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Early Field Experience Course Students' Perceptions of School-based Agricultural Education Laboratory Environments

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Abstract

Laboratory instruction is an important component of school-based agricultural education (SBAE) programs (Phipps, Osborne, Dyer, & Ball, 2008). Early field experience (EFE) coursework can be an important component of agricultural teacher preparation programs (Retallick & Miller, 2007). Through the use of a modified photovoice technique, we sought to identify the perceptions of students (i.e., preservice teachers) enrolled in an EFE course in relation to the laboratory environment component of the SBAE model. Students enrolled in a 40-hour EFE course photographed a laboratory environment at their placement site and completed a 250-word descriptive/reflective summary of the laboratory. Through open coding of the summaries, three prominent themes emerged: 1) project-based learning is widely used for instructional purposes; 2) laboratory environments are set up and arranged in particular fashions based on needs; and 3) laboratory environments are arranged as settings for effective learning. Within the photographs, the agricultural mechanics laboratory was most commonly identified as a laboratory environment. The EFE students identified laboratory environments are not always traditional in their scope, and classrooms can serve as laboratory environments. We recommend photovoice be further used as a tool to explore students' perceptions of the realities of modern SBAE programs.

Keywords: Early field experience; EFE; Laboratory; Preservice teachers; Teacher preparation

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Introduction & Conceptual Framework

School-based agricultural education (SBAE) teachers have a wide range of responsibilities associated with their positions (Phipps, Osborne, Dyer, & Ball, 2008; Talbert, Vaughn, Croom, & Lee, 2014). These responsibilities often include managing the learning environment (Saucier, Vincent, & Anderson, 2014), training students for competitive events (Ball, Bowling, & Sharpless, 2016), and teaching agriculturally-based content (Roberts & Ball, 2009). These events can take shape in a variety of environments in, and around, a SBAE program. As part of this list of environments, and as a component of the complete model of SBAE programming (Croom, 2008), laboratory environments serve to connect classroom content to real-world applications (Phipps et al., 2008). Laboratories have long been a staple in SBAE programs (Twenter & Edwards, 2017),

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and a wide variety of facility types exists, including greenhouses, agricultural mechanics, livestock handling, and aquaculture (Shoulders & Myers, 2012).

Laboratory instruction can be an experiential learning process to help facilitate the growth of students' intellectual and physical capacities (Shoulders, Blythe, & Myers, 2013). As such, laboratories, and laboratory-based activities, can serve as the context for a substantial variety of learning opportunities, including academic content application (Parr, Edwards, & Leising, 2006), problem-solving (Pate & Miller, 2011), hypothesis generation (Blackburn & Robinson, 2016), and inquiry-based learning (Thoron & Myers, 2012). Laboratories are typically designed to mimic industry-based settings to develop familiarity with tasks and work experiences aligned with real-world environments (Phipps et al., 2008). Laboratory-based activities frequently range in type, from servicing small engines in an agricultural mechanics facility to checking water quality in an aquaculture pond (Phipps et al., 2008). Considering these notions, teachers must be well-prepared to ensure laboratory environments are purposefully used. Prior experiences gained in a particular context (i.e., observations of a laboratory environment) can have ramifications on future pursuits (i.e., teaching in a laboratory environment) (Wells, Perry, Anderson, Shultz, & Paulsen, 2013). Teachers should be exposed to positive, adequate experiences during their teacher preparation programs (Whittington, 2005), or even before (i.e., as secondary students), to help ensure that well-informed, competent teachers are produced (Whittington, 2005).

Dewey (1938) suggested the quality of one's education is related to the quality of one's experiences. As such, Dewey (1938) further opined experience is a fundamental portion of the educational process, and that learning occurs through effective experiences. Decades later, Kolb (2015) expounded upon the notion of experiential learning, describing the process as a cycle in which the learner is actively engaged in the learning process through a series of four diametrically opposed modes of grasping and transforming experience to create knowledge. These modes are: 1) concrete experience; 2) reflective observation; 3) abstract conceptualization; and 4) active experimentation (Kolb, 2015). Knowledge is ultimately formed through the grasping and transforming of experience as the learner moves through the modes in the experiential learning process. (Kolb, 2015).

Fundamentally, experiential learning can be incorporated into SBAE in numerous ways (Baker, Robinson, & Kolb, 2012), including concrete experiences within the laboratory environment. As SBAE laboratories provide numerous outlets for high-quality learning that can be experientially-based (Phipps et al., 2008; Talbert et al., 2014), teachers should be well-versed in the laboratory environment's potential utility, in the context of teaching and learning, in a modern SBAE program (Phipps et al., 2008). The use of the experiential learning process in teacher education (i.e., an early field experience [EFE] course) could be beneficial to the process of preservice teacher preparation (Baker, Culbertson, Robinson, & Ramsey**,** 2017; Rank & Smalley, 2017; Retallick & Miller, 2007), especially when considering their potential utility for shaping perceptions about a subject (i.e., laboratory environments in SBAE programs).

EFEs, as part of the experiential learning process for preservice teachers, are frequently used within SBAE teacher preparation programs (Retallick & Miller, 2007). Many potential benefits of participating in EFEs have been identified, but McIntyre (1983) identified six specific benefits of EFE for preservice teachers. McIntyre (1983) noted the benefits for preservice teachers included: 1) learning quickly if they enjoy working with students; 2) an experienced teacher can gauge a preservice teacher's potential success as an future educator; 3) the opportunity to begin honing their teaching skills; 4) developing an understanding of a classroom environment; 5) the improvement of communication skills; and 6) the beginning of the transition from being a student to becoming a teacher. A great emphasis has been placed on the importance of EFE (Retallick &

Miller, 2007; Smalley & Retallick, 2012). Myers and Dyer (2004) highlighted that experiences such as EFEs assist preservice teachers in deciding their futures. Baker et al. (2017) noted EFEs can provide numerous, excellent opportunities to challenge preservice teachers' preconceived notions about topics related to SBAE (e.g., teaching and learning in laboratory environments, etc.).

Smalley and Retallick (2012) suggested retention and recruitment of teachers could be improved with exploratory EFEs. A study conducted by Retallick and Miller (2007) focused on EFEs and concluded a requirement should be identified for an experience including a minimum number of EFE contact hours and number of lessons that should be planned and taught during the experience. Providing a quality experience is important for a preservice teacher to achieve a more desirable level of preparation for entry into the profession (Baker et al., 2017; Rank & Smalley, 2017; Smalley & Retallick, 2012). Laboratory environments represent a considerable portion of many SBAE programs (Shoulders & Myers, 2012); thus, it is expected preservice teachers be well-prepared to engage in laboratory-based instruction (Phipps et al., 2008; Shultz, Anderson, Shultz, & Paulsen, 2014).

Galbraith (2004) noted that adult learners (e.g., preservice teachers, EFE students, etc.) bring a wide range of diverse, unique experiences and backgrounds to the learning environment. As such, it could be surmised that preservice teachers (i.e., EFE students) exhibit these characteristics as well. Rank and Smalley (2017) noted preservice teachers enrolled in agricultural teacher preparation programs may not necessarily share experiences in all aspects of the modern SBAE model (i.e., classroom and laboratory instruction, FFA, and Supervised Agricultural Experiences [SAEs] [National FFA Organization, 2015]). In the context of the present study, we postulated that perhaps not all preservice teachers received the opportunity to engage in the diversity of laboratory environments included within modern SBAE programs (e.g., agricultural mechanics, greenhouses, livestock, apiaries, etc.). Moreover, some preservice teachers may have never been exposed to an SBAE program at all in their past experiences, as noted by Rank and Smalley (2017). It is imperative preservice teachers be well-versed, and well-prepared, in all facets of SBAE, including an understanding of teaching and learning in learning environments, as the move from the teacher preparation program into their own classrooms (Thoron, Myers, & Barrick, 2016). Interestingly, little work has been conducted to determine how, exactly, preservice teachers (i.e., EFE students) view the laboratory environment component of SBAE. Perhaps a need to identify how preservice teachers perceive the laboratory environment component of the SBAE model currently exists.

Purpose & Objectives

The purpose of this study was to identify the perceptions of preservice teachers enrolled in a field experience course in relation to the laboratory environment component of the SBAE model. Specific objectives were to:

1. Identify EFE students' perceptions of what constitutes a laboratory environment in SBAE.
2. Identify and describe the meaning that EFE students ascribe to the laboratory environment as a component of a complete SBAE program.
3. Describe the change, if any, between the students' initial expectations of their EFE and their reflection after the experience.

The present study aligned with Research Priority Five of the National Research Agenda (NRA) of the American Association for Agricultural Education (AAAE): Efficient and Effective Agricultural Education Programs (Thoron et al., 2016). Teacher preparation programs are designed to facilitate the development of teacher candidates through a combination of field experiences, coursework, and student teaching (Whittington, 2005). The growing complexity of agricultural education programs, in both school-based and teacher preparation settings, dictates future practitioners (i.e., inservice teachers) will continue to have many needs related to knowledge and skill development (Thoron et al., 2016). Current preservice teachers must be adequately prepared through a variety of experiences (Baker et al., 2017; Rank & Smalley, 2017; Whittington, 2005), including EFEs (Retallick & Miller, 2007). The need for quality teacher preparation programs in which effective experiences in agricultural education settings are provided exists; moreover, the need for well-rounded, well-informed, competent individuals who can effectively lead modern SBAE programs exists is great (Thoron et al., 2016). The present study focused on identifying and interpreting the perceptions of preservice teachers through an EFE course, with a targeted focus, via a modified photovoice process, toward addressing knowledge related to laboratory environments.

Methods

Preservice teachers enrolled in the AgEdS 211: High School Agriculture Programs (AgEdS 211) course were invited to participate in a modified photovoice process focusing on laboratory environments during their EFE. These preservice teachers were specifically selected for this study because they were in the beginning of their university-level teacher education coursework. As such, the participants had not yet taken any agricultural mechanics, curriculum planning, or teaching methods courses in which SBAE laboratory environments would have been discussed.

The AgEdS 211 course is an academic credit EFE course that consists of a 40-hour field experience and a reflective portfolio. This course allows undergraduate agricultural teacher education students the opportunity to observe a complete SBAE program. Over the course of the EFE, students were required to complete 10 specific required observations and choose two additional observations from a list of suggested observations. The students were also required to keep a daily reflective journal during the EFE. The reflective journal as well as reflections on the specific and optional observations were submitted as a portfolio at the end of the course.

Photovoice was selected as a medium for students to express their visions (Wang & Burris, 1997) as well as to obtain rich descriptive information (Catalani & Minkler, 2010) about various SBAE laboratory environments that would be encountered during the EFE process. The present study was initiated upon the receipt of Iowa State University Institutional Review Board (IRB) approval. Participation in the present study was voluntary and informed consent was obtained from the EFE students prior to participation. To protect the identities of the EFE students, pseudonyms were used in the place of actual names.

The modified photovoice process was explained to the participating EFE students ($N = 16$). The EFE students were asked to submit one photograph and a 250-word reflection/description depicting a laboratory environment that they observed during their 40-hour EFE placement site. The photographs and written reflections/descriptions were independently coded by each of us through using an open coding process to discover emerging themes (Merriam, 2009). Open coding is a constant comparative research method that can be used to analyze qualitative data (Merriam, 2009). Our intent in using open coding was to inductively code the EFE student's reflections/descriptions while remaining open to anything the students perceived during their EFE, rather than deductively coding the EFE student's responses based on predetermined themes (Merriam, 2009).

After completing the open coding process, we met to determine, and describe, the themes that emerged from our analyses. Independent coder review and peer debriefings were used by the research team to enhance credibility (Guba & Lincoln, 1989). Additionally, we discussed bracketing among ourselves to strengthen the trustworthiness of the study by identifying potential personal biases based on our own prior experiences (Merriam, 2009). As we are directly involved in the process of agricultural teacher preparation, we are all former SBAE teachers who taught in public high school settings in different states, and we extensively used laboratory environments as part of our instructional practices. Further, as researchers our diverse backgrounds and roles in the agricultural teacher education program at Iowa State University provided for a variety of expertise and interests in relation to different areas and steps of the teacher preparation process. One researcher teaches preservice agricultural mechanics coursework, another researcher serves as the Agricultural Teacher Education Coordinator and is directly involved with EFE students each semester, and the other researcher serves as an agricultural teacher educator at Arkansas Tech University and had previously served as the EFE coordinator at Iowa State University.

Findings

Sixteen ($N = 16$) EFE students participated in the photovoice process, which was conducted during an EFE course offered during the Fall 2017 semester. All of the participants in the present study ($N = 16$) were majoring in Agricultural and Life Sciences Education (AGLSE). The majority of the participants were female ($n = 15$). Additionally, the majority of the participants were classified as juniors ($n = 9$). Various laboratory environments were shown in the EFE students' photographs. These environments included 11 agricultural mechanics laboratories, two classrooms, a land laboratory, two greenhouses, two plant science laboratories, and a makeshift livestock laboratory constructed within an agricultural mechanics laboratory. The qualitative analysis process resulted in the emergence of three distinct themes related to laboratory environments within SBAE programs.

Theme One: Project-based Learning is Widely Used for Instructional Purposes

The students noted no matter the laboratory setting, the facility served as an effective way to provide project-based learning. Megan observed an agricultural mechanics laboratory activity indicated, "This shop gives students the opportunity to have hands-on work, which I think is better for student learning. It gives students a physical object that they can look at. It gives students a physical problem that they can look at and solve." Amy (see Figure 1) was impressed by the agricultural mechanics laboratory and explained,

> This is the most impressive high school ag mechanical shop I have ever seen. When I walked in my jaw hit the floor. The students love this shop too, they look forward to coming out here and working on their projects. The tractors you are seeing have been donated by people in the community, through connections [TEACHER] has made over the years, and some from connections the students have made. The students will fix them up, from the inside out, and enter them at the state fair, and any other competitions they choose. The students start in ag mechanics working on smaller motors, such as the mower you can see. As their skills improve they move up to ag mechanics II, where they get to rebuild tractors, or anything else that gets donated. The students fixed it and now use as a work truck. They received another donated tractor, that did not run, they had to use the [COMPANY] work truck to go work on this tractor so they could get it back to their shop.

Regarding the agricultural mechanics laboratory environment, Janelle indicated, "Its super cool to see their faces light up when they complete something right for the first time, and it was even more fun to see them shoot sparks an d everyone get all excited." Jack shared project-based learning as,

> The students did single pull switches, double pull switches, different types of outlet boxes and they had to use different types of wire as well. The students had to start by wiring in the extension cord and they had a checklist of switches and outlets to hook up and test. These kinds of hands on experiences stick with people for a long time. Most teachers wouldn't dive into a lesson like this to teach... I think this is a very beneficial activity for the students to do. Later down the road, both the male and female students could be able to fix their own wiring problems and make sure that things are safe when buying a home.

Mary indicated (see Figure 2), "I think that being able to do hands on work with simple scientific tools is essential to high school students." Emily shared,

> A teaching laboratory is a great use of hands on learning. This can be enhanced by the use of a shop or greenhouse facility. It gives students the chance to learn about sciences and practical skills in a place that isn't a classroom. Hands-on learning is the mission in agriculture education and this cannot be carried out through regular classroom learning. Through my observations, they also teach students how to use certain tools and how to cooperate with each other. In most labs, cooperation is key to completing the lab successfully.

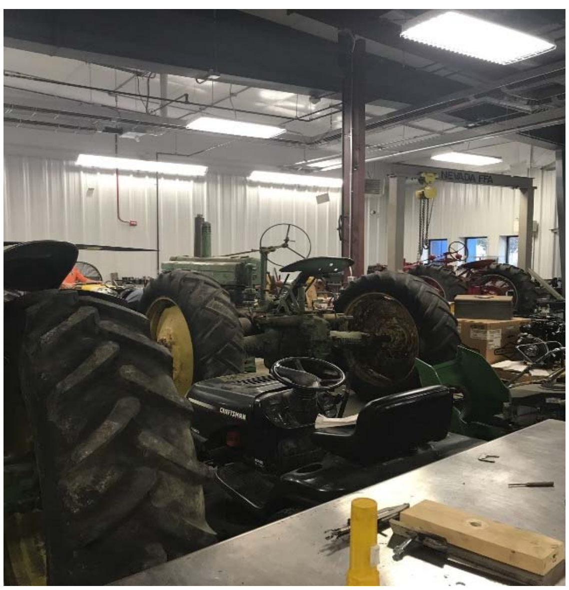

Figure 1.

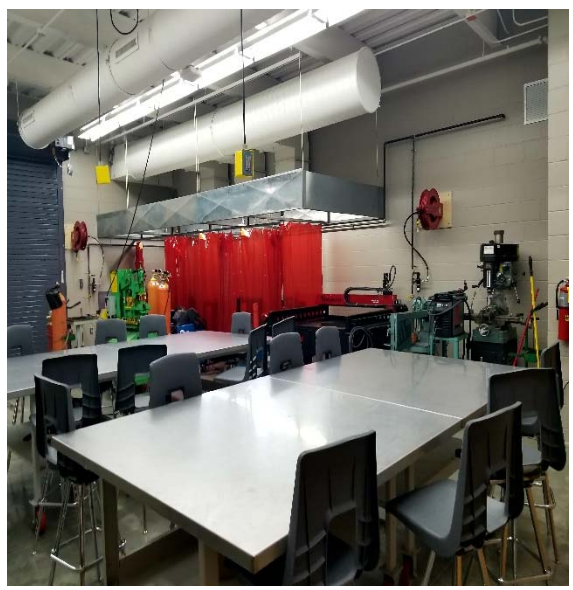

Figure 2.

Theme Two: Laboratory Environments are Set Up and Arranged in Particular Fashions Based on Needs

Observing in a laboratory provided EFE students with the opportunity to see first-hand how a laboratory environment may be set up and arranged. Tina specified (see Figure 3), "Large benches allow students to have room they can spread out while still sharing tools with others... There are retractable extension cords that hang from the ceiling which allow students to plug in power tools." Becky noted specifics of their classroom shop settings,

> Directly walking into the shop to the right are tables used in woods class for woods project. On the far right of the shop there are metal tables used in woods class for woods projects. To the left of the garage door there are several welders in separate spaces for kids in industrial tech class. Scattered around the shop are several machines and tools that students can use to cut wood, weld, or construct projects.

Students noticed specific facility orientations, which was expressed by Karl, who indicated that, "The welding shop is set up in a very industrial matter…Inside each booth each student has a table and a welder." Casey viewed a classroom set up and indicated, "There are no chairs with the table. This makes each student more productive and able to work." Becca (see Figure 4) indicated, "I believe that the shop is an effective learning environment for students involved in the Ag Mechanics class… An open shop leaves less room for distractions by other students." Mary shared, "While it may be in an inconvenient location the students have a very nice facility to weld in with new curtains and welders. In addition, all of the CASE curriculum monitors and monitors that are inside the wood cabinets are very useful for agricultural sciences."

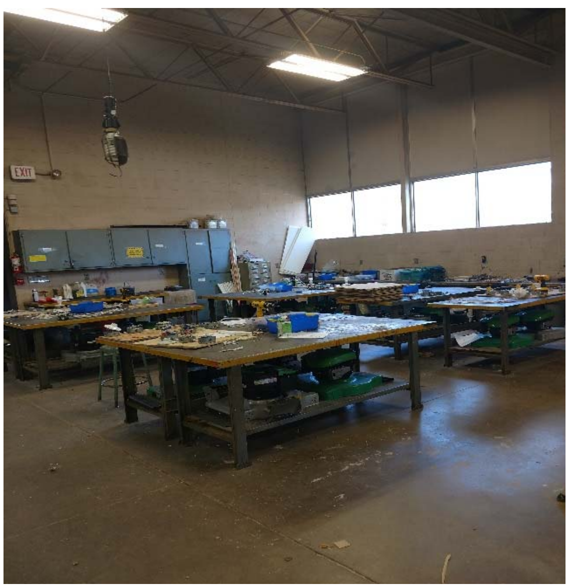

Figure 3.

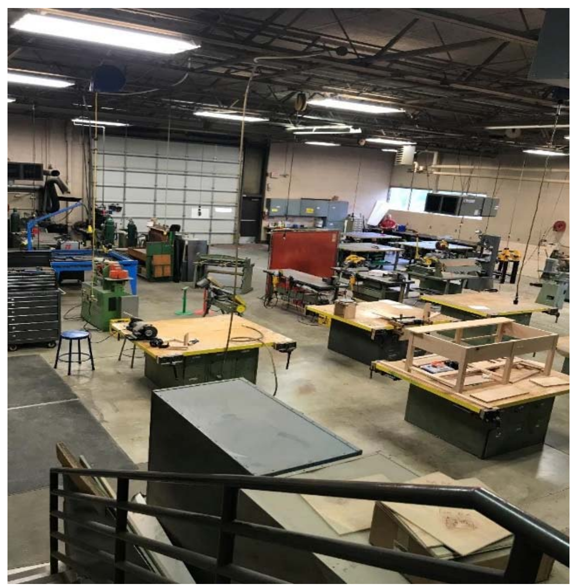

Figure 4.

Theme Three: Laboratory Environments are Arranged as Settings for Effective Learning

Students recognized the importance of keeping SBAE students accountable by ensuring that the laboratory environment was clean, organized, and safe. Jess noted (see Figure 5), "Just like his classroom the lab is always clean and [TEACHER] asks the students to be responsible and put the equipment they use away." Michael said, "The shop includes many blue screens so when welding outside of the booth safety standards can still be met." Amy focused on the skill development within the learning environment, as she indicated (see Figure 6),

> Keeping up on the greenhouse takes a lot of work through. When there are long weekends off from school, a student is required to go to the greenhouse and water the plants. Also, students have to make sure the greenhouse is clean at all times,

> up to the standards of the school, and managed appropriately to make sure that all of that plants are in good condition. Having this type of responsibility teaches students a lot about themselves.

> Interestingly, Ashley viewed a cemetery as a learning environment and indicated: I have attached a photo of us at the cemetery. I have attached this photo to prove that you do not need a specific facility, to have an optimal learning laboratory. We have taken the school bus to the cemetery and had taught lessons there about GeoCaching and the kids had a blast. Another class had been out to observe a field to determine crop residue and had hands on learning.

The arrangement of the laboratory environments to facilitate a variety of learning experiences challenged some EFE student's expectations. Maria commented, "When I learned this was the lab, or what I would have referred to it in as school as the "shop", I was shocked. There were no woodworking supplies in sight, just welding and plant science instruments". Similarly, Meghan wrote, "This is absolutely amazing that this chapter has such an elaborate ag mechanics program set up for their students. I believe this more so than some probably because my chapter never had anything like this."

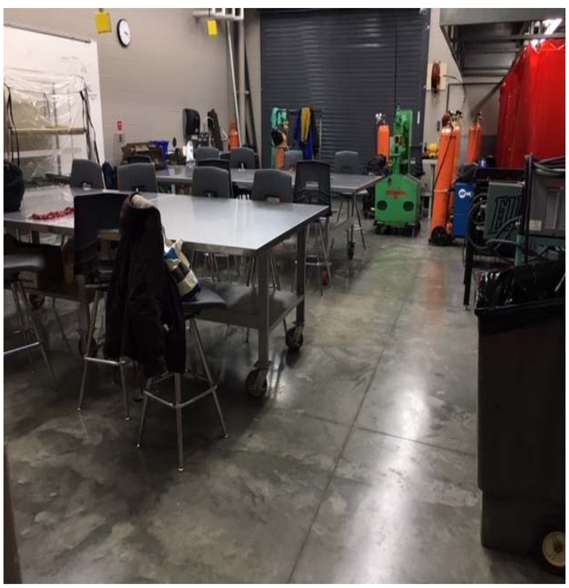

Figure 5.

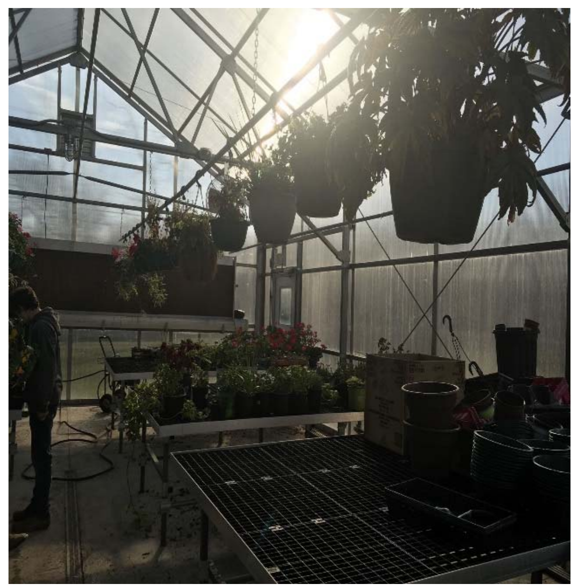

Figure 6.

Conclusions, Discussion, Implications, & Recommendations

Being frequently used as part of the teacher preparation process, EFEs help to connect preservice teachers to the orientations of actual SBAE programs (Retallick & Miller, 2007). Moreover, and more importantly, EFEs help to ground preservice teachers in the realities of many SBAE programs (Rank & Smalley, 2017). As part of these realities, SBAE programs throughout the United States often do, and have since their inceptions, used laboratory environments as ways to connect classroom learning to real-world phenomena (Phipps et al., 2008; Twenter & Edwards, 2017). Thus, teachers must be prepared to engage in these environments themselves as facilitators of the learning process (Talbert et al., 2014). Experiences are fundamental to the learning process (Dewey, 1938), and experiential learning opportunities, such as those that occur as part of the EFE process, help to connect individuals to way to acquire knowledge and skills through engagement through experiences (Kolb, 2015).

In the context of an EFE course at Iowa State University, it was apparent these EFE students' perceptions of SBAE laboratory environments were quite diverse, as their reflective/descriptive summaries of their respective environments were focused on varied aspects. The three dominant themes that emerged from the qualitative data analysis process were: 1) project-based learning is widely used for instructional purposes; 2) laboratory environments are set up and arranged in particular fashions based on needs; and 3) laboratory environments are arranged as settings for effective learning. Within these three primary themes, several different less-frequently reported concepts emerged within several EFE students' reflective/descriptive summaries. These concepts included the challenging of, and differences between, initial expectations and assumptions, the laboratory environment as a domain for skill development and learning, and the reinforcement of prior beliefs.

Interestingly, as these data were coded and conceptualized the three dominant themes that emerged during the analysis of each EFE students' reflective/descriptive summary, a common thread flowed through each of the three themes was the challenging or supporting of existing initial assumptions. The students were in the beginning of their teacher education program. Therefore, the student's initial assumptions were based on their lived experience rather than programmatic coursework. This is certainly a noteworthy observation, as Baker et al. (2017) discussed the challenging of initial assumptions and pre-conceived notions is an important component of EFEs used within agricultural teacher preparation programs. As part of the teacher education process, EFEs can serve as guideposts for preservice teachers as they evolve into their professional selves (Myers & Dyer, 2004). Further, as EFEs in agricultural teacher preparation programs may be the first point of SBAE program contact that some preservice teachers may have (Rank & Smalley, 2017); thus, it is imperative that potentially negative ideas, conceptualizations, or perceptions about laboratory environments in SBAE programs be dismantled and, over time, dealt with in a proactive manner. We were certainly pleased to see this particular population of EFE students viewed the laboratory environments as holistically connected to the rest of the SBAE programs that they visited.

As photos and written reflections were observed for the study, several interesting concepts were observed. One of these observations related to the laboratory environments that the EFE students selected. We noticed several of the laboratory environments photographed, and subsequently documented in the EFE students' reflective/descriptive summaries, were agricultural mechanics-oriented. This observation left us with some questions. Did the EFE students see this as the primary representation of a SBAE laboratory environment? As agricultural mechanics is a traditional staple in many SBAE programs (Burris, Robinson, & Terry, 2005), it is conceivable most of the programs in which they conducted their EFEs may happened to have agricultural mechanics laboratories. Many students' impressions of an active, traditional SBAE program in Iowa may include the use of available agricultural mechanics laboratory environments. Could this relate to a potential belief that many SBAE programs in Iowa may still mimic the curricula, designs, and purposes of a bygone era of SBAE that was heavily focused on agricultural mechanics and was production-oriented (i.e., vocational agriculture)? Moreover, does it indicate that these EFE students view agricultural mechanics as an important driving force in many SBAE programs in Iowa, or could it be indicative of these EFE students' interests in this curriculum area? As many preservice teachers have anxiety about teaching in an agricultural mechanics laboratory (Tummons, Langley, Reed, & Paul, 2017), this last question is of particular interest. These questions deserve follow-up through both qualitative and quantitative research.

In two instances, students noted classroom environments were, from their perspective, laboratory environments. Some notations even existed describing that laboratory environments are not bound by a facility type or a physical structure, but instead are characterized by how the space is used. Such ideas indicate these EFE students were quite expansive in their definitions of laboratory environments. Further, these EFE students recognized many settings not traditionally recognized as laboratory environments (e.g., the cemetery, the classroom, etc.) can indeed serve as laboratory environments for teaching and learning purposes. While not typically identified as laboratory environments (Phipps et al., 2008; Shoulders & Myers, 2012; Talbert et al., 2014; Twenter & Edwards, 2017), perhaps these settings can provide teaching and learning experiences that are as equally valuable as those within traditionally-recognized SBAE laboratory environments.

Many of the EFE students noted how the learning of different topics (e.g., skill development, facility management, etc.) occurred in each laboratory environment. These observations are important and foundational to the purposes of laboratory-based instruction. As laboratory environments serve, and have done so for decades (Twenter & Edwards, 2017), to connect theoretical concepts to hands-on, minds-on instructional practices (Phipps et al., 2008), as well as potentially serve as a source for experiential learning (Shoulders et al., 2013), it is vital preservice teachers understand how laboratory environments are, from a philosophical standpoint, meant to be incorporated into the complete modern SBAE program.

It is conceivable many programs may not adequately use their laboratory environment space in a manner consistent with the agricultural education profession's conceptualizations of what a laboratory environment is, and what it should be used for. For example, we can, from an anecdotal perspective, recall visiting numerous SBAE programs in different parts of the nation and seeing how some laboratory environments were being used as storage spaces for the SBAE program or, perhaps even more troubling, for the remainder of the school campus classrooms. In some instances, laboratory environments were underused or misused, with minimal focus on teaching and learning, but instead being viewed as profit centers for the local SBAE program or school. Research following up on these particular issues would be useful to the profession. Regarding the EFE students in the present study, however, we found it encouraging that there were many positive attributes about the use of the laboratory environments that they observed. We hope that as these EFE students continue down the path of teacher preparation, their understanding of how to best incorporate laboratory-based teaching and learning into modern SBAE programs will continue to grow.

Laboratory environment set-up was mentioned frequently by the EFE students. In particular, the EFE students made mention of how laboratories were clean, organized, and well-maintained. This served as an interesting discussion point, as laboratory management remains an important topic in SBAE programs (Saucier et al., 2014) and teacher preparation (McKim & Saucier, 2011). As indicated by the EFE students in the present study, prioritizing the care of individual laboratory environments can positively contribute to the valuing of the settings as places of high-quality teaching and learning, which includes creating good impressions for outsiders coming to observe the environments. Moreover, several EFE students discussed in their reflective/descriptive summaries the value of caring for the facilities and crafting a positive image for the work done there. We hope these impressions last as these EFE students enter the profession as new teachers. Properly managing facilities is paramount to ensuring their long-term usage within a SBAE program (Saucier et al., 2014). Because stakeholders (e.g., parents, school administrators, students not enrolled in the local SBAE program, etc.) bear witness to the state of repair (or disrepair) and use of laboratory environments (or lack of use), laboratory environments need to be well-maintained and used to help present in professional image of the SBAE program (Phipps et al., 2008). The EFE students in the present study seemed to recognize this within their placement sites. As a result of the experiential learning process (i.e., the EFE course), perhaps these ideas will remain at the forefront of these EFE students' minds as they begin their teaching careers.

Interestingly, several EFE students noted there was a connection between the use of project-based learning and laboratory set-up. Project-based learning is focused on the use of projects as a context through which to teach underlying principles (Larmer, Mergendoller, & Boss, 2015). Examples of suitable projects in the context of a SBAE program could include caring for livestock in a school livestock handling laboratory, wiring electrical circuits in an agricultural mechanics laboratory, or cultivating field crops as part of a test plot on a land laboratory. Moreover, project-based learning has been a traditional staple of teaching and learning in SBAE settings (Phipps et al., 2008; Talbert et al., 2014). As an instructional strategy, project-based learning serves as an excellent engager and motivator of students, allowing for a variety of teaching and learning approaches that help to prepare students for their lives beyond high school (Larmer et al., 2015). We were encouraged to see several EFE students in the present study noticed the laboratory environments in which they observed were set up to facilitate project-based learning.

We recalled how Amy was in awe of the agricultural mechanics laboratory presented in Figure 1; moreover, she easily identified how secondary students at her placement site were frequently engaged in hands-on projects (e.g., tractor repairs, etc.) that challenged their thinking and their abilities to work together. Other EFE students' stories were similar, noting that using projects as a teaching and learning tool was vital to the educational process. The SBAE teacher is responsible for a variety of tasks, including laboratory set-up, management, and ensuring that materials for learning experiences (i.e., such as those offered through project-based learning) are available and ready for use (Saucier et al., 2014). Preservice teachers should be prepared to structure their curricula, learning environments (including laboratories), and available resources to meet the needs of their students (Whittington, 2005).

We recommend agricultural teacher preparation programs adopt EFE coursework as part of their programs of study, if such efforts have not been undertaken already. EFEs are beneficial to preservice teachers (McIntyre, 1983) and help to connect them to colleagues already in the profession (i.e., inservice teachers) and expose them to the realities that surround teaching in, and leading, an SBAE program. Further, we recommend agricultural teacher preparation programs should ensure EFEs are providing adequate exposure to topics prevalent within modern SBAE programs. As EFEs are designed to be impactful experiences that can help to guide preservice teachers' career directions (Myers & Dyer, 2004; Retallick & Miller, 2007; Smalley & Retallick, 2012), supervising teacher education faculty and EFE coordinators should work to ensure the experiences are of adequate quality and will expose preservice teachers to the complexities of modern SBAE programs.

Moreover, those individuals responsible for EFE placements should work to ensure strategic decisions are being made to best facilitate the professional growth and development of preservice teachers. Placing preservice teachers in low-quality SBAE programs could lead to poor perceptions about the quality of programs, facilities, and curricula beyond a particular placement. This could be especially destructive for preservice teachers whose backgrounds do not include enrolling in SBAE programs as secondary students, as perceptions may easily become reality. In addition, exposure to low-quality programs may inadvertently, and negatively, impact preservice teachers' motivations to continue toward a teaching career. Conversely, placing preservice teachers in high-quality SBAE programs may be more ideal, as exposure to more complete, better-quality SBAE programs may assist in maintaining, or even enhancing, preservice teachers' motivations to pursue education as a career. EFEs are meant to challenge pre-conceived ideas about SBAE (Baker et al., 2017); however, those responsible for EFE placements must be cognizant that some pre-conceived ideas are worth more than others.

We recommend future research should include replication of this study to better understand EFE students' experiences, assumptions, and expectations in relation to laboratory environments. Photovoice can be an excellent tool to explore preservice teachers' perceptions about the realities of modern SBAE programs (Rank & Smalley, 2017); thus, we recommend agricultural education scholars continue using this research method when conducting such inquiries. Additional efforts to expound upon the questions asked within the present study should be made as well. Conducting both qualitative and quantitative research will help to increase the body of knowledge related to EFEs and the role they play in agricultural teacher preparation programs. Possible quantitative research could include the development of a questionnaire for inservice teachers which addresses how they incorporate laboratory-based teaching and learning experiences within their respective programs. As laboratory-based instruction is, and has long been, a foundational part of the modern SBAE program model (Shoulders & Myers, 2013; Twenter & Edwards, 2017), further understanding exactly how inservice teachers are using such practices could help to more fully define how EFEs could be operationalized as both a teaching and a learning tool. Further, a combination of qualitative and quantitative research explorations into these broad topics could lead to the development of a model for delivering teaching and learning experiences in laboratory environments, with a particular focus on how EFEs serve to prepare preservice teachers for that role.

Teacher education programs, as part of the broader field of agricultural education, must continue to remain focused on preparing high-quality teacher candidates (Whittington, 2005). Moreover, these programs, as part of a broader mission to serve as effective and efficient in their scope, function, and purpose (Thoron et al., 2016), must continue to evolve. EFEs, such as the one described in the present study, can help to create lasting impressions on preservice teachers (Baker et al., 2017; Rank & Smalley, 2017). To remain relevant, agricultural teacher preparation programs must continue providing exceptional learning opportunities for preservice teachers so they, in turn, can do the same for their forthcoming secondary students (Thoron et al., 2016; Whittington, 2005). Perhaps quality instruction facilitated in laboratory environments is part of that process.

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