” (Gavora, 2010, p. 3). Lastly, vicarious experiences are also a source of teacher self-efficacy. In general, a vicarious experience is when a teacher gains self-efficacy from observing the successes of other highly-qualified teachers. Gavora indicated that “observing and modelling successful teachers may generate expectations that teachers can learn from successes of colleagues, which in turn, can result in their own positive self-efficacy” (p. 3). Motivation is defined in social cognitive theory as an internal state that arouses, directs and sustains goal-oriented behavior. To be motivated to learn students must participate in activities and courses that are personally meaningful and worthwhile (Glynn and Koballa, 2006). Motivated students achieve academically by engaging in behavior such as asking questions, participating in labs and working in groups (Schunk, et al., 2008).

Bandura described the concept of self-efficacy, as a person’s beliefs about their capabilities (Bandura, 1984; 1997). With self-efficacy being closely related to ability, if a person has low efficacy or confidence in a task, then their performance in that task is expected to be low, and conversely, higher ability levels would tend to increase their motivation levels and as a result, their level of performance (Bandura, 1997). Often linked with social cognitive theory is the theory of planned behavior (Azjen, 1985), which is an extension of the theory of reasoned action (Fishbein & Azjen, 1975; Azjen & Fishbein, 1980). Both were designed to exhibit the relationship between informational and motivational influences on behavior (Connor & Armitage, 1998). Taken together, this study examines demographic variables and knowledge as they relate to attitudes, motivation, and self-efficacy for success in teaching agricultural mechanics.

According to Burris, McLaughlin, McCulloch, Brashears, and Fraze (2010), teacher efficacy is an important characteristic of highly motivated and qualified agricultural science teachers, because as teacher efficacy increases, the level of effort applied by teacher increases as well. Past research indicates the concept of teacher efficacy is complex and difficult to understand (Knoblock, 2001; Tschannen-Moran, 2000), yet many definitions of this concept have been rendered. Gibson and Dembo (1984) explained teacher efficacy as a multi-dimensional construct comprised of two independent dimensions: general teaching efficacy and personal teaching efficacy. General teaching efficacy is the degree to which a teacher believes educators

can control the learning environment despite exterior influences. The other dimension, personal teaching efficacy, incorporates a teachers’ evaluation of their own capability to bring about student learning. The teachers’ knowledge of the subject matter they teach has been found to be an important characteristic of effective teachers (Roberts & Dyer, 2004). Therefore, theoretical conceptual models explaining teaching self-efficacy, should account for perceived content knowledge.

Research indicates agricultural teachers may not have the confidence or self-efficacy needed to successfully teach agricultural mechanics courses. Previous studies indicate agricultural mechanics is the subject matter which beginning teachers are least confident in performing (Burris et al., 2010). While, studies show agriculture teachers are confident in basic agricultural mechanics skills (Leiby, Robinson, & Key, 2013), other studies indicate agricultural mechanics topics as a major need for training among in-service teachers. Needs assessment studies of agricultural mechanics instructors show the highest need for training in the areas of laboratory safety, welding, carpentry, electricity, concrete, engines, plumbing, laboratory and equipment maintenance, and laboratory management (Fletcher & Miller, 1995; Johnson, Schumacher, & Stewart, 1990; McKim & Saucier, 2011; Saucier, McKim, & Tummons, 2012; Saucier, Terry, & Schumacher, 2009; Schlautman & Silletto, 1992).

One way for teachers to develop confidence and skills in agricultural mechanics is for teacher preparation programs to provide pre-service teachers with more agricultural mechanics experiences. Studies show previous experiences in a specific content area (i.e., agricultural mechanics) creates a higher level of self-confidence and increases comfort in teaching that subject (Burris et al., 2010; Stripling & Roberts, 2012; Wells, Perry, Anderson, Shultz, & Paulsen, 2013). Studies also indicate teachers experience a higher level of confidence as their time in the agricultural mechanics lab increases (Burris et al., 2010).

Although, not all pre-service teachers will end up teaching courses in agricultural mechanics, every teaching candidate has to have a base knowledge of the subject to pass the state content exam. With the decline of required agricultural mechanics courses in pre-service education, agricultural teacher educators will have to identify effective and efficient methods of teaching these technical skills. Although quantitative studies have conducted on agricultural mechanization teacher efficacy (Burris et al., 2005; Burris et al., 2010), a need exist for an in-depth qualitative study, to examine the pre-service teachers’ self-efficacy towards teaching agricultural mechanics. Therefore, this study sought to examine sources of self-efficacy (Bandura, 1997) among pre-service teachers through a qualitative, case study analysis. Based on the theoretical framework and literature review, a conceptual framework involving teacher self-efficacy and content knowledge were utilized to guide this study.

**Purpose and Research Questions**

The purpose of this case study was to determine the perceived self-efficacy Texas Tech University pre-service teachers had towards teaching agricultural mechanization. This study aligned with Priority Area #5 of the National Research Agenda (Roberts, Harder, & Brashears, 2016) and was guided by two research questions:

1) What is the perceived self-efficacy of pre-service teachers towards teaching agricultural mechanics.

2) What factors influence pre-service teachers’ self-efficacy in teaching agricultural mechanics.
Methods

This study utilized an embedded, single-case design. This case study encompasses several units of analysis including interviews of pre-service teachers and document analysis of the agricultural mechanization course syllabi. The Texas Tech University offers students various undergraduate and graduate degree programs. One of the undergraduate degree programs, which prepares pre-service teachers to become secondary agricultural educators, is the agricultural education-teacher certification degree. This degree program offers students the opportunity to gain knowledge in the field of agricultural education, along with valuable teaching experiences to better prepare them. All students seeking their teaching certificate are required to enroll in a minimum of six hours of agricultural mechanics coursework. At the time of this study (spring, 2015), three agricultural mechanization undergraduate courses were offered to pre-service teachers at Texas Tech University. These courses included a welding course, and agricultural mechanics course, and laboratory methods in agricultural mechanics course. All three of the agricultural mechanization courses encompassed both a lecture and laboratory component. The professor and instructor teaching these courses had been with the department for a multitude of years, and the curriculum of the classes has remained relatively unchanged over time.

Data Collection and Analysis

The participants in this case study were two agricultural education pre-service teachers. The first participant, Mariah (name of student was changed to protect privacy) was a senior who was earning her teacher certification through the department. Drew (name of student was changed to protect privacy) was a junior who was planning on entering the student teaching block next spring. Mariah had taken the welding and lab methods courses while Drew had taken the welding and agricultural mechanics courses.

The pre-service agricultural education students were recruited to participate in the study. The researcher recruited agricultural education pre-service students who had previously taken, or are currently enrolled in two agricultural mechanics courses, at Texas Tech University. The participants were asked to participate in two 45 minute interviews. Both the first and second interviews were conducted in a face-to-face setting. Students were asked to describe their background in agricultural mechanization, their perceptions of teaching agricultural mechanics at the secondary level, what areas of agricultural mechanization they felt confident about, and what subject matter they felt they lacked confidence in teaching. The interviews were recorded and transcribed verbatim.

Open coding of the data was the first part of the data analysis for this study on the self-efficacy of pre-service agricultural educators toward teaching agricultural mechanics. The researcher read the pre-service teacher interview transcripts independently several times, and the independently highlighted text to capture main ideas. The interview transcripts and document analysis were observed for major categories of information. Brief memos were included in the margins of the transcript to identify the open codes. Axial coding was then utilized to identify core phenomenon which emerged from the open coding. The codes which were identified in the interviews and data analysis were then categorized into groups. A total of 9 categories were identified from the data, which were then condensed into four themes and six sub-themes.

Numerous standards of qualitative rigor were utilized in this study to ensure the research was conducted correctly and the findings had merit. Yin’s (2009) standards of qualitative rigor were used in this case study. To insure construct validity in this study, multiple sources of data (i.e., interviews and data analyses) were utilized and a chain of evidence was developed during the data collection phase. Construct validity was established by discussing the initial findings of the
report with the participants in this study, the pre-service teachers. Minor adjustments were made to the findings based on the participants’ assessment of the accuracy and credibility of their accounts.

Reliability was established in this study to minimize errors and biases. An audit trail was developed to establish reliability, which included interview protocols, interview memos, initial data analysis notes, and an outline of data analysis procedures (Yin, 2009). The internal validity (i.e., credibility) of the findings was developed through the exploration of rival explanations of the observed phenomenon. The internal validity in this study also described the method in which the conclusions were drawn from the data. In regard to external validity (i.e., transferability), the single-case study design does not have the ability to make generalizations from the study to the population. Although, generalizations cannot be made from this study, analytical generalizations, which use a theory as a template to facilitate the study, are appropriate (Yin, 2009).

According to Creswell (2013), researchers must position themselves in their writings and be conscious of potential biases that they may bring to the research study. The self-conscious exploration of personal bias allows researchers to express how given experiences potentially shaped the study’s findings, interpretations, and conclusions (Creswell, 2013). In the context of this study, the authors recognized their personal opinions and bias had the propensity to affect the research study, therefore the authors addressed the aforementioned concern by composing a research subjectivity statement. The authors’ backgrounds, knowledge, and experiences in agricultural mechanics and agricultural education made them advocates of the subject matter. While the authors’ notions about agricultural mechanics were not significant to this study, the authors remained open-minded to the pre-service teachers’ perceptions of teaching agricultural mechanics. Thus, the author’s reactions to the participants’ responses did not influence the interpretation of results in this research study. Philosophically, the authors perceived micro-teaching, in agricultural mechanics courses, to be a valuable experiential learning activity for pre-service teachers. Once again, the authors strove to be unbiased to the participants’ perceptions of mastery teaching experiences. Although the authors attempted to recognize and mitigate personal biases throughout the study, some research bias potentially existed which could have effected this study.

Limitations
This case study included only two agricultural education pre-service teachers’ perceptions of their ability to teach agricultural mechanics, although there were over a hundred pre-service teachers at Texas Tech University, at the time of the study (i.e., Spring of 2015). The small number of participants utilized in this study, might serve as a limitation to understanding the broad perceptions of all the pre-service teachers in the department. By nature, qualitative research focuses on a smaller amount of participants in greater depth. While the findings in this study might be transferable to other settings, the findings are limited to the context of the two pre-service teachers who participated. Another limitation of this study was the limited experience of the pre-service teachers who participated in this study. Although both pre-service teachers had or were currently taking agricultural mechanics courses, neither participant had completed the student teaching experience. This served as a limitation because the participants had a limited amount of previous teaching experiences. The only teaching experiences described by the participants in this study occurred during teacher preparation courses at Texas Tech University.
Results

Four major themes, with six sub-themes emerged from the data. These themes and sub-themes included mastery learning and teaching experiences (i.e., experiences with technical agricultural mechanics content; and mastery teaching experiences), emotional arousal (i.e., fear and anxiety; and enthusiasm), content knowledge (i.e., lack of knowledge, experiences, and opportunities to learn; and confidence in the basics but apprehension towards subject complexity), and social persuasion.

Experiences with technical agricultural mechanics content. When pre-service teachers were asked about their ability to teach agricultural mechanics, the pre-service teachers indicated past experiences played an important role in their ability to teach the subject matter. The pre-service teachers in this study indicated they needed to experience something to construct a deeper understanding of the subject. The pre-service teachers’ experiences in previous agricultural mechanization classes (i.e., high school and university level) along with informal learning experiences shaped their confidence. Mariah explained she felt more confident in teaching certain classes “because those are the ones that I have the most experiences in and examples for.” Mariah further commented, “I have a lot of background knowledge so it’s not going to take a lot for me to teach these kids successfully.” Mariah also indicated a higher comfort level with tools she had experience with. More specifically, she perceived her ability to pour concrete and build fences to be very high, based on prior experiences. In agreement with Mariah, Drew indicated his background of home renovation had bolstered his competence to teach plumbing.

The pre-service teachers also mentioned that the projects they completed in their agricultural mechanics courses in college aided them in their confidence to teach agricultural mechanization. Drew discussed the valuable experience he had in constructing a hat rack in the metal fabrication course at Texas Tech University. Mariah indicated she constructed a hackamore in her agricultural mechanics class and she said, “I learned not only how to weld better with stuff I already know... I learned new stuff as well (sic.).” Overall, when the pre-service teachers were asked about their ability to operate various pieces of equipment, they often discussed projects in which they had utilized the tool previously.

Mastery teaching experiences. The pre-service teachers discussed the experiences they had in the agricultural mechanization laboratory, and how it impacted their confidence of teaching the subject matter. Drew mentioned he had helped train other students in an agricultural mechanization laboratory to set up an oxy-acetylene rig. He perceived this teaching opportunity to be useful when teaching secondary students how to use the oxy-acetylene rig. Drew mentioned “I feel like this is another tool that I could teach students how to use proficiently.” He also indicated that “I think it would be exciting to teach students how to use this tool [oxy-acetylene torch].” Mariah indicated she had performed a demonstration in front of her class using an oxy-acetylene rig and now she would feel confident teaching it to high school students. Mariah said, “I feel very confident because I have used this tool, I really feel like I could show my students how to use it.”

Emotional Arousal. Different aspects of emotional arousal were discussed by the pre-service teachers in this study. The participants discussed their fear and anxiety towards teaching agricultural mechanics Participants shared their anxiety over shop safety as well as their anxiety about student perceptions of their ability to teach agricultural mechanics.

Fear and Anxiety. The pre-service teachers discussed their fear of supervising students in the shop. Both participants discussed their concerns with shop safety and the anxiety they
associated with keeping their students safe. In regard to the ability to supervise students in the agricultural mechanics lab, Mariah indicated her largest concern was “the fact that I can’t have eyes everywhere at all times.” She also stated:

That makes me very nervous… Just the fact that they are high school kids… and most of them will be high school boys… and they will try to make a race car out of a sander [laugh] and um who knows what is going to happen? So… just the fact that I can’t control everything at all times is what scares me the most.

Along with the pre-service teachers’ fear of proper supervision, they also discussed the danger they associate with the agricultural mechanization lab. In general, both Mariah and Drew discussed stories they had heard of accidents which occurred in an agricultural mechanics laboratory. Both pre-service teachers elaborated on stories they have heard about with the incorrect use and transportation of oxy-acetylene rigs. Mariah further elaborated on shop related fears of students using a table saw and working with electrical systems. In regard to the table saw she said “it doesn’t take much to lose a finger or something, so not that I wouldn’t be able to teach it, it would be once the students started to use it, I would be freaking out that they use it safely.” Her concern with students working with electrical systems was, “they might get shocked.” Drew indicated his largest concern with shop safety was eye protection and students wearing the correct personal protection equipment. He also shared his belief that the two largest reasons for injuries in the shop are related to “horseplay” and students being rushed to complete projects.

Another topic discussed frequently by the participants was the fear of students’ perceptions regarding their knowledge and ability with agricultural mechanics. Mariah expressed her fear of student perceptions by indicating that in agricultural mechanics courses “they [students] are going to ask you questions all the time and can you come over here and help me out with this?” She explained that the experiential learning encompassed by agricultural mechanics demands that the instructor be very knowledgeable. More specifically, Mariah was concerned that if she did a welding demonstration in front of her class, they would think “oh my gosh, that’s horrible, and so that to me, you lose their respect instantly.” When discussing the importance of agricultural mechanics instructor’s skills, Mariah stated “I mean there is no way you can hide it [lack of skills].” Mariah also said “I would probably feel most confident about teaching welding, but honestly, I don’t necessarily feel that confident in teaching it.”

Lack of knowledge and experiences. The pre-service teachers discussed the concern of their limited knowledge of agricultural mechanics. More specifically, the participants indicated they needed more formal education on this subject matter along with more knowledge of tool and machine operation. Mariah explained specifically,

I would say we need to take more classes [agricultural mechanics] in college and in high school. I know that they only require us to take I think two ag mech classes. And… personally I think that maybe we should do away with some classes…. Ok maybe not do away with it but transition it into teaching people more about how to teach woodshop.

Mariah was concerned with her knowledge about agricultural mechanics, when she said “we’re lacking significantly” in the background knowledge. Mariah said “if you don’t know what you are talking about or doing, then [I am going to be like… so why don’t you just not touch it [agricultural mechanics equipment].” A lack of confidence in her knowledge and ability was expressed when Mariah said “for me to strike a weld, a really good weld, is not very (sic.) likely.”
Drew also showed a lack of confidence in his ability, when giving reasons why he did not feel confident teaching agricultural mechanics. He said, “lack of experience… definitely… hinders your ability”. Lack of opportunities to learn and teach. The pre-service teachers discussed not having enough opportunities in the role of the agricultural mechanics instructor to feel confident in teaching agricultural mechanics. Although learning the skills is part of being the pupil, they expressed their need to acquire the technical skills of teaching the class. They indicated the professors and teaching assistants in the agricultural mechanics lab played an overbearing role, by not allowing the students to use all the tools and to learn troubleshooting skills. Drew discussed his lack of opportunities: “He always used it [and] he never let us try it, but that’s kind of one of those things, where… you may have one, you may not. But I would like to learn how to use one.” Mariah mentioned the professor supervising one of her course was the only one who operated the ironworker, and she never gained experience cutting metal. She expressed her concern by saying,

I really wish we could have used one [ironworker] in class. I know if I teach agricultural mechanics [sic.] in high school, I know I will have to cut metal for my students. If I am supposed to be ready for doing that, I need some experience using it [ironworker] First hand.

The pre-service teachers also indicated they were concerned with fixing and maintaining tools, because they had never had any experience in troubleshooting. When discussing her ability to operate a band saw, Mariah mentioned she felt comfortable using one, but not “servicing it.” Furthermore, she stated “He would walk around and fix different tools and adjustments as we worked. I need to learn to do that [service tools]. I would like to… learn how to change the blade.”

Mariah discussed her need for more education pertaining to agricultural systems, electrical work, operating a plasma cutter, plumbing, and operating an oxy-acetylene torch. In regard to the operation of tools Mariah commented “if you don’t know the information, or have a background knowledge, being thrown out into a lab is not going to be super beneficial.” Drew on the other hand indicated he could teach the basics of plumbing but commented “if I was going to teach it and show it, I would want [to take a] class over it so that I knew more about it.”

Confidence in basics but apprehension towards subject complexity. The pre-service teachers indicated confidence in the rudimentary aspects of teaching agricultural mechanics but expressed concern about more complex topics and skills. When discussing the agricultural mechanics content exam, Mariah, who had already passed the exam said, “I was nervous about agricultural mechanics (sic.), I mean I know the basics of it [agricultural mechanics] but if it got in-depth into mechanics or anything like that, I wasn’t going to know the answer.” In regard to the mechanization of tractors, Mariah explained she could “check the oil and… and change the filters”, but when it came to working on the engine she exclaimed “I’m not very experienced there.” While Drew indicated he could weld “with enough skill that they (students) understand that I’ve done it” but he only felt comfortable with “basic welding things.” In regard to teaching students how to operate a band saw, Drew said “I am no expert but I feel like I could teach students how to use this type of saw.”

The pre-service teachers consistently mentioned their apprehension to teach agricultural mechanics because of subject complexity. While discussing woodworking, Drew indicated he was apprehensive when “getting into the fine detail of projects.” He further explained “I have no idea about it in that (fine detail), I mean I’ve cut lumber but nothing fancy…” The pre-service teachers also mentioned they feared using tools requiring more advanced knowledge and skill.
Mariah said “I really hope that if I teach an agricultural mechanics (sic.) course that I don’t have to teach TIG [Tungsten Inert Gas Welding].”

**Social Persuasion.** Social persuasion is the emotional support which builds a teacher’s belief in teaching self-efficacy. In this study, the pre-service teachers discussed this social persuasion in the form of feedback and advice from the professors. Drew indicated in one of his agricultural mechanics courses he would have to run beads and show them to the professor for approval. He indicated the professor would provide constructive criticism, and either congratulate students or encourage them to re-weld it by saying “you probably ought to redo that.” Mariah discussed she received feedback after she presented agricultural mechanics lessons to her peers. She indicated the professors would write down feedback on an evaluation form helping build confidence in their ability to teach and point out areas for improvement. Mariah perceived this to be a good way to hone her teaching skills. Mariah also mentioned that her professors would give her confidence in being a new teacher through simple advice. She said her professor would tell her, “beginning agriculture teachers are very talented, but they don’t have experience and examples to draw from.” She supported this comment from her professor by saying “I totally understand the subject matter but I haven’t accomplished many things, so I have no extra examples to give to class.” This statement from her professor seemed to comfort her and build her confidence in teaching.

**Conclusions, Implications, and Recommendations**

The findings identified the perceptions the pre-service agriculture teachers had towards teaching agricultural mechanics at the secondary school level. The narrative detailed the participants’ perceived level of confidence and factors influencing their self-efficacy in teaching agricultural mechanics.

The pre-service teachers identified a sense of confidence toward their ability to teach basic concepts of agricultural mechanization (e.g., welding). Similar results were identified in Leiby et al.’s (2013) study, where pre-service teachers indicated high confidence levels on basic welding skills. With similar results to Leiby et al.’s (2013) study, it can be implied that confidence in basic welding skills is commonplace for some agricultural education pre-service teachers.

When the pre-service teachers were questioned about their perceived ability to teach agricultural mechanics, they talked about their past experiences with agricultural mechanics content or teaching. They indicated prior experiences influenced their confidence of the agricultural mechanics subject matter while the lack of experiences negatively influenced their confidence and increased fear and anxiety. This finding is consistent with previous literature indicating previous experiences in a specific content area (i.e., agricultural mechanics) creates a higher level of self-confidence regarding a given subject (Burris et al., 2010; Stripling & Roberts, 2012). It is also consistent with a study from Wells et al. (2013) stating prior training in agricultural mechanics, before the first year of teaching, could increase comfort in teaching agricultural mechanics. Findings from this study are also consistent with Burris et al.’s (2010) explanation that teachers experience a higher level of confidence as their time in the agricultural mechanics lab increases. In consideration of previous literature, it can be implied that to further increase the confidence of pre-service teachers towards teaching agricultural mechanics, the pre-service teachers should enroll in a greater number of agricultural mechanics courses.

The findings of this study show pre-service teachers have a sense of fear and apprehension towards teaching agricultural mechanics because of their perceived lack of knowledge and skill. Both participants indicated a fear of student perceptions towards their ability to teach agricultural
mechanics as well. These concerns are similar to pre-service teachers’ perceptions in other studies that also indicate a need for more agricultural mechanics training in the areas of laboratory safety, welding, carpentry, electricity, concrete, engines, plumbing, laboratory and equipment maintenance, and laboratory safety and management (Fletcher & Miller, 1995; Johnson et al., 1990; McKim & Saucier, 2011; Saucier et al., 2009; Saucier et al., 2012; Schlautman & Silletto, 1992). To increase the pre-service teachers’ self-efficacy towards teaching agricultural mechanics, students should enroll in a breadth of agricultural mechanics coursework that allows them to practice the various skills and concepts within agricultural mechanics. It is recommended teacher preparation programs implement classes which allow students to practice teacher shop responsibilities (e.g., laboratory and equipment maintenance) prior to entering student teaching. These types of teaching and learning experiences at the post-secondary level in agricultural mechanics can aid in reducing teachers’ perceived fear towards teaching agricultural mechanics.

The pre-service teachers indicated their past teaching experiences have increased their teacher self-efficacy. More specifically, the teachers indicated that teaching other students in the lab, helped them gain confidence in teaching agricultural mechanics. Similar findings were found by Krysher, Robinson, Montgomery, and Edwards (2012), which indicated the perceptions of the pre-service teachers at Oklahoma State University, increased toward teaching agricultural mechanics after having the opportunity to master teaching skills. It is recommended that pre-service teachers receive the opportunity to instruct various lessons in their post-secondary education, to bolster their teaching self-efficacy. Along with teaching opportunities, completed agricultural mechanics projects served as a source of performance accomplishments. The pre-service teachers in this study indicated they felt confident in teaching students how to build projects they have already mastered.

In regard to the physiological and emotional states of the pre-service teachers, the participants associated anxiety and fear with their teacher self-efficacy. The teacher’s anxiety can lead to negative judgements of teachers’ abilities (Bandura, 1977). The areas which the pre-service teachers indicated feeling anxious about (e.g., agricultural systems, advanced welding techniques), could potentially lead to negative judgments about their teaching abilities and skill levels. The feelings of anxiety indicated by the pre-service teachers are similar to the beginning teachers’ perceptions in other studies (Burris et al., 2010; Krysher et al., 2012; Leiby et al., 2013; & Wells et al., 2013). Furthermore, Burris et al. (2010) found that teachers gained a higher sense of personal teaching efficacy and general teaching efficacy within five years of teaching experience. It is recommended that the pre-service teachers seek professional development and continuing education opportunities, to increase their confidence in the areas of agricultural education which they feel anxious about.

In comparing the findings of this study to the influences of self-efficacy, it is interesting to note there was very little evidence of vicarious experiences as contributing to the participant’s confidence in teaching agricultural mechanics. Regarding vicarious experiences, the pre-service teachers watched their professors and teaching assistants work with shop equipment, but were not given the opportunities to utilize the equipment for themselves. Although the participants’ self-efficacy was likely influenced by watching the professors successfully utilize the equipment, the lack of opportunity to practice with the equipment seemed to have a greater negative influence on their self-efficacy than this vicarious experience. Gavora (2010) stated, “observing and modelling successful teachers may generate expectations that teachers can learn from successes of colleagues, which in turn, can result in their own positive self-efficacy” (p. 3). Additionally, “Seeing others perform threatening activities without adverse consequences can generate expectations in observers that they too will improve if they intensify and persist in their
efforts” (Bandura, 1977, p. 197). It can be implied that the pre-service teachers can gain confidence and self-efficacy in the areas they feel anxious about, by watching others performing the task successfully. It is recommended the pre-service teachers closely observe their student teaching cooperating teachers, to acquire a higher sense of teaching self-efficacy.

Social persuasion also played a role in increasing the self-efficacy of the pre-service teachers. Both Drew and Mariah discussed how their advice, encouragement, and constructive criticism gave them more confidence in teaching agricultural mechanization. Similar to the findings in this study, Krysher et al. (2012) indicated their pre-service teachers gained self-efficacy through social persuasion from various sources (e.g., cooperating teacher, university supervisor, the pupils being instructed, or the pupils’ parents). It can be implied that the feedback rendered by a “significant other”, serves as a scaffolding for the teachers to gain teaching self-efficacy. It is recommended that agricultural mechanics professors and university instructors provide ample feedback to the pre-service teacher.

Recommendations for Further Research

Due to the fact that the pre-service teachers in this study had not completed student teaching, a follow up study should be conducted to gauge if their perceived teaching self-efficacy is altered by their teaching experience. Additionally, to develop a deeper understanding of the overall teaching self-efficacy of the participants in this study, a study on their perceived teaching abilities of all other subjects in agricultural education, should be conducted. Further research of teacher self-efficacy in content areas should be conducted to determine what topics if any, should be included for pre-service teacher training. With a lack of generalizability of this qualitative study, more research should be conducted on pre-service teachers’ perceived self-efficacy towards teaching agricultural mechanics. This will serve as a formative assessment of the effectiveness of the agricultural mechanics courses in their program, in preparing future agricultural educators.

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References


