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"A Challenge that I'm Willing to Take On:" The Self-Efficacy of Female Undergraduate Students in Agricultural Mechanics

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Abstract

This qualitative study sought to answer the question: How do female agricultural education undergraduates describe their self-efficacy to teach agricultural mechanics? In response, we conducted a case study of female agricultural education majors (n=5) who enrolled in an Introduction to Agricultural Mechanics course. After multiple rounds of coding, three themes emerged: (1) Conflicting Perceptions of Agricultural Mechanics, (2) Confronting Challenges, and (3) Building Experience. When viewed through the lens of Bandura's theory of self-efficacy, we concluded that the female students used four sources of self-efficacy to inform their judgments about agricultural mechanics. Although the participants had mixed views on agricultural mechanics, their perceived challenges to effectively teach the content, such as a lack of knowledge and prescribed gender roles, served as obstacles they hoped to address through future coursework and experiences. The findings of this study aligned with similar research; however, notable differences were also evident regarding the attitudes, concerns, and emotions articulated by the participants. Based on these findings, we recommend that future students in the course receive supplemental vicarious experiences with women who teach agricultural mechanics in school-based agricultural education. Because the participants were earlier in their coursework than those in previous studies, we also recommend that research examine how the perceptions of agricultural mechanics changes over time for agricultural education undergraduates from diverse backgrounds, as well as theory-building efforts to distill the sources of self-efficacy for such students going forward.

Keywords: agricultural mechanics; self-efficacy; agricultural education

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Introduction and Review of Literature

For school-based agricultural education (SBAE) teachers, fulfilling their career demands requires them to draw on a diverse collection of knowledge and skills to be considered effective (Roberts & Dyer, 2004). One such skill is the ability to foster student learning in laboratory settings (Jenkins et al., 2010). Although agricultural laboratories can take on an array of forms, the most common are those dedicated to facilitating agricultural mechanics instruction (Shoulders & Myers, 2012). Beyond laboratory spaces, the

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need for quality agricultural mechanics instruction in SBAE programs is essential because secondary coursework in the subject area has been popular for many years (Burris et al., 2005). Similarly, documenting outcomes ubiquitous to agricultural education majors regarding agricultural mechanics has been of great interest to those involved in SBAE teacher preparation (Blackburn et al., 2015; Burris et al., 2010; Byrd et al., 2015; Leiby et al., 2013; Saucier & McKim, 2011; Tummons et al., 2017; Whitehair et al., 2020; Wingenbach et al., 2007). To this point, such work has been critical to improving the preparation of teachers, especially when considering the findings reported by Smith et al. (2019) that newly licensed SBAE teachers account for over 30% of new hires, and of license-eligible program completers, only about three-quarters intend to teach.

These trends are even more troubling in light of the work of Burris et al. (2010), that reported that of the five common agricultural content areas, first-year teachers in SBAE ranked their self-efficacy to teach agricultural mechanics lower than any other content area. This finding has painted a confusing depiction of the phenomenon when juxtaposed with the historically high enrollment trends in agricultural mechanics at the secondary level (Burris et al., 2005). To complicate this issue further, preservice teachers in SBAE have consistently rated themselves poorly regarding agricultural mechanics skills as they progress throughout their teacher preparation coursework (Blackburn et al., 2015). In particular, preservice teachers in SBAE have reported concerns regarding laboratory management skills, maintenance of laboratory facilities and equipment, as well as ensuring student safety during experiential learning activities (McKim & Saucier, 2013; Saucier & McKim, 2011). Preservice and early career teachers have also reported a lack of confidence in equipment maintenance and administering first aid to students (Saucier & McKim, 2011). Consequently, despite great interest, preservice and early career teachers are primarily not confident in delivering learning experiences in agricultural mechanics (Blackburn et al., 2015; Burris et al., 2010; Saucier & McKim, 2013).

These findings, although troubling, are not without potential solutions. For instance, Byrd et al. (2015) reported a statistically significant and positive relationship between the number of post-secondary credit hours completed in agricultural mechanics and SBAE teachers' perceived level of competence in the subject area. Regarding experience, previous research has also shown that experiential learning activities in agricultural mechanics influenced high school students' intentions to teach secondary agricultural education (Gorter & Swan, 2018). Statistically significant and positive relationships have also been demonstrated among students' agricultural mechanics experience at the secondary level, intention to enroll in agricultural mechanics coursework at the post-secondary level, and perceived importance of teaching agricultural mechanics skills (Rasty et al., 2017; Wells et al., 2013). Although agricultural education majors often enter teacher preparation programs with low self-efficacy and knowledge, skill-based coursework has shown to have a practical impact on undergraduate students' understanding of key concepts and perceived self-efficacy (Blackburn et al., 2015; Leiby et al., 2013).

In response to these findings, researchers have called for agricultural education majors to complete additional coursework and skill development in agricultural mechanics (Blackburn et al., 2015; Byrd et al., 2015; Saucier & McKim, 2011). However, McKim and Saucier (2013) found that the opposite trend appeared to be occurring, with some teacher preparation programs reporting a reduction in the number of required agricultural mechanics academic credits. Although most teacher preparation programs require some agricultural mechanics coursework, the amount varies considerably by state and institution (Burris et al., 2005; Granberry, 2022), with one study reporting the majority of SBAE teachers in Iowa completed less than two courses in this area (Byrd et al., 2015). The disparities in agricultural mechanics preparation appear to have created some additional unintended consequences as well. A qualitative case study by Hainline et al. (2018) reported a lack of knowledge and experience in agricultural mechanics as a self-efficacy concern of preservice teachers in Texas. Additionally, Tummons et al. (2017) examined the perceptions of teaching agricultural mechanics from a gendered perspective. They found that female preservice teachers in their final year of agricultural education degree programs had fears about student and teacher safety as well as an apparent lack of knowledge and skills in agricultural mechanics. These concerns

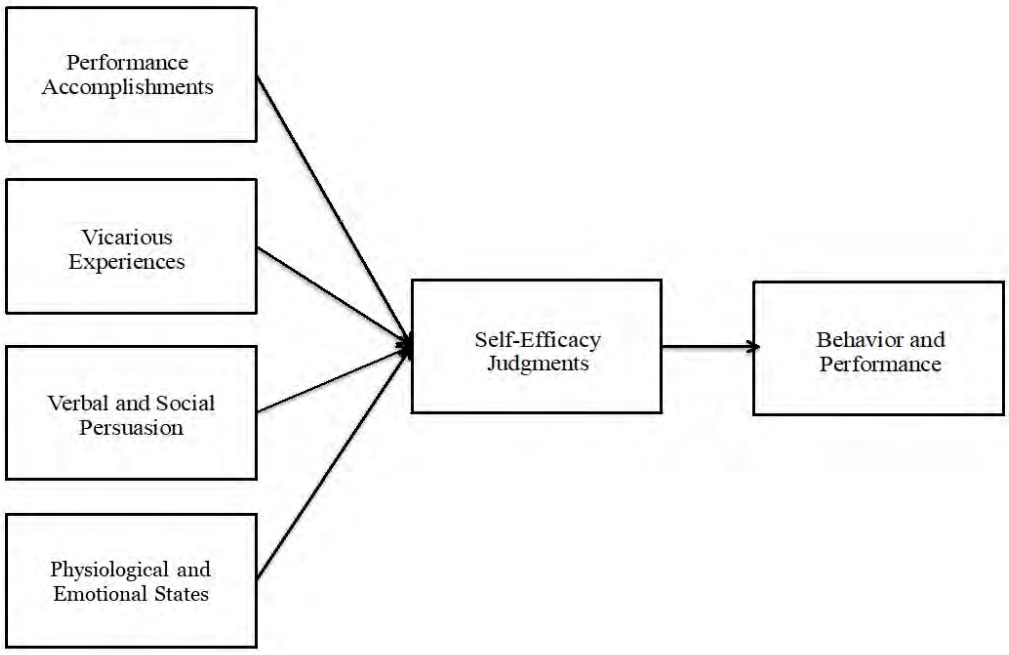
appeared to influence the female preservice teachers' self-efficacy and ability to conceptualize learning outcomes. As a result, more research on female undergraduate students' self-efficacy in agricultural mechanics was warranted to obtain a baseline of female agricultural education majors' self-efficacy regarding agricultural mechanics to better understand how they progress through teacher preparation programs.

Theoretical Framework

This study was guided by Bandura's (1977) theory of self-efficacy. Broadly defined, self-efficacy is an individual's perception of their ability to perform or accomplish a given task, activity, or level of achievement (Bandura, 1977). Regarding behavior, self-efficacy can be a limiting factor in personal choice and one's ability to persist toward a goal (Bandura & Adams, 1977). For example, Bandura (1977) explained, "[n]ot only can perceived self-efficacy have direct influence on choice of activities and settings, but, through expectations of eventual success, it can affect coping efforts once they are initiated" (p. 194). Through the lens of Bandura's (1977) theory, self-efficacy emerges through four primary sources: (1) performance accomplishments, wherein an individual attempts to perform a skill or task and is successful; (2) vicarious experiences, by which an individual is able to observe successful outcomes; (3) verbal persuasion, a concept similar to positive reinforcement; and (4) emotional and physiological states, which refers to the overall health of the individual (Bandura, 1977). These four elements influence an individual's self-efficacy and, thereby, a behavior or action. Experiences, actions, and emotions related to these four factors and their interconnectedness to the perceptions of female agriculture education majors were the focus of this study.

Figure 1

Model Adapted from Bandura's (1977) Theory of Self-Efficacy



As an illustration, agricultural mechanics coursework in post-secondary education has the potential to provide students with the knowledge and skills to influence their self-efficacy. Skill-based courses also allow for the development of performance accomplishments. Further, vicarious experiences, especially in the form of modeling, can be achieved using demonstrative teaching methods and approaches. Meanwhile,

verbal persuasion, in the form of coaching, may be established through the instructor-student relationship during the course. Although emotional and physiological factors are individualized for each student, enrollment in agricultural mechanics courses allows for the expression of these states in a context where they can be identified for further examination. Similarly, the relationship between teachers' pre-existing beliefs and their delivery of the content has been shown to have implications for the SBAE context (Knobloch, 2008). The relationship between these sources and the self-efficacy of agricultural education students may help reveal the underlying decisions they make regarding pursuing, or avoiding, further agricultural mechanics coursework.

Purpose, Significance of the Study, and Research Question

This study sought to expand on Tummons et al. (2017) and Hainline et al. (2018) qualitative work that examined preservice teachers' perspectives on teaching agricultural mechanics. Previous studies have focused primarily on students in the latter half of their undergraduate degree; however, the focus of this investigation was to understand female agricultural education underclassmen's self-efficacy. Additionally, this study sought to build upon the recommendations of McKim and Velez (2016) to consider laboratory facilitation topics and qualitative methods to further develop self-efficacy research in agricultural education. Because this study intended to build knowledge concerning the self-efficacy of individuals in initial teacher preparation programs, it aligned with Priority Three of the American Association for Agricultural Education's National Research Agenda: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016). The overarching research question that guided this investigation was: *How do female agricultural education undergraduates describe their self-efficacy to teach agricultural mechanics?* Based on this question's nature, we approached the investigation from a post-positivist epistemological position (Crotty, 1998). This position allowed us to understand how participants assigned meaning regarding their self-efficacy in agricultural mechanics through the lens of Bandura's (1977) theory of self-efficacy.

Methodology

This study employed an exploratory, single case study design to examine the self-efficacy of female agricultural education undergraduates in agricultural mechanics (Yin, 2017). A case study was the most appropriate approach for this study, as the time, location, participant characteristics, and context all served as a bounded system for analysis of the data (Yin, 2017). These factors are all essential in an in-depth understanding of the case, with the participants being the most significant amongst them.

Description of the Case and Selection of Participants

The participants of this study were female agricultural education undergraduates (n = 5) at Louisiana State University who enrolled in *Introduction to Agricultural Mechanics*, an entry-level course with content designed for future agricultural educators. As such, the course also helped bound the case (Yin, 2017). Our capacity to identify these bounds derived from our involvement with agricultural mechanics at the secondary and post-secondary levels in student and instructor roles. For example, the course content appropriately aligns with the context of the research question. Further, historically the students who enrolled in the course were early in their pursuit of a degree in agricultural education, which provided a basis for the students' self-efficacy regarding agricultural mechanics. In our roles as instructor and graduate teaching assistant for the course, we had access to students that would otherwise not have been possible. In total, the course had 23 students, seventeen females and six males, most of whom were pursuing an undergraduate degree in agricultural and extension education. Enrollment data from the course indicated that one of the male students was a person of color; all other students were white. Additionally, most of the students were Louisiana residents, although a small number of out-of-state students were present. Further, many of the students had no previous experience in agricultural mechanics. All female students majoring in agricultural and extension education who were enrolled in *Introduction to Agricultural Mechanics* during the Spring

2020 semester (N = 13) were invited to participate in the focus group interviews that constituted one of the primary data sources for this study.

Participants consisted of five female undergraduate students, who are introduced using their pseudo-name next. The first participant was Elaina, a 21-year-old junior in the agricultural education program's agricultural leadership concentration. Although she had the highest classification of the participants, Elaina was a recent transfer from agricultural business and, consequently, had completed relatively few credits of agricultural education coursework. Her father was an SBAE teacher, but her experience with SBAE was limited due to three years of attending a private school that did not have an SBAE program. Elaina reflected fondly on her childhood on a ranch and her time showing livestock with her 4H club, emphasizing the life lessons she gleaned from those environments. Despite her perception of the importance of agricultural education in her life, she was unsure if she would pursue a teaching position after graduation. Next was Brigitte, a 20-year-old sophomore pursuing a career as an SBAE teacher. Brigitte had experience with SBAE; her father, like Elaina's, was an SBAE teacher, and she was an FFA member throughout high school. Brigitte was unsure of her chosen career path as an SBAE teacher until completing an early field experience, stating, "I was still on the fence about it when I went to college, and then I had to go in and observe a classroom for one of my classes and … I felt comfortable. I felt like this is where I was supposed to be." Although she had some experience with agricultural mechanics as a high school student, she was the least comfortable of the group concerning agricultural mechanics and made her doubts about her abilities frequently known. The third participant was Desiree, a 21-year-old sophomore concentrating in formal agricultural education. Desiree had enrolled in agricultural mechanics classes in high school but expressed that some of her experiences did not meet her expectations. She earned two industry-based certifications aligned with agricultural mechanics skills during her time as a high school student but was ultimately disillusioned with the quality of instruction she had received. The next participant was Celeste, a 20-year-old sophomore with the goal of being an SBAE teacher after graduation. Celeste had the most exposure to agricultural education of the group, having been involved in both 4-H and FFA since middle school. Although she admitted to gaps in her knowledge of agricultural mechanics, Celeste was the most confident focus group member. She frequently reassured herself and others of their ability to learn the content, regardless of their perceived limitations, often saying: "I know we can all do it" when confronted with a challenging task. The final participant was Adeline, an 18-year-old freshman with intentions to pursue an SBAE teaching career. Although her exposure to agricultural mechanics was limited, Adeline was eager to learn and was the only group member that had been an SBAE student outside of Louisiana. Adeline spoke of the importance of her relationship with her SBAE teacher: "I got really close with my Ag teacher. She's someone that I still talk to on a daily basis." Adeline presented the most praise for her previous teachers and SBAE experience of all the participants.

Data Collection and Analysis

The primary source of data was a focus group interview. An interview protocol for the focus group was developed under the advisement of experts in agricultural mechanics instruction and qualitative research in agricultural education. The protocol consisted of 16 items designed to gather information on participants' experiences with agricultural mechanics content and their perceptions of the subject matter concerning personal attributes and characteristics as future educators. Additional probing questions were also prepared to clarify students' responses as needed. Bandura's (1977) Theory of Self-Efficacy served as the foundation for the protocol and probing questions. After approval from the Louisiana State University Institutional Review Board, an email was sent to all agricultural education majors enrolled in the course. The email described the purpose of the study, the date and time for the focus group interview, and urged them to participate. An additional email reminding the students was sent the day before the focus group session. Microsoft Teams was used to conduct the focus group through video conferencing software due to social distancing requirements resulting from the COVID-19 global pandemic.

Participants were read a consent script, which provided them with the information needed to make an informed decision about their participation in the study. With each question, all members of the focus group were allowed to speak candidly and discuss the subject with other members of the focus group. The focus group interview lasted one and a half hours, allowing participants ample time for in-depth responses to the questions and discussion of their experiences. The session was recorded and transcribed verbatim for analysis.

Additional data were collected through observations of course sessions and examination of relevant course documents. The observations occurred in the classroom and laboratory settings by which the lead researcher captured fieldnotes in an observer-participant format (Ary et al., 2014; Emerson et al., 2011). For example, after each class session, detailed fieldnotes were made that outlined the content, with particular attention given to occurrences that aligned with the purpose of this investigation. Class sessions occurred twice per week for one hour and fifty minutes per session. The fieldnotes were organized to contain both descriptive components, documenting the behaviors and actions of the participants and reflective observer comments (Ary et al., 2014; Marshall & Rossman, 2006).

During the semester, students were introduced to entry-level instruction in safety, carpentry, agricultural structures, and electricity in the classroom and laboratory setting. However, due to the COVID-19 global pandemic, the course format moved to entirely online instruction in March 2020. This move required the final phase of instruction in electricity and all of the instruction covering small gasoline engines to be delivered virtually. Observations continued through class sessions facilitated using Microsoft Teams. Although the focus of our observations was on agricultural education majors, the entire class was observed equally. The majority of students in the course were agricultural education majors; however, all students enrolled in the course experienced the same coursework, lab activities, and circumstances. The fieldnotes from these observations were used to triangulate the study's findings by creating a more comprehensive representation of the actions of the participants during their time actively engaged with the content of the agricultural mechanics course (Creswell & Poth, 2018).

The focus group session's transcript and the fieldnotes from the class observations were analyzed using multiple coding cycles to emerge themes within the case (Saldaña, 2016). The first round of analysis involved establishing codes using open coding techniques advanced by Saldaña (2016). Then, the open codes were reduced to categories in the second round of coding to establish axial codes. A comparison of the axial codes to Bandura's (1977) theory of self-efficacy helped emerge the investigation's themes. This step was critical to validating the data sources, ensuring that the actions of the observations mirrored the thoughts, feelings, and opinions expressed in the focus group, as well as noting any dissimilarity between the two (Creswell & Poth, 2018).

Reflexivity

Before offering our interpretation of the findings, it is important to address our reflexivity. First, we all had roles in the design, implementation, interpretation, and reporting of the findings. It is also critical to recognize that all researchers in this investigation are male, which introduced bias and is a limitation of this study. Second, all of the researchers have experience as SBAE teachers. Therefore, we have a strong positive opinion of agricultural mechanics instruction. Beyond the points of experience and opinion, all of the researchers have professional relationships with the students serving as participants in the study, as is a natural part of our roles as instructors, teaching assistants, and advisors of the students. In addition to possible bias on the part of the researchers, it is noteworthy that the course in which the participants were enrolled was conducted using a Team-Based Learning (TBL) structure before being moved to an online format due to the COVID-19 pandemic. Additionally, the focus group interview used in the study was initially designed for a face-to-face format in March 2020; however, for participant safety during the onset of the pandemic, a distance format via Microsoft Teams was adopted. The pandemic and the subsequent

change in interview format may have affected the recruitment of participants. These biases were identified during the design of the study, and steps were taken to mitigate their influence.

Qualitative Quality

For this investigation, we used Lincoln's and Guba's (1985) strategies for building quality into the investigation to ensure the validity of our findings. From the beginning, *dependability* was addressed by the creation of a clear research question and continued by describing our roles in the study (Lincoln & Guba, 1985). We also provided full descriptions of methods and procedures and were explicit about our biases, two crucial factors in the *confirmability* of our findings (Lincoln & Guba, 1985). Further, triangulating our data across multiple sources was critical to achieving *credibility* of our findings (Lincoln & Guba, 1985). The process of triangulating the data involved carefully examining the transcript from the focus group interview and the fieldnotes from the observation of the participants for corroboration of the codes and themes that serve as the foundation for the study's findings (Creswell & Poth, 2018; Yin, 2017). Finally, having a thorough description of the participants was essential to ensure that *transferability* of the study's findings was possible (Lincoln & Guba, 1985).

Findings

The goal of this study was to describe female agricultural education majors' self-efficacy regarding agricultural mechanics. Our analysis of the study's findings revealed three primary themes: *(1) Conflicting Perceptions of Agricultural Mechanics, (2) Confronting Challenges, and (3) Building Experience.* The three themes were drawn from participants' words during the focus group interviews and our observations of their work during the agricultural mechanics course to present a more granular portrayal of the phenomenon.

Theme 1: Conflicting Perceptions of Agricultural Mechanics

Participants exhibited a diverse mix of strong emotions concerning agricultural mechanics during the course as well as in the focus group. Nervousness and anxious behavior were often observed in the laboratory activities, which aligned with Bandura's (1977) concept of the importance of physiological and emotional states. In particular, nervousness was most frequently observed during demonstrations concerning the safe operation of power tools and equipment. Meanwhile, anxious behaviors were often observed during the electricity unit and seemed more prevalent as the level of complexity increased. Desiree, who had the most agricultural mechanics experience in the group, summarized her feelings of anxiety and difficulty learning from the standpoint of comfort with the content: "…I'm very comfortable with carpentry, so building the wiring board was nothing, but I'm not necessarily as comfortable with electrical, so to me that was harder to learn." The participants also expressed feelings of self-doubt on multiple occasions. Brigette presented her thoughts on self-doubt and questioning her role in an agricultural mechanics laboratory: "Once you get in your head… it kinda makes you keep thinking like, "Oh, do I need to be here?" When discussing nervousness and anxiety, participants explained that a lack of knowledge and experience was the basis of these feelings.

The participants also emphasized their views about the possibility of not knowing how to answer their future students' questions about agricultural mechanics. Adeline explained: "…I'm nervous about not having all the right answers and not knowing what to tell my kids, like, if they have a question about a contest or something that I don't know the answer to." She continued: "So I think that's something that definitely could be a fear most people have is not having all the right answers and not knowing what to do at times." Brigitte echoed similar sentiments but also shared thoughts on the need for early-career teachers to ask for help: "Don't be too prideful, you know? Definitely go back and speak with someone who has more experience with that area you don't know about." Although admitting the need for help and reliance on asking questions was present during the focus group interview, it was not as commonly observed in the

class observations. These students were frequently content to struggle in silence until their difficulties were noticed by the instructor or graduate assistant and help was offered. When observed, most students, though nervous, exhibited an eagerness to perform the skills correctly. As a result, students conveyed the course would be beneficial to their pursuit of a career in agricultural education or that the course would be fun or different in a way that interested them. Although personal views on teaching agricultural mechanics content were mixed, all of the focus group participants expressed an understanding that agricultural mechanics was vital to secondary agricultural education.

As an extension of this thought, participants maintained the belief that a basic level of understanding of the subject was necessary to teach secondary agricultural education students effectively. Brigitte verbalized her mixed feelings in this regard: "We can all say, "Oh, I'm never gonna teach this in my classroom." I know I say that because… I mean, I'm gonna be honest, Ag mechanics is not at the top of my list with my things I'd like to teach. Just 'cause I'm not extremely comfortable with it just yet." She continued: "But I think you know you're gonna have one or two students that have an interest in that, and you can't turn them away. You know? So you're gonna do the best you can to teach them and give them that experience that they want to have. So, I definitely feel it's necessary."

Theme 2: Confronting Challenges

In the focus group, participants also articulated a sense of the challenges they must overcome to facilitate student learning in agricultural mechanics successfully. For instance, all participants expressed recognition of their shortcomings in content knowledge and technical skills, which aligned with Bandura's (1977) position on the role of performance accomplishment in shaping the self-efficacy of individuals. Celeste posited: "It's kinda intimidating, just as far as like the welding and carpentry and stuff like that. But I mean, in the end, I know we can all do it, so it's not so much of a concern as a confidence thing, and I think that the more we work on it and get better at it, it won't even matter in the end." Participants also spoke to the struggles they encountered concerning obtaining the skills needed to succeed in the course, which became apparent during our observations. Frustration among the female students was especially evident in the electrical wiring portion of the course. On this point, Brigitte explained the confusion she encountered: "I had no, absolutely no, experience with building or wiring, so that was a little difficult for me. I mean, I was asking for help all the time, but I didn't know what I was doing." She continued: "You could have said 1,000 times what I'm supposed to do; I still didn't know what I was doing." Despite this sentiment, gratification with their successes and willingness to improve also emerged in discussions of their challenges.

Another challenge that emerged from our analysis was that the female students perceived they struggled to overcome prescribed societal gender roles. As an illustration, participants reported they noticed there was a difference in expectations among genders of agricultural mechanics students at the high school level. They also perceived that female agricultural educators were not thought of positively in regard to having the competence needed to teach agricultural mechanics. Elaina was very straightforward in her opinion on the matter: "I think that you will have those few people who don't take you seriously because you are female." They also suggested that age, race, and lack of relevant experience were factors that may cause their future students and colleagues to view them negatively. Desiree explained her views on the subject by saying: "I did have a fairly young Ag teacher, and a lot of my class didn't necessarily take her seriously until she kind of put her foot down and was like: "look, I'm not playing. I'm here to be an actual teacher and get respect." She continued: "but I also think it definitely is affected by background. I feel like maybe something people who don't necessarily have an agricultural background don't necessarily get taken as seriously because they're like, "Oh, what do you know?" Desiree captured the complex emotional state encountered by participants best when she argued: "Hey, this is going to be hard, but it's … a challenge that I'm willing to take on…."

Theme 3: Building Experience

Participants mentioned having positive experiences in secondary agricultural education, especially through FFA. For instance, during the focus group interviews, participants explained that their reason for pursuing a degree in agricultural education was primarily based on their positive interactions with people, content, and experiences related to agricultural education, i.e., vicarious experiences and social persuasion when viewed through the lens of Bandura (1977). Desiree explained how her career choice was influenced: "[My ag teacher] was really... to the point. She didn't play favorites and really instilled me with a good sense of how a good Ag teacher should run her classroom. It just kind of made me realize, like, hey, you know she loves her job. I really like her, 'cause I found my passion for it, and I told myself I wanted to be Ag teacher in the future." Regarding agricultural mechanics exposure, four of the five participants reported having enrolled in at least one course during their time in high school that included an agricultural mechanics component. Elaina had only one year of agricultural education courses in high school, with no agricultural mechanics coursework. She explained: "But I mean, my dad's an Ag teacher, and I live on a ranch, so the lessons really never stopped." Their experiences with specific content varied between individuals, with particular mentions of electrical wiring, carpentry, plumbing, and small gas engine content. Celeste, the most experienced of the group, recounted her experience and desire to learn more: "so, we got to do electrical, plumbing, carpentry… We did not get to do small engines, so I was kind of really looking forward to being able to do those things." Most of the discussion about their experiences in the subject matter before post-secondary enrollment was positive. A key complaint, however, was that their exposure to the content was limited due to a lack of resources such as content-specific instructional time or available space in their schedule. Desiree expanded on this matter: "In high school, I took small engines class, so I kind of got a little taste of small engines, but other than that, the electrical classes and everything else filled up pretty quickly. She continued: "so the only other thing I got to experience was carpentry… and then I feel like small engines is gonna be a new experience because we never actually got to break down an engine since we didn't have enough at my school." Their wish to further develop their skills was also noted in the observations, where female students were frequently noted as asking for extended time to work in the agricultural mechanics laboratory.

All of the focus group participants mentioned interactions with SBAE teachers, parents with similar technical skills to the coursework, and instructors or graduate assistants as influential figures that inspired them to build their experience in agricultural mechanics. Adeline beamed: "My dad is a journeyman electrician, so I grew up around that, and… it definitely was interesting to see what he did and understand what in the world he was always talking about." It is also important to note that four of the five participants mentioned at least one female figure who served as an example for them in agricultural mechanics. Celeste spoke fondly of a former graduate teaching assistant for the course: "I had Brittney last year in the Foundations of Ag Ed class… and she wanted me to take the class with her, but I didn't get a chance to take it because it didn't fit my schedule so... I was really interested in taking it because she said it was fun." Desiree explained a similar influence: "My ag teacher told me that she definitely wants me to pay attention in this class because it's something that she didn't necessarily get to learn [as an undergraduate]." Although most figures discussed were mentioned favorably with positive intentions to replicate their behaviors, some participants also explained they would act differently because of what they had observed from their previous instructors. For example, many of the participants reported they desired to have a better grasp of content knowledge for agricultural mechanics as well as engaging instructional approaches rather than what had been observed previously. Adeline clarified, "My Ag teacher wasn't really that good [at agricultural mechanics]. She wasn't very hands-on, so I made the decision to be an Ag teacher because I wanted kids to have a better education than I got." Participants also reported they were influenced positively by others to take the course. Desiree described the conversation with her academic advisor, who was also the instructor of the course: "…my advisor… who helps me schedule…he kind of recommend it, but he also basically told me, hey, I need this …to graduate. So I was like, "Yeah, you know, why not? Let's learn."

Conclusions and Discussion

The purpose of this study was to investigate how female agricultural education majors described their self-efficacy regarding agricultural mechanics. The emergent themes aligned with Bandura's (1977) theory of self-efficacy in *varied* and *nuanced* ways. For example, the participants reported they felt nervous and anxious about agricultural mechanics content and related experiences, which spoke to Bandura's (1977) argument that self-efficacy was largely influenced by individuals' physiological and emotional states. The findings also aligned with those reported by Tummons et al. (2017) and Hainline et al. (2018). Of note, the participants' nervousness, anxiety, and self-doubt were present during observations and focus group interviews, which suggested that such affected the female students' self-efficacy in this investigation. These feelings were met, however, with participants' contradictory views of their self-determination and confidence. Despite this, we conclude that participants' mixed emotions during the course appeared to serve as a catalyst for the development of their positive perceptions about teaching agricultural mechanics moving forward.

In this case, self-confidence was of particular interest because participants did not articulate it overtly. Case in point, the female agricultural education majors subtly spoke to how their confidence had improved slightly during the semester rather than demonstrating confidence when *performing* specific skills. Instead, participants were confident in their ability to *learn* skills in the future. We conclude that for participants to achieve self-determination and confidence in the face of perceived challenges resulted from their ability to balance *performance accomplishments*, a factor Bandura (1994) argued was a key to improving self-efficacy. In this study, participants also indicated that the perceived opinions of their future students largely shaped their level of confidence about teaching agricultural mechanics concepts to secondary students. Meeting their prospective students' expectations emerged as the participants reflected on their previous experiences and pondered what they anticipated encountering in the field. Because of this, participants began to challenge themselves by gaining knowledge and skills with unfamiliar content, which was supported by Whitehair et al. (2020) work.

Regarding prescribed societal expectations, the findings of Tummons et al. (2017) presented gender issues as a factor contributing to feelings of inadequacy. The female agricultural education majors in this study articulated similar sentiments but did not experience crippling anxiety about breaking traditional gender stereotypes. Instead, they desired to challenge themselves by excelling in agricultural mechanics knowledge and skills. We also conclude that those female role models appeared to serve as powerful examples for the participants. For instance, students often referenced the importance of observing competent female teachers to understand how they could successfully teach similar content. Interestingly, these sentiments also extended to a diversity of attributes such as age, background, and race. Such factors were recognized as potential challenges because they stood in contrast to the perceived norm. Participants in this investigation also noted that negative influences shaped their self-efficacy to teach agricultural mechanics. In particular, they explained that several female instructors did not meet their expectations, which led to disappointment. Consequently, these negative examples appeared to establish a basis for what quality should *not* look like for females teaching agricultural mechanics. Similarly, Lockwood et al. (2002) reported that witnessing the failures and shortcomings of others could motivate some individuals. It is important to note that the negative models mentioned by participants were primarily encountered when they were secondary students in agricultural education. Meanwhile, the individuals who served as more positive examples were from more diverse interactions, such as secondary instructors, graduate assistants, and other SBAE teachers who were guest speakers in their post-secondary courses. Although the positive role models mentioned by participants were both male and female, participants mentioned female role models more frequently and in higher regard. Therefore, the importance of vicarious experiences for females in agricultural mechanics, especially concerning the importance of modeling, is in alignment with Bandura's (1994) work.

A review of the *Introduction to Agricultural Mechanics* course syllabus suggested a heavy emphasis on skill development in safety, carpentry, electricity, and small gasoline engines (Blackburn, 2020). Through our observations of students in laboratory settings, we noted the critical role of verbal persuasion in helping the female students overcome their self-doubt and learn to implement new skills throughout each focus area of the course (Bandura, 1977). The approach to developing these skills in the agricultural mechanics laboratory was deeply rooted in coaching by which the instructors and students engaged in unique teaching dynamics that helped them feel more comfortable. We conclude that this approach helped verbally persuade the students and promoted their ability to safely and successfully perform technical skills (Bandura, 1977). For example, the students articulated that by instructors taking on a coaching role, they perceived that they experienced greater patience, positivity, and diversity in instructional approaches than in other courses.

Finally, the absence of *safety* in our emergent findings was also noteworthy. In the research from Tummons et al. (2017), safety was presented as a major theme that served as a concern of female preservice teachers with agricultural mechanics. Further, knowledge and skills associated with safety in the agricultural mechanics laboratory have served as points of importance in the literature associated with agricultural mechanics education for preservice and early career teachers (Albritton & Roberts, 2020; Leiby et al., 2013; Saucier & McKim, 2013; Saucier et al., 2012; Wells et al., 2018). It is important to note that safety was not ignored in the course. All students completed an instructional unit entirely devoted to agricultural mechanics safety at the beginning of the semester, and safety considerations were made known for each unit of instruction that occurred in the agricultural mechanics laboratory.

Further, during observations in the laboratory, nervous behaviors were noted during instruction that emphasized the safe operation of equipment. All students were also made aware of safety concerns when an incident occurred in the agricultural mechanics lab that involved the melting of an extension cord. Although this incident did not result in any injuries, it made real the concept of electrical safety for students present in the lab at the time. With the combination of importance in the literature, experience through the course, and observed behaviors, it should be expected that the participants would address safety. However, during our observations and the focus group interview, participants did not verbalize any concern for their safety or the safety of their future students regarding agricultural mechanics. Safety was an expected topic when discussing considerations that should be kept in mind when teaching agricultural mechanics. Instead, participants discussed addressing future students' levels of interest, dealing with diverse backgrounds with the content, and expenses associated with teaching agricultural mechanics. Therefore, the absence of findings associated with safety is a unique point in this case. Although such a notion does not support previous literature in agricultural education, this feature served as a defining issue that warranted inclusion.

Implications and Recommendations

The inspiration for this research was born from the literature that explored similar concepts of self-efficacy, confidence, and concerns related to learning, teaching, and management associated with agricultural mechanics (Leiby et al., 2013; McKim & Saucier, 2013; Tummons et al., 2017; Wingenbach et al., 2007). This case study sought to expand the knowledge base on the phenomenon by examining female participants who were just beginning their teacher preparation coursework. The group of young female agricultural education majors in this case, therefore, provided greater insight into the basis of their perceptions concerning agricultural mechanics. We anticipate that this perspective may change over time as they gain more experience. Perhaps the findings from this investigation could be transferrable to female teachers in Louisiana who are alternatively certified since their self-efficacy may be similar. As such, we recommend that future studies examine the self-efficacy of early-career female agricultural teachers who are alternatively certified to determine if parallels could be drawn between the two populations. The study's findings could also serve as a baseline for the perceptions of this cohort of female teachers and provide a benchmark to explore more extensive research.

Findings from this investigation also illuminated several additional areas of future research and practice moving forward. First, because previous experiences in agricultural mechanics appeared to be a defining factor for participants in this case, additional research should seek to identify the level of agricultural mechanics experience by which female agricultural education majors enter their post-secondary studies. Vicarious experiences, especially modeling, were also revealed to be particularly impactful for participants. Therefore, future practice in this course should seek to expose agricultural education majors to female role models that are competent teachers in the agricultural mechanics content area so that they may serve as a positive point of reference. In practice, this may be accomplished through assignments that involve observations, interviews, or guest speakers. Research should also be conducted to examine the degree to which these experiences are impactful and how they should best be implemented.

Because of the importance of verbal and social persuasion in this case, more work is also needed to understand the implications of such for female students when they enter the teaching profession. Participants also articulated the role of social pressure frequently in this study. These pressures were largely based on prescribed social norms such as age, background, gender, and race. As such, additional research is needed to determine the specific sources of these expectations and the degree to which their influence is felt among the various groups they encompass. The current practice of instructors in this course serving as mentors that acknowledge and discuss norms and expectations for future SBAE teachers is recommended to continue based on the findings of this study. Further research should also be conducted to explore whether the sentiments reported by the participants in this study may extend to other minority groups in similar settings.

Participants' expression of negative emotions was a complex finding in this investigation, and we interpreted such as the self-perceived challenges they must overcome to succeed as a teacher in secondary agricultural education. Going forward, additional research should seek to distill the sources, development, and outcomes of these emotions. We also recommend a longitudinal study to document the emotional changes that agricultural education majors, especially females, undergo concerning agricultural mechanics. Such data could paint a more complete picture of the growth and development that students may grapple with during their teacher preparation coursework. In addition, by better understanding their changes in attitudes, perhaps we can begin to achieve a more accurate understanding of students' views on safety. Although safety did not emerge as a salient finding in this investigation, given its prominence in the literature (Albritton & Roberts, 2020; Leiby et al., 2013; Saucier & McKim, 2013; Saucier et al., 2012; Wells et al., 2018), we conjecture that this phenomenon may be more complex and students' understanding of such might mature as they move into more advanced coursework. Consequently, we call for future research to more intimately explore how students from diverse backgrounds differ in how they conceptualize and understand the role of safety in agricultural mechanics. Finally, because Bandura's (1977) theory of self-efficacy served as the framework for this study, we recommend that future theory building efforts be conducted to define and establish the sources of self-efficacy in agricultural mechanics across other groups defined by gender, race, background, certification type, and career experience.

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