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The Impact of a Project-Based Learning Experience on the SAE Self-Efficacy of Preservice Teachers

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Abstract

The Supervised Agricultural Experience (SAE) program is a valuable component of school-based agricultural education (SBAE). SAE component outcomes consist of real-world career exposure and skill development through experiential learning. Unfortunately, the SAE program is often the weakest component of SBAE in local programs. As such, SBAE teachers regularly request professional development in supervising student SAE projects. To address this need, we evaluated preservice teachers' self-efficacy for teaching SAE throughout a semester-long course focused on the topic. We were especially interested in how self-efficacy changed over time, and we used an explanatory mixed-methods approach to do so. Our findings revealed that preservice teachers increased their perceived SAE self-efficacy by one full point on a 5-point scale, as a result of the course, when comparing data from Week 1 to Week 16. Financial data records of SAEs were perceived as the lowest SAE self-efficacy item for preservice teachers. Focus group members identified mastery experiences in the form of experiential learning and vicarious experiences of course instructors as contributing factors to their increase in SAE self-efficacy. It was recommended to course instructors to continue experiential learning projects and employing current and previous SBAE teachers as course instructors and guest speakers while also revising instruction related to The Agricultural Experience Tracker. Peer institutions should consider an experiential learning experience in relation to SAE supervision in their SBAE teacher preparation program.

Keywords: experiential learning; preservice teacher self-efficacy; supervised agricultural experience

Introduction

To be prepared for the 21st century workforce, students must be able to think critically, solve complex problems, communicate effectively, possess initiative, and be accountable (Thiel & Marx, 2019). Experiential learning activities provides a real-world simulation for students to enhance these skills with the supervision of a teacher (Bertoni & Bertoni, 2019; D'Amato, 2019; Hulaikah et al., 2020). Providing experiential learning opportunities has become a popular pedagogical approach throughout all levels of education – primary, secondary, post-secondary, and adult education (Hayden & Osborn, 2020) – but has been a mainstay regarding the instruction of SBAE programs (Baker et al., 2012). Experiential learning has comprised the Supervised Agricultural Experience (SAE) component of school-based agricultural education (SBAE) programs, which has existed for over a century (Rubenstein et al., 2014) and has been shown to increase students' employability skills (Haddad & Marx, 2018; Ramsey & Edwards, 2012; Thiel

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& Marx, 2019). However, teachers of various educational fields have reported uncertainty in their abilities to plan and facilitate an experiential learning activity (Hanna, 1992).

Teacher effectiveness is a significant predictor of educational outcomes (Darling-Hammond et al., 2005). Therefore, for experiential learning to be effective, teachers must be well prepared in their perceived ability to perform necessary skills and tasks (Bandura, 1993; Roberts et al., 2019). Teacher preparation programs exist to provide preservice students the opportunity to learn the "essential knowledge, skills, and habits of mind for quality teaching" (Hollins, 2011, p. 395). For SBAE teachers, this includes tasks related to facilitating students' SAE projects. Unfortunately, SBAE teachers commonly report a low sense of self-efficacy in planning, implementing, and supervising SAE projects (Duncan & Ricketts, 2008) and continually request professional development in those areas (DiBenedetto et al., 2018; Rank & Retallick, 2016). Therefore, it is important to focus on teacher self-efficacy at the preservice education level (Pajares, 1992). In addition to exposing preservice teachers' views on their likelihood of success in aspects of their chosen career field (Bandura, 1997), self-efficacy data inform teacher educators in evaluating and planning experientially-based learning activities (Bolick et al., 2020).

The current iteration of SAEs has evolved over the past century (Smith & Rayfield, 2016) from projects related to production agriculture to career exploration, agricultural literacy, workplace safety, college and career readiness, and financial management through placement/internship, ownership/entrepreneurship, research, school-based enterprise, and service-learning projects (The Council, 2017). By engaging in SAEs, students acquire entry-level technical skills (Ramsey & Edwards, 2012), 21st century workplace skills (Robinson & Haynes, 2011), and agricultural content knowledge (Cheek et al., 1994; Ricketts et al., 2006). Although SAEs have the potential to provide financial incentives and benefits (Hanagriff et al., 2010), student motivation to complete SAE projects have waned in recent decades and has been a topic of concern for SBAE teachers and teacher educators (Bird et al., 2013).

SBAE teacher motivation and perceived competence are important predictors of student success related to SAEs (Lewis et al., 2012). Competent SBAE teachers are those who have knowledge and skills in the communication, instruction, agricultural context, assessment, and project development of SAE types (Hainline & Smalley, 2021; Jenkins & Kitchel, 2009; Rubenstein et al., 2014). In addition, those who are able to use SAEs as instructional tools are deemed more effective in the classroom (Eck et al., 2019).

SAE professional development needs have spanned four decades of agricultural education literature (DiBenedetto et al., 2018) and have included topics such as: identifying SAE opportunities for students (Garton & Chung, 1996; Roberts & Dyer, 2003), SAE documentation and assessment (Toombs & Ramsey, 2020), and student motivation and recognition through FFA proficiency and degree applications (Sorensen et al., 2010). Yet, professional development continues to be a need for improving SBAE teachers' SAE self-efficacy (Wolf, 2011). In particular, preservice teachers need focused experiences related to understanding SAEs to improve their self-efficacy with that component of the program (Rubenstein et al., 2014).

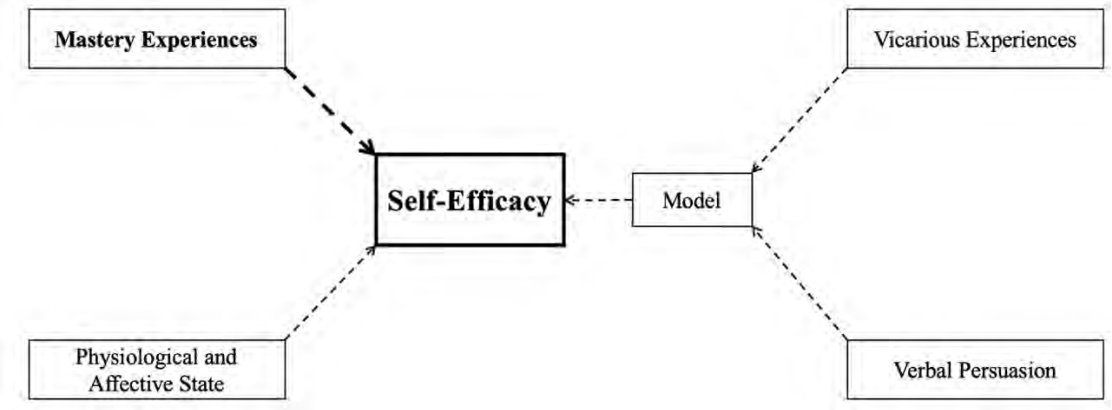
Theoretical Framework

Bandura's (1986) self-efficacy theory guided the study. Self-efficacy measures a person's belief in his or her ability to be successful in a particular task of an identified context to achieve a predicted outcome (Bandura, 1977). Self-efficacy is tied to motivation (Azjen, 1991) and serves as a strong predictor of a person's behavior, effort, and persistence (Walumbwa et al., 2011). Those who have elevated levels of self-efficacy in a particular context are more likely to set higher goals and achieve greater outcomes than those who lack self-efficacy (Bandura, 1997).

Self-efficacy is formed through various personal experiences (Bandura, 1997), as illustrated in Figure 1. Internal sources include mastery experiences and physiological and affective states (Bandura, 1997). External sources of self-efficacy include vicarious experiences and verbal persuasion (Bandura, 1977), which is vitally important when internalizing self-efficacy beliefs (Bandura, 1993).

Figure 1

Sources of Self-Efficacy (Bandura, 1997)



Mastery experiences have lasting impacts on self-efficacy (Bandura, 1997). An individual's self-efficacy improves with successful performances and declines with failures (Wilson et al., 2020). Success in similar tasks with transferable skills can offer participants a positive self-efficacy in a new arena (Bandura, 1997). Mental, physical, and emotional states are another internal source of self-efficacy. For high-achieving individuals, a manageable amount of stress increases motivation; but for low achievers, the same stress can be a demotivator (Bandura, 1997). A higher sense of self-efficacy can be a buffer toward adverse situations while individuals low in self-efficacy can be more susceptive to negative stress (Bandura, 1997). A positive mood is more likely to elicit recollections of past successful mastery experiences while negative moods more often draw on memories of past failures (Bandura, 1997).

External self-efficacy influences are interpreted in large part by their source (Bandura, 1997). The effectiveness of a model is directly related to how that individual views the person's competence (Brewer & Wann, 1998). Also, the impact of a model is exponentially increased when individuals identify with and find similarity in that person (Connolly, 2017).

Models can provide vicarious experiences and verbal persuasion. Others' experiences may impact an individual's self-efficacy if context, tasks, and abilities are perceived as corresponding to the individual's context (McKim & Velez, 2016). As with vicarious experiences, the credibility and similarity of the model filters verbal persuasion's influence on self-efficacy (Bandura, 1997). This verbal persuasion can be of great importance when faced with hardships and self-doubt (McKim & Velez, 2016). Often verbal persuasion is presented in the form of performance feedback. The timing, word choice, and compliment/critique balance of feedback are contributing factors that impact a person's self-efficacy (Bandura, 1997).

In addition, mastery experiences, vicarious experiences, verbal persuasion, and psychological and affective states work together through complicated psychological processes to form a person's self-efficacy (Bandura, 1997). Though most self-efficacy beliefs are formed in childhood and adolescence, they remain pliable throughout a person's lifespan (Bandura, 1997). The introduction of an equitable

model or a formative mastery experience can have great impact on an individual's self-efficacy (Wilson et al., 2020).

Background of the Study, Purpose, and Research Questions

AGED 3203 – Planning the Community Program in Agricultural Education is a junior-level preservice course taught at Oklahoma State University (OSU) which exists to educate students about "FFA chapter advisement, planning and managing the instructional program, [and] identification and completion of records and reports required to be a teacher of agricultural education in Oklahoma" (Oklahoma State University, 2016-2017, p. 199). The course aims to assist students in orchestrating effective FFA and SAE programs at the secondary level. To do so, a project-based assignment was developed in which each student participated in raising five broiler chicks from one-day-old hatchlings through the six-week maturity phase (AGED 3203 Course Syllabus, 2020). Each student was paired with a partner in which the birds were combined for a total of ten. This allowed the birds to be randomly assigned to two groups of five to undergo a feed trial over the six-week process. One group of birds received a high protein diet, and the other group received a scratch diet. The feed rations were predetermined by the poultry nutritionist and mixed at the feed yard at OSU. Pairing students and their birds together enabled them to role play the teacher and student as they practiced making a SAE visit each week to check on the birds. In addition to caring for and feeding their birds daily, students submitted weekly project reports and photos, collected data related to their feed trials, and produced an Agriscience Fair presentation on their projects. Because SAE tends to be the weakest component of the SBAE program (Rubenstein et al., 2014), we were interested in assessing the course's impact on students' self-perceived changes in SAE self-efficacy. This purpose aligns with The American Association for Agricultural Education's (AAAE) third research priority concerning a professional workforce in the 21st century (Roberts et al., 2016). Three research questions guided the methodology of this study:

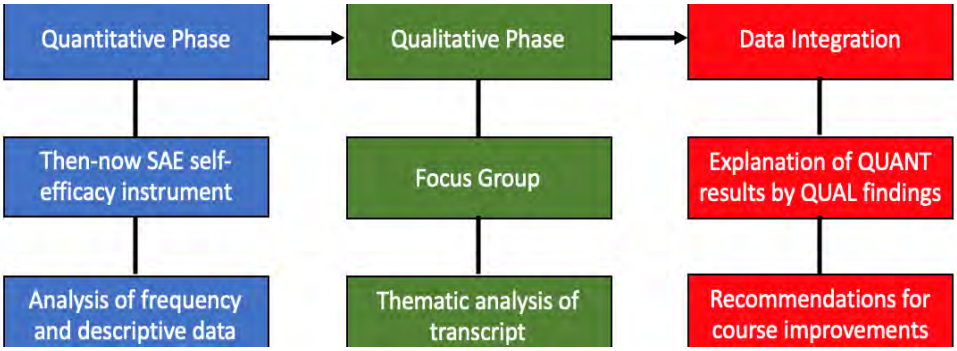
1. How did students' perceived SAE self-efficacy change over the semester?
2. What were students' perceptions of the SAE components of the course?
3. How does the qualitative data explain the quantitative changes in SAE self-efficacy?

Methodology

Sheehan and Moore (2019) stated that both qualitative and quantitative data are needed to understand the formation and impact of important self-referent belief systems. Wolf (2011) advocated for multiple forms of data in researching preservice and novice SBAE teacher self-efficacy. Therefore, a mixed methods approach was employed with an explanatory sequential design to achieve the study's aims (see Figure 2). We first collected numerical data in a quantitative phase and then used qualitative data to explain the quantitative findings by integrating data points (Creswell & Clark, 2018). Explanatory sequential designs provide participant voices to further interpret quantitative data (Greene et al., 1989).

Figure 2

Research Study Design



Population and Participants

The population of this study was students enrolled in AGED 3203 during the Spring 2020 semester ($N = 44$) at OSU. All students in this course were agricultural education majors, and most were juniors. Students were invited to participate via email during university mandated distance learning due to the Covid-19 pandemic. All data collection occurred during the final week of the semester.

Quantitative Methodology

In the first phase, a preexisting instrument was used in a then-now design to collect perceived self-efficacy data. Rubenstein et al. (2014) developed an instrument to assess preservice teachers' self-efficacy in relation to AAAE SAE competencies and recommended that "self-efficacy should be examined after respondents . . . have had an opportunity to implement what was taught in the preservice program" (p. 81). Though the instrument was developed before the current SAE for All curriculum was released, items are reflective of The Council's (2017) recommendations for effective SAE supervision. This 20-item, five-point Likert-type instrument reported a 0.95 Cronbach's alpha reliability coefficient (Rubenstein et al., 2014).

The instrument was modified to accommodate a then-now design. A then-now design may be more reliable than a pre-posttest when participants have little experience in program topics (John & Robins, 1994; Rockwell & Kohn, 1989). Participants were asked to reflect on their perceived SAE self-efficacy in Week 1 of the course and report their current sense of self-efficacy during Week 16 on the same items. The instrument yielded a 0.95 Cronbach's alpha reliability coefficient, the same as reported in the original study (Rubenstein et al., 2014).

Students were emailed a link of the instrument housed on Qualtrics. Per Dillman et al. (2014), they were reminded twice to complete the instrument, once through a group chat and again verbally in a Zoom lecture session. A total of 28 complete responses were collected for a response rate of 64%. To address non-response bias, late respondents, those completing the instrument after the final reminder ($n = 6$) were compared to early respondents ($n = 22$) using an independent *t*-test on the construct measuring preservice teachers' current sense of self-efficacy to evaluate SAE programs (Linder et al., 2001). No statistically significant difference ($p = 0.75$, Cohen's $d = 0.14$) was found between early and late respondents, indicating the findings may be generalized to the population (Johnson & Shoulders, 2017).

Qualitative Methodology

Qualitative data were collected through a focus group interview via Zoom web conferencing. Focus groups allow qualitative researchers to obtain both intra and interpersonal data in an efficient matter (Liamputtong, 2011). Students were invited to participate by email and reminded one day before the focus group was to occur. A total of 12 students participated. The protocol for the focus group included questions representative of items on the quantitative instrument and changes in SAE self-efficacy as well as perceptions of SAEs, implications for future practice, and recommendations for improving the course. This protocol was assessed by two experts in SBAE with qualitative research experience. The focus group was audio recorded and transcribed. Codes were assigned to data points in the transcription using in vivo coding (Saldaña, 2016). Participants' own words were used as initial codes which were then condensed to 13 unique codes representing sources of change in preservice teacher SAE self-efficacy (Manning, 2017). The constant comparative method was used to organize similar codes into themes which were then compared again to the transcript (Glasser & Strauss, 1967). Qualitative methods and data interpretation were undertaken with a hermeneutic approach. Focus group notes and transcripts were analyzed as an entire product in addition to the careful analysis of individual codes and themes (McCaffrey et al., 2012; Paterson & Higgs, 2005).

Credibility, transferability, dependability, and confirmability were addressed to build trustworthiness of the qualitative findings (Privitera, 2017). An audio recording and a transcription of the focus group created a record of participants' statements and provided a chain of evidence to help establish credibility. Although these experiences cannot be transferred past these participants, they were compared to Bandura's (1997) self-efficacy theory for corroboration. Open-ended, non-biased protocol questions and focus group procedures allowed all participants to contribute, adding dependability to the study. Finally, confirmability was addressed through participant quotes and triangulation of data.

To assist preservice teachers in learning about SAEs in class, three course instructors, who also serve as the researchers of the study, assisted them throughout the project-based broiler experience. Therefore, it is important that we reveal our own experiences and how they may have influenced preservice teachers throughout the semester. We offer our biases and perspectives below in the reflectivity section.

Reflexivity Statement

All three of us are former SBAE teachers and were employed at OSU in the preparation of SBAE preservice teachers at the time of data collection. In total, we have a combined 37 years of teaching experience (both at the secondary and post-secondary levels) in agricultural education in five different states. Specifically, at the time of this study, we all were involved in the delivery of the course and worked closely with the students enrolled throughout the semester. Two authors held a PhD in agricultural education and served as co-instructors. The other author was a graduate student working toward a PhD in agricultural education and served as the course's laboratory instructor. Therefore, we all had a vested interest in the course, and we recognize this as a potential bias.

In addition, in Oklahoma, animal science is arguably the most popular course offered at the secondary level. Therefore, we recognize our biases toward the importance of teaching SAEs in the context of the project-based broiler experience. Certainly, our decision as course instructors to contextualize our learning experience using broilers was based on our access to free, one-day-old broiler chicks, facilities (i.e., heated barn with automatic water access, and optimal pen space,), and feed (i.e., both high protein and scratch diets) through our partnership with the Food and Animal Science Department at OSU. In addition, we were able to leverage our experience for multiple uses in the course (i.e., conduct a feed-trial clinical experiment; emphasize the scientific method of teaching; enable students to track, record, and analyze real data, such as daily weights of birds and feed consumed, photos, and observation notes; allow students to role play and practice being an agricultural education teacher making a SAE visit; and prepare and deliver an Agriscience Fair presentation). We recognized that our students would likely be more interested in learning about SAEs in a context for which they might be familiar, hence, the importance of tying the learning to raising animals – in this case broilers. All these decisions were made from a biased set of lenses. We recognize we likely held biases regarding our interpretation of the study's findings as well. However, it was our sincere attempt to mitigate our biases whenever possible through quality-control checks such as memoing, bracketing, audit trails, and introspective reflection (Saldaña, 2016) of the data. Through these efforts, we are comfortable with the findings shared in the following section.

Findings

Quantitative Results

The first research question explored changes in SAE self-efficacy using an instrument from Rubenstein et al. (2014) in a then-now design. Data revealed a full one-point increase in SAE self-efficacy scores from Week 1 (M = 3.41; SD = 1.08) to Week 16 (M = 4.41; SD = 0.64), as reported in Table 1. Participants reported both higher means and lower standard deviations for each item at the end of

the semester (i.e., Week 16) as compared to the beginning (i.e., Week 1). The item, *evaluate student knowledge and skill development within their SAE program*, revealed the greatest increase (M = 1.32) in SAE self-efficacy regarding these SBAE preservice teachers when comparing changes throughout the 16-week course. The item, *encourage students to improve their SAE*, resulted in the next greatest increase regarding preservice teachers' perceived changes in their self-efficacy (M = 1.24). All other items measured in the instrument experienced an increase of at least 0.78 points in perceived self-efficacy when comparing Week 1 and Week 16.

Table 1

*Comparison of SAE Self-Efficacy in Week 1 and Week 16 of Course (*n *= 28)*

	Week 1		Week 16	
Item: My ability to…	*M*	*SD*	*M*	*SD*
Encourage students to improve their SAE	3.39	1.10	4.63	0.57
Build positive relationships with administrators	3.68	0.98	4.61	0.57
Clearly communicate the purpose of SAE programs with others	3.61	0.92	4.50	0.58
Assist students in selecting SAE programs that meet their individual abilities	3.21	1.00	4.32	0.67
Identify SAE programs that connect to the agriculture curriculum	3.50	1.00	4.36	0.73
Assist students in planning an agriculturally based SAE program that meets their needs	3.39	1.07	4.58	0.50
Encourage students to complete a record book for their SAE program	3.25	1.21	4.36	0.83
Assist students in developing SAE programs that meet their capabilities	3.39	0.99	4.46	0.64
Instruct students in how to complete SAE programs	3.43	1.07	4.32	0.61
Evaluate SAE programs	3.29	1.12	4.07	0.66
Coordinate communications between a student, parent, employer, and myself	3.43	1.14	4.46	0.58
Evaluate student knowledge and skill development within their SAE program	3.25	1.01	4.57	0.57
Provide students with meaningful supervision during their SAE program	3.50	1.11	4.54	0.64
Identify SAE programs that are beneficial for individual students	3.43	1.00	4.39	0.83
Inform administrators about the benefits of SAE programs	3.61	1.20	4.61	0.57
Identify SAE programs within a community	3.46	1.14	4.21	0.63
Provide individualized instruction related to a student's SAE program	3.43	1.14	4.50	0.58
Clearly communicate the procedures of SAE programs with others	3.32	1.12	4.32	0.61
Assist students in acquiring necessary resources to complete a SAE program	3.48	1.01	4.39	0.63
Assist students in completing a record of the financial transactions related to their SAE program	3.18	1.22	3.96	0.88
Total	3.41	1.08	4.41	0.64

Note. 5 = High, 4 = Moderately High, 3 = Neutral, 2 = Moderately Low, 1 = Low

Tables 2 and 3 display frequency counts of Week 1 and Week 16 responses, respectively. A positive shift existed in SAE self-efficacy when comparing the frequency of responses between the two tables. Per Table 2, the most frequent scale indicator selected by preservice teachers in Week 1 regarding their SAE self-efficacy was *neutral* (*f* = 172, 31%), followed by *moderately high* (*f* = 164, 29%), *moderately low* (*f* = 108, 19%), *high* (*f* = 101, 18%), and then *low* (*f* = 14, 2.5%). Specifically, *neutral* was the most frequently selected indicator for ten items for preservice teachers regarding their Week 1 SAE self-efficacy (see Table 2). Those ten were: *build a positive relationship with administrators* (*f* = 10; 36%), *assist students in selecting SAE programs that meet their individual abilities* (*f* = 12, 43%), *assist students in planning an agriculturally based SAE program that meets their needs* (*f* = 11, 39%), *assist students in developing SAE programs that meet their capabilities* (*f* = 12, 43%), *instruct students in how to complete SAE programs* (*f* = 13, 46%), *coordinate communications between a student, parent, employer, and myself* (*f* = 9, 32%), *evaluate student knowledge and skill development within their SAE program* (*f* = 11, 39%), *identify SAE programs within a community* (*f* = 8, 29%), *provide individualized instruction related to a students' SAE program* (*f* = 9, 32%), and *clearly communicate the procedures of SAE programs with others* (*f* = 9, 32%).

Table 2

*Frequency Distribution of Week 1 SAE Self-Efficacy (*n *= 28)*

Item: My ability to…	Low	Mod. Low	Neut.	Mod. High	High
Encourage students to improve their SAE	1	6	6	11	4
Build positive relationships with administrators	0	3	10	8	7
Clearly communicate the purpose of SAE programs with others	1	1	10	12	4
Assist students in selecting SAE programs that meet their individual abilities	1	5	12	7	3
Identify SAE programs that connect to the agriculture curriculum	0	5	9	9	5
Assist students in planning an agriculturally based SAE program that meets their needs	1	4	11	7	5
Encourage students to complete a record book for their SAE program	1	9	5	8	5
Assist students in developing SAE programs that meet their capabilities	1	3	12	8	4
Instruct students in how to complete SAE programs	1	3	13	5	6
Evaluate SAE programs	1	7	7	9	4
Coordinate communications between a student, parent, employer, and myself	1	5	9	7	6
Evaluate student knowledge and skill development within their SAE program	1	5	11	8	3
Provide students with meaningful supervision during their SAE program	0	7	6	9	6
Identify SAE programs that are beneficial for individual students	0	6	8	10	4
Inform administrators about the benefits of SAE programs	1	4	9	5	9
Identify SAE programs within a community	0	7	8	6	7
Provide individualized instruction related to a student's SAE program	1	5	9	7	6

Table 2

*Frequency Distribution of Week 1 SAE Self-Efficacy (*n *= 28), continued…*

Clearly communicate the procedures of SAE programs with others	1	6	9	7	5
Assist students in acquiring necessary resources to complete a SAE program	0	6	6	11	4
Assist students in completing a record of the financial transactions related to their SAE program	1	11	2	10	4
Total	14	108	172	164	101

Per Table 3, the scale descriptor selected most frequently by preservice teachers in Week 16 regarding their SAE self-efficacy was *high* (*f* = 274, 49%), followed by *moderately high* (*f* = 243, 44%), *neutral* (*f* = 34, 6%), and *moderately low* (*f* = 6, 1%). Specifically, *high* was the most frequently selected indicator for eleven items for preservice teachers regarding their Week 16 SAE self-efficacy (see Table 3). Those eleven were: *encourage students to improve their SAE* (*f* = 18, 64%), *build positive relationships with administrators* (*f* = 18, 64%), *assist students in planning an agriculturally based SAE program that meets their needs* (*f* = 15, 54%), *assist students in developing SAE programs that meet their capabilities* (*f* = 15, 54%), *coordinate communications between a student, parent, employer, and myself* (*f* = 14, 50%), *evaluate student knowledge and skill development within their SAE program* (*f* = 17, 61%), *provide students with meaningful supervision during their SAE program* (*f* = 17, 61%), *identify SAE programs that are beneficial for individual students* (*f* = 16, 57%), *inform administrators about the benefits of SAE programs* (*f* = 18, 64%), *provide individualized instruction related to a students' SAE program* (*f* = 15, 54%), and *clearly communicate the procedures of SAE programs with others* (*f* = 15, 54%).

Table 3

*Frequency Distribution of Week 16 SAE Self-Efficacy (*n *= 28)*

Item: My ability to…	Low	Mod. Low	Neut.	Mod. High	High
Encourage students to improve their SAE	0	0	1	8	18
Build positive relationships with administrators	0	0	1	9	18
Clearly communicate the purpose of SAE programs with others	0	0	2	15	11
Assist students in selecting SAE programs that meet their individual abilities	0	0	3	13	12
Identify SAE programs that connect to the agriculture curriculum	0	1	1	13	13
Assist students in planning an agriculturally based SAE program that meets their needs	0	0	0	11	15
Encourage students to complete a record book for their SAE program	0	1	0	14	13
Assist students in developing SAE programs that meet their capabilities	0	0	2	11	15
Instruct students in how to complete SAE programs	0	0	2	15	11
Evaluate SAE programs	0	1	2	19	6
Coordinate communications between a student, parent, employer, and myself	0	0	1	13	14

Table 3

*Frequency Distribution of Week 16 SAE Self-Efficacy (*n *= 28), continued…*

Evaluate student knowledge and skill development within their SAE program	0	0	1	10	17
Provide students with meaningful supervision during their SAE program	0	0	2	9	17
Identify SAE programs that are beneficial for individual students	0	1	3	8	16
Inform administrators about the benefits of SAE programs	0	0	1	9	18
Identify SAE programs within a community	0	0	3	16	9
Provide individualized instruction related to a student's SAE program	0	0	1	12	15
Clearly communicate the procedures of SAE programs with others	0	0	1	12	15
Assist students in acquiring necessary resources to complete a SAE program	0	0	2	13	13
Assist students in completing a record of the financial transactions related to their SAE program	0	2	5	13	8
Total	0	6	34	243	274

Qualitative Results

Research question two, which sought to explore student perceptions of the course, was addressed through a focus group interview. After transcribing audio recordings and reviewing field notes, data were coded into 13 unique codes. These codes were then organized into four themes, as shown in Table 4. Three of these themes, *Course Instructors, Hands-on Experiences (Experiential Learning),* and *SAE Supervision*, contributed to the increase in SAE self-efficacy as a result of the course. *AET Apprehension* includes preservice teachers' anxieties in managing student data using The Agricultural Experience Tracker (AET).

Table 4

Focus Group Codes and Themes

Theme	Codes
Course Instructors	Instructor Experience and Credibility Course Organization Student Interaction
Hands-on Experiences (Experiential Learning)	Broiler Production Broiler Processing Broiler Exhibition Agriscience Fair
SAE Supervision	SAE Opportunities SAE Project Evaluation SAE Communication Outcomes of SAE Projects

Table 4

Focus Group Codes and Themes, continued…

AET Apprehension	AET Student Data Records AET Teacher Tools

The theme, *Course Instructors*, captured the influence of two lead instructors and one teacher assistant on preservice teachers' SAE self-efficacy. Members of the focus group enjoyed the applicable antidotes from the course instructors' time as SBAE teachers. Participant 9 stated: "(Course Instructors) were really experienced ag teachers and shared their stories." These personal experiences served to build credibility in the course and placed instructors as content experts. Participants also noted the structure of the course as a positive influence on their perceived ability to supervise SAE projects. They appreciated the theory-based lectures with practice-based laboratory sections. Finally, the student interaction code was assigned to examples of instructor-student and student-student interaction opportunities built within the course. Focus group members enjoyed working with their peers in the broiler experiential learning project and noted the instructors were approachable and easy to contact.

Focus group members referred to the project-based learning activity as a *positive hands-on experience*. Discussion related to raising broilers was coded as broiler production. "I hadn't even ever touched a chicken before this class. Now I think I could help students raise broilers for the Tulsa State Fair," said Participant 4. The broiler production activities were novel experiences for the focus group participants, and students noted they were appreciative of those experiences. Participant 2 stated: "I learned a lot from the agriscience fair poster. This was my first one. But my partner was a big help in putting everything together. I can see how it would be a great experience for students." Other than the comment from Participant 5, who said: "I kinda lost interest feeding chickens every day," perceptions of the experience were positive.

The codes of SAE opportunities, project evaluation, communication, and outcomes were organized into the theme: *SAE Supervision*. Participant 10 commented she never thought SAEs could be "so varied with lots of opportunities other than showing livestock." Integration of the SAE for All curriculum provided preservice teachers tools needed to confidently present SAE opportunities to students. "If a student doesn't have the resources for a show animal or isn't interested in one, I can use a foundational SAE for that kid" (Participant 4). Focus group members also felt more confident in communicating SAEs. Participant 1 commented:

> SAEs are too important to be ignored just because they're hard. I still use things I learned in my SAE. I think if you tell students and parents what they can get out of SAEs, you can get them to buy-in.

Outcomes of SAEs were grounded in the participants' personal experiences of SAEs. They listed work ethic, agricultural content knowledge, fiscal opportunities, and resiliency as personal gains from their own SAE projects as former SBAE students.

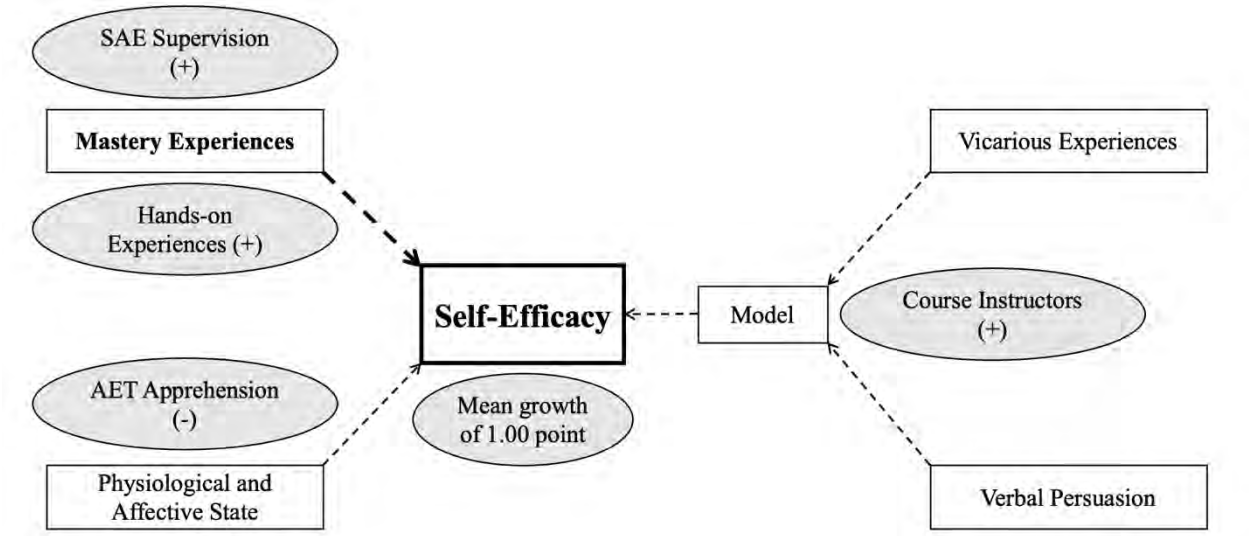
The final theme, *AET Apprehensions*, described students' insecurities with the SAE data management system used in Oklahoma SBAE programs. Three laboratory sessions and four mock AET data management assignments combined with the six-week project-based broiler experience were insufficient in building self-efficacy in relation to the AET system for the focus group participants. "I don't feel confident I could help students with their AET records. I just don't know enough about the systems," Participant 11 commented. Other participants noted previous negative experiences with AET as a SBAE student. "I hated learning AET as a [high school] senior," said Participant 12. Focus group members recognized a difference between course assignments in AET and implementation in the SBAE classroom.

Mixed-Methods Results

Research question three sought to determine how qualitative data explain the quantitative changes in SAE self-efficacy. The qualitative data showed that the increase in self-efficacy may be explained by the influence of the course instructors, hands-on experiences, and SAE supervision components in the course. Course instructors and guest speakers served as models for students to observe. In addition, students learned by applying their knowledge through vicarious experiences. The positive hands-on experience (i.e., broiler production activity) and SAE supervision themes provided mastery experiences for preservice students to build self-efficacy. Several focus group members identified an increased knowledge of SAE types, which may serve to improve their ability to match students with appropriate SAE opportunities. This association may have contributed to the increase in SAE self-efficacy, particularly in relation to the items: *assist students in selecting SAE programs that meet their individual abilities, identify SAE programs that connect to the agriculture curriculum,* and *identify SAE programs that are beneficial for individual students*. Participants noted a lack of perceived competency in relation to the AET data management system. Apprehension of AET data led to a decrease in overall SAE self-efficacy. These relationships are depicted in Figure 3.

Figure 3

Joint Display of QUANT and QUAL Findings



Note. (+) = positive influence on SAE self-efficacy; (-) = negative influence on SAE self-efficacy.

Conclusions, Implications, and Recommendations

The six-week project-based assignment of raising broiler birds as a context for learning about SAEs resulted in preservice teachers increasing their SAE self-efficacy by one full point on the 5-point scale. Preservice teachers began the semester *neutral* on their general self-efficacy regarding SAE projects and finished the semester with a *moderately high* level of self-efficacy related to SAEs. This conclusion is encouraging given the fact that SAE is an integral component of being an effective SBAE teacher (Eck et al., 2019) and teachers are generally lacking in their competence in that area (Rubenstein et al., 2019). This conclusion supports Hollins' (2011) recommendations for teacher preparation programs to provide the specific skills and education preservice teachers need to be effective in their discipline.

Evaluation and student assessment have long been emphasis areas in teacher preparation programs of agricultural education (Belcher et al., 1996). However, they remain a concern for all

preservice teachers, regardless of discipline (Simon et al., 2010). Therefore, it is encouraging to see the greatest change in these preservice teachers' perceived self-efficacy was: *Evaluate student knowledge and skill development within their SAE program*. It is recommended that additional professional development exist for these students on the topic of assessing and evaluating students' SAE programs once they move into the teaching profession.

Bandura's (1977) self-efficacy theory proposes that when proper modeling, vicarious reinforcement, verbal persuasion, and affective and psychological states are present, people can perform successfully in a particular task, which increases their self-efficacy beliefs. Based on the study's findings, it can be implied that preservice teachers perceived course personnel as competent models for delivering the content and experiences, which relates to Zigo's and Gorton's (2016) assertion regarding the importance and influence course instructors have on preservice teachers' success in their teacher preparation courses. Such preparation is vital for equipping preservice teachers (Hollins, 2011). Therefore, it is recommended that when SBAE teacher educators use a multiple-week project-based learning activity, they possess the relevant experiences necessary to provide preservice teachers with opportunities to improve their own personal self-efficacy using Bandura's (1977) mastery experiences, vicarious reinforcement, verbal persuasion, and psychological and affective states as a template.

The project-based learning activity used in this study (i.e., broiler production with an experimental feed trial followed by an Agriscience Fair presentation) allowed students to acquire multiple iterations of role-playing the student and teacher, which led to the beginning of mastery experiences (Bandura, 1977). Such experiences can positively impact self-efficacy (Bandura, 1997). In this case, the experience impacted students' SAE self-efficacy in every metric used (quantitative instrument and qualitative focus group) except for students' ability to apply the AET data management system. AGED 3203 – Planning the Community Program in Agricultural Education devoted multiple weeks to basic AET instruction prior to and during the project-based assignment. It is concerning and disheartening that after such emphasis students still were not efficacious with using the AET system. Why is that? Part of the low self-efficacy can be explained from preservice teachers' stressful experiences with AET as a student in their SBAE program. Therefore, additional professional development is needed for inservice teachers regarding their teaching of AET to SBAE students. It is also recommended that course instructors in AGED 3203 review and revise the AET application exercises to be more impactful on preservice teachers' self-efficacy regarding data used for SAE financial records. Perhaps an inservice SBAE teacher proficient in AET could serve as a guest speaker and model managing student AET accounts. However, it is also possible the broiler experience is too specific and contextualized, and students fail to see the applicability in other areas. Regardless, additional research is needed to understand the reasons students continue to struggle in this area.

Azjen (1991) suggested that high levels of self-efficacy can have a positive influence on aspiring teachers' decisions to enter the profession. Therefore, additional longitudinal research is warranted to determine if this proposition holds true for these preservice teachers and if and how it impacts their long-term retention in the profession. If personal and relevant project-based learning experiences such as the one featured in this study can impact teachers long-term, then it is recommended that faculty consider adding similar experiences to their own courses and teacher preparation programs.

Discussion

Student evaluations are commonly the most reported metric for course effectiveness yet are plagued with reliability and validity issues (Goos & Salomons, 2017). Coker et al. (2013) called higher education instructors to modify course evaluations beyond the typical student evaluation of teaching, as limited knowledge may be gained from these types of survey research. Instead, occasional robust evaluation of course impacts should be studied to ensure effective instruction. In addition to current

student self-efficacy, previous students can provide long-term impacts of the course past graduation. The data from this study may provide evidence for informing future class offerings.

Although the broiler experiential learning activity may not translate to all institutions that prepare preservice SBAE teachers, they should nevertheless be encouraged to incorporate real-world, project-based SAE supervision activities into existing coursework and plans of study. The findings of this study suggest that such an experience can increase preservice teachers' self-efficacy when facilitating student SAEs. Project-based activities, such as the one used in this study, should strive to mimic real-world circumstances and situations to the greatest extent possible while leveraging instructors' experiences as content experts who provide mastery and vicarious experiences, verbal persuasion, and affective and psychological states to support the application of course concepts.

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