Exploring Technology Integration in School-Based Agricultural Education (SBAE) Teacher Education: A Study of Preservice Teachers' Experience

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ABSTRACT

Teacher education programs have been known to omit critical aspects of technology preparation among undergraduates. Teaching practices are constantly evolving to accommodate the latest innovations in society; therefore, change is required in how we prepare educators to integrate technology into the classroom.

As technology continues to change, teachers' practices need to reflect on how teachers are prepared to integrate technology into teaching and learning. Researchers have often found various ways to help prepare teachers to incorporate technology, including field experiences and various program design models. There has been a lack of research within School-Based Agricultural Education (SBAE) of preservice teachers integrating technology into the classroom. A qualitative phenomenology was conducted among nine preservice SBAE teachers regarding their experiences integrating technology during their time in their teacher education program. The Unified Theory of Acceptance and Usage of Technology (UTAUT) served as the theoretical framework to aid in conceptualizing the experiences of preservice SBAE teachers. The thematic findings from this study address the lack of preparation from their teacher education programs, support and expectations, challenges integrating technology into the classroom, succession of technology integration, and technology strategies for teaching and learning.

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GENERAL AUDIENCE ABSTRACT

The use of technology in education is more prevalent in today's classrooms than ever before, and teachers are required to revitalize their methods for ensuring student success. Developing an understanding of how technology can appropriately assist both students and teachers in classrooms is vital to ensuring success. Postsecondary teacher education programs are not adequately preparing teachers to effectively integrate technology into their classrooms and curriculum. As graduates leave these programs and enter the classrooms, it is critical that they understand the implications of the various types of technology on student learning. This qualitative research study focuses on understanding how School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology into the classroom. Nine preservice SBAE teachers from the Southeastern region of the United States participated in this study through semi-structured interviews and document collections of course syllabi and lesson plan they created. The preservice teachers showcase a lack of understanding of how to adequately integrate technology in the classroom and highlight the challenges they experience during their student teaching practicum. Additionally, SBAE teacher education programs are not preparing teachers to integrate technology which is a proven challenge among the participants. SBAE teacher education programs should reconsider how they scaffold this to their preservice teachers.

Dedication

This work and every part of my educational journey is dedicated to my family,

Without your unwavering support, I would not have been able to live out my dreams.

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First, I would like to acknowledge every educator I have had in my life. Most importantly, Coach Haynes. It is an honor to say I was a product of the greatest Agricultural Education program in the nation. Your dedication to student success is unmatched, and no one will ever forget the legacy you have left in Manning, South Carolina. Thank you for sharing your passion for agriculture and the FFA with me. Thank you for teaching me how to lead others and be a positive influence in others lives.

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Chapter 1 Introduction

1.1 Introduction

Technology in education has been a longstanding topic of discussion. As emerging technologies continue to enter the educational landscape, it is critical to evaluate how these tools will change teaching and learning (Delgado et al., 2015). Technology in education provides many benefits for students but can also be problematic among adolescents learning how to use technology autonomously. Despite the rapid technological development and widespread use of technology among students, teachers still need to understand how technologies improve classroom teaching and learning (Shin, 2015). The impact of educational technology should be considered beyond strictly increasing student achievement (Antoniou & Ioannou, 2018). Delgado et al. (2015) have found that the practical use of technology among students and teachers needs to be improved. By providing valuable practices for integrating educational technologies, teachers are better able to identify how students can use technology to create equitable learning opportunities in which all students can succeed (Cheah et al., 2023).

Education in the 21st century requires new skills to be provided to preservice teachers in their teacher education programs (Liu, 2016). As emerging technologies continue to affect the educational landscape, it is worthwhile to understand how we prepare future educators to teach using technology. When deciding how to best integrate technology into teaching and learning, understanding preservice teachers' attitudes and beliefs is essential for teacher preparation programs (Tondeur, Scherer, Siddiq & Baran, 2017). Additionally, teacher preparation programs must determine how to prepare their preservice teachers to integrate technology for learning

while staying attuned to how it can impact adolescents (Tondeur, Scherer, Siddiq & Baran, 2017).

Expectations for students in K-12 settings to engage in learning through technology can be challenging depending on factors such as technology exposure and access (Francom et al., 2021). Specifically, the increase in virtual learning requires students to understand how to operate technology, which may be a barrier to student learning (Esfandiari & Gawhary, 2019). As technology has evolved in education, prior challenges focused on whether hardware such as calculators, cell phones, and laptops should be allowed during educational time (Santos et al., 2018). More recently, the continual rise of emerging technologies that students have access to has called into question new issues, such as academic integrity (Haleem et al., 2022).

Emerging technologies in education that have caused a rift include ChatGPT and other tools utilizing Generative Artificial Intelligence (Gen AI) (Mintz et al., 2023), which can best be described as the ability of a machine to perform human capabilities (McCarthy, 2007). The development of Gen AI allows users to generate a human-like product that can be confused for human work (Baidoo-Anu & Ansah, 2023). Education institutions at every level are reconsidering current practices to elevate how students are using this new form of technology (Baidoo-Anu & Ansah, 2023). However, it is a challenging time for educators trying to figure out solutions nearly overnight to deal with the challenges of emerging technologies in the classroom.

Educators often struggle with how to use technology effectively in the classroom. Research indicates there are issues integrating technology effectively to increase student achievement. The widespread transition to virtual learning that has continued to manifest in schools in various forms requires educators to develop new instructional design skills.

Professional development for educators has been offered by school districts or professional associations, but these lack explicit assistance with technology integration. However, schools that have instructional technology specialists have generally found success in assisting educators in integrating technology. Similarly, teacher preparation programs have become an area of concern and are identified as a place that should be fostering digital literacy skills to prepare preservice teachers for the classroom (Castellvi et al., 2020). Therefore, this study seeks to explore the experiences of school-based agricultural education (SBAE) and how preservice teachers in SBAE integrate technology during their student teaching semester.

1.2 Problem Statement

The problem that serves as the focus of this study is the lack of technology preparation for preservice teachers during their teacher education programs (Short et al., 2021). The most recent guidance for teacher preparation programs comes from the Department of Education Office of Educational Technology, which outlines guiding principles to prepare preservice teachers (OET, 2017). More recent guidance, including the 2024 National Educational Technology Plan (NETP), has suggested "teachers need to experience these new instructional models as learners through…..teacher preparation programs" (USDOET, 2024, p. 23). There is still debate on the best methods for teacher education programs to adopt to prepare preservice teachers to integrate technology in the classroom (Nelson & Voithofer, 2022), as preservice teachers do not possess the ability to adequately integrate technology into the classroom without the assistance of their teacher education program (Dincer, 2018). A meta-analysis by Wilson et al. (2020) found that when preservice teachers complete one technology integration course, it has a large effect on their technological knowledge (TK). Additionally, the ability of the teacher educator to integrate technology in the classroom impacts preservice teacher technology beliefs

and adoption (Li et al., 2016). Research in School-Based Agricultural Education (SBAE) has lacked investigations of preservice teachers' experiences with technology integration during their teacher education program. Morey et al. (2023) have identified the need to develop technologically competent SBAE teachers, but there is a lack of evidence that identifies specifically how to prepare them.

1.3 Purpose Statement

The purpose of this qualitative phenomenology is to investigate the technology-related experiences of preservice School-Based Agricultural Education (SBAE) teachers in their teacher education programs. While research has examined the experiences of preservice teachers during their teacher education program, many omit technology's impact on teaching and learning in agricultural education. Specifically, this study explores the coursework, field experiences, and practical application of preservice teachers integrating technology during their student teaching semester.

1.4 Research Questions

This investigation involves the student teaching experience of preservice teachers. This qualitative transcendental phenomenology addresses one main research question with three sub-questions to explore the beliefs about knowledge of technology in education as they prepare for their future career in education.

How do School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology into their teaching and learning?

Sub Questions:

- What are the experiences of preservice SBAE teachers during their student teaching practicum?

- How do preservice teachers use technology to address responsibilities outside of teaching?
- How do preservice teachers implement educational technology as a tool to promote learning?

1.5 Conceptual Framework

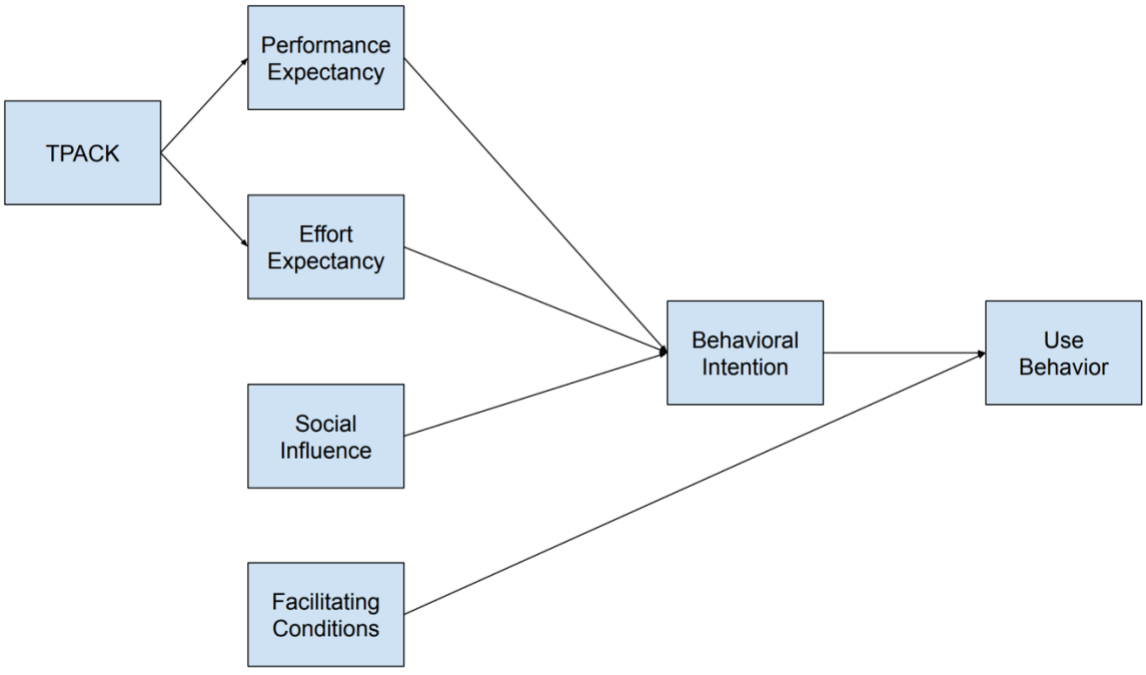
This study uses an extended model of The Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh et al., 2003). This study aims to explore the experience of preservice SBAE teachers who choose to integrate technology in the classroom during their teacher preparation program. UTAUT is a model that combines eight theories that have commonly been used to investigate technology acceptance and usage in various contexts (Venkatesh et al., 2016). The theory focuses on four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. Moderating variables are considered to impact the constructs in various ways, including gender, age, experience, and voluntariness.

Technological, Pedagogical, and Content Knowledge (TPACK) is used as a secondary framework to guide this study in accounting for preservice teachers' usage of educational technology in the classroom (Koelher & Mishra, 2008). When considering educational technology in the K-12 classroom, TPACK illustrates the intersection of technology, content, and pedagogy within teacher preparation (Koelher & Mishra, 2008). TPACK has been identified to have a relationship within the constructs of performance expectancy and effort expectancy in the UTAUT model to explore teachers' adoption of Web 2.0 technologies (Mohammad-Salehi et al., 2021).

Combining the UTAUT and TPACK theoretical models will allow for a more comprehensive understanding of student teachers' intentions and outcomes when integrating classroom technology. While UTUAT is known as a framework for explaining technology, extending the model to include TPACK allows for a deeper understanding of student teachers' performance expectancy along with effort expectancy. Wangdi et al. (2023) found the higher levels of TPACK among teachers will lead to a higher performance expectancy and effort expectancy. Figure 1 showcases the extended model proposed for this study to consider TPACK as a factor influencing technology usage.

Figure 1

An Extended Model of the Unified Theory of Acceptance and Usage of Technology



Performance expectancy explores how student teachers perceive the benefits of using technology for instructional and classroom requirements. Using TPACK to inform performance expectancy will illustrate how technology mediates technological and periodical knowledge. Additionally, TPACK with effort expectancy will allow for challenges associated with technology in educational contexts. Factors known to be associated with effort expectancy and TPACK include access to resources, challenges among teachers and students, and support availability. The moderating variables were not considered within this study since gender has been denounced as having an impact on technology adoption (Venkatesh et al., 2016). Also, voluntariness was not considered since using technology is a requirement of the preservice teacher's responsibility as a student in a university teacher education program.

1.6 Assumptions, Limitations and Delimitations

Assumptions. The following assumptions were identified in the study:

1. The participants were able to provide data that adequately reflected their experiences, thoughts and beliefs.
2. Participants in this study will have received some training on technology from their teacher preparation programs.
3. The use of computers in the classroom is at a minimum once a week.
4. Toward the end of their student teaching semester, the participants should have extensive experience with using technology
5. Transcendental phenomenology will allow for a deeper understanding of student teaching as an experience.

Limitations. Limitations are aspects of the research that refer to the methodology chosen by the researcher. Research studies are

1. The first limitation of the study comes from choosing a qualitative approach, that is not able to produce generalizable data.
2. The second limitation of the study is the time constraint on behalf of the participants. The aim of this study is to understand the experiences of preservice teachers at the pinnacle of their teacher education program. There was a small window of opportunity to recruit participants.

Delimitations. In addition to limitations, delimitations are important to address in research because they impact the overall scope of the study.

1. Since this study was specific to one region within the Southeastern region of the United States this may not be representative of all preservice teachers' experiences.
2. The study is limited to participants who have finished their student teaching practicum semester; this resulted in a specific group of individuals who met the criteria for this study.

1.7 Definition of Terms

Educational Technology - Also referred to as edtech or instructional technology. This term is used to describe any form of hardware (e.g., computers, cell phones, projectors) or software (e.g., learning management systems, online classrooms, digital learning databases) that could be used by teachers to enhance teaching and learning (Morel & Spector, 2022).

School-based Agricultural Education (SBAE) - A program typically introduced to students at the secondary levels which integrates an agriculturally based curriculum (Talbert et al., 2014).

Teacher Educator Technology Competencies (TETCs) – Foulger et al. (2017) developed a guideline to assist teacher educators on competencies they should possess when preparing preservice teachers.

Technological, Pedagogical, and Content Knowledge (TPACK) - The intersection of technology, pedagogy, and content knowledge is a skill possessed by in-service and preservice teachers. This framework was developed by Mishra and Koelher (2006) to explain how educational technology can be integrated into a classroom setting.

Technological Pedagogical Knowledge (TPK) – Mishra and Koelher (2006) further define TPK as the knowledge to select appropriate technologies for teaching and learning while considering the students and classroom.

Unified Theory of Acceptance and Usage of Technology (UTAUT) - A framework heavily utilized when understanding factors that influence technology usage by considering factors such as performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

Chapter 2 Literature Review

2.1 Chapter Overview

This chapter will provide an overview of the study, and the methods pursued by the researcher to guide the literature review. The theoretical framework will aid the literature review in identifying how theories of technology acceptance and usage apply to the context of preservice SBAE teachers. Later in the chapter, research on teacher education programs will be discussed with specific reference to the technology preparation of preservice teachers and research within agricultural education. It will also indicate how the research question that guides this study was developed.

2.2 Problem Statement

The problem that serves as the focus of this study is the lack of technology preparation for preservice teachers during their teacher education programs (Short et al., 2021). The most recent guidance for teacher preparation programs comes from the Department of Education Office of Educational Technology, which outlines guiding principles to prepare preservice teachers (OET, 2017). More recent guidance, including the 2024 National Educational Technology Plan (NETP), has suggested "teachers need to experience these new instructional models as learners through…..teacher preparation programs" (USDOET, 2024, p. 23). There is still debate on the best methods for teacher education programs to adopt to prepare preservice teachers to integrate technology in the classroom (Nelson & Voithofer, 2022) as preservice teachers do not possess the ability to adequately integrate technology into the classroom without the assistance of their teacher education program (Dincer, 2018). A meta-analysis by Wilson et al. (2020) found that when preservice teachers complete one technology integration course, it has

a large effect on their technological knowledge (TK). Additionally, the ability of the teacher educator to integrate technology in the classroom is impactful on preservice teacher technology beliefs and adoption (Li et al., 2016). Research in School-Based Agricultural Education (SBAE) has lacked investigations of preservice teachers' experiences with technology integration during their time in their teacher education program. Morey et al. (2023) have identified the need to develop technologically competent SBAE teachers, but there is a lack of evidence that identifies specifically how to prepare them.

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The purpose of this qualitative phenomenology is to investigate the technology-related experiences of preservice School-Based Agricultural Education (SBAE) teachers in their teacher education programs. While research has examined the experiences of preservice teachers during their teacher education program, many fail to consider technology's impact on teaching and learning in agricultural education. Specifically, this study explores the coursework, field experiences, and practical application of preservice teachers integrating technology during their student teaching semester.

2.4 Research Questions

This investigation involves the student teaching experience of preservice teachers. This qualitative transcendental phenomenology addresses one main research question with three sub-questions to explore the beliefs about knowledge of technology in education as they prepare for their future career in education.

How do School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology into their teaching and learning?

Sub Questions:

- What are the experiences of preservice SBAE teachers during their student teaching practicum?
- How do preservice teachers use technology to address responsibilities outside of teaching?
- How do preservice teachers implement educational technology as a tool to promote learning?

2.5 Literature Review Methodology

This study was informed by a literature review encompassing various disciplines, databases, and academic journals. Four databases were used in this literature review, including Google Scholar, EBSCO Host, Virginia Tech Libraries, and recommendations from colleagues. The search strategy builder provided by the Virginia Tech Library was used to develop search terms to guide the review process. Search term examples include: "(Teacher Education Programs OR Preservice Teacher Education OR Teacher preparation programs) AND (School Based Agricultural Education OR SBAE OR Agricultural Education OR Secondary Agricultural Education OR Career and Technical Education) AND (Classroom technology integration OR Technology in the classroom OR Classroom Technology OR High school technology usage).

2.6 Literature Review

2.6.1 Theoretical Framework

Unified Theory of Acceptance and Usage of Technology (UTAUT)

The Unified Theory of Acceptance and Usage of Technology (UTAUT) guided this study (Venkatesh et al., 2003). Venkatesh's work from a management background has implications for information systems and research on technologies in other areas, such as education (Yee &

Abdullah, 2021). Venkatesh et al. (2003) combine eight theories regarding technology adoption, which has allowed for a more comprehensive understanding of technology integration into various aspects of society frame models include Theory of Reasoned Action (TRA) (Fishbein & Azjen, 1975), Technology Acceptance Model (TAM) (Davis, 1989), Motivation Model (Vallerand, 1997), Theory of Planned Behavior (TPB) (Azjen, 1991), the Combined TAM-TPB (Taylor & Todd, 1995), Model of PC Utilization (Thompson et al., 1994), Diffusions of Innovation Theory (Rogers, 2003) and Social Cognitive Theory (Bandura, 1986).

UTAUT (Figure 2) offers four constructs to consider when understanding technology acceptance and usage: Performance expectancy, Effort expectancy, Social Influence, and Facilitating Conditions (Vanketash et al., 2003). UTAUT has been utilized to explain the technology intention of a variety of actors in settings to integrate technology into their jobs, including preservice teachers and bankers (Rahi et al., 2019). Additionally, researchers found self-efficacy, anxiety, and behavioral intention to use the system to be nonsignificant factors impacting technology acceptance and use (Venkatesh et al., 2003).

Performance expectancy is the expected performance that technology can provide an individualist when they use it for their job (Venkatesh et al., 2003). Venkatesh et al. (2016) found performance expectancy to be the strongest predictor of technology use in multiple contexts. Specifically, within teacher education, researchers have found that how preservice teachers expect technology to perform is a significant indicator of their intention to integrate technology into the classroom (Birch & Irvine, 2009). Further, research has been inconclusive as to whether other factors, such as effort expectancy, social influences, and facilitating conditions, impact how preservice teachers expect technologies to perform for their learning and usage in

university practicums (Buabeng-Andoh & Baah, 2020). Holzmann et al. (2018) contradict these findings but found performance expectancy to be a contributing factor to the overall intention to adopt technology such as 3D printers.

Effort Expectancy is the level of ease when using a specific technology (Davis, 1989). Venkatesh (2003) defines Effort Expectancy as "the degree of ease associated with the use of the system." After technology users have extensive experience with technology, effort expectancy is less significant (Chauhan & Jaiswal, 2016). Kim and Lee (2022) conducted a study that found a relationship between teacher's use of technology and the effort required to use the technology. Teachers would rather spend their time developing instructional materials on a system that is easier to use than take the time to learn how the technology works. (Kim & Lee, 2022).

Social influence is nearly synonymous with the construct of subjective norms from the Theory of Reasoned Action (Fishbein & Azjen, 1975). Social influence is used to identify whether others around an individual, especially those of authority or high influence on the individual, impact the person's use of technology (Venkatesh et al., 2003). Batane and Ngwako (2017) found that the effect of cooperating teachers on preservice teacher technology usage was a major influence on their technology integration during the first year of teaching. This social influence can also be understood as the assistance schools provide teachers to enhance their technology integration practice for student learning (Nandwani & Khan, 2016).

Facilitating Conditions depend on whether an individual's organization supports the technology (Venkatesh et al., 2003). Facilitating Conditions have been identified by research in education as school policies, classroom policies, professional development, or helping with routine tasks among technology users (Bixter et al., 2019). Dwivedi et al. (2019) identify facilitating conditions as a major integration consideration among both teachers and students

when determining the intention to use technology for learning. Providing teachers assistance in the classroom to integrate technology has been investigated on a broader scale to understand technology adoption.

Four moderators impact the four constructs in UTAUT, including gender, age, voluntariness, and experience (Venkatesh et al., 2003). Research has been conducted to consider these various moderating factors on behavioral intention among technology users (Venkatesh et al., 2016). Later revisions, such as UTAUT2, were offered and are not in the theoretical framework because they include constructs relating to consumer behavior (Venkatesh et al., 2012). Those constructs included hedonic motivation (amusement or enjoyment of the technology), price value, and habits. One study by Chopdar et al. (2018) found perceived risk as an external factor among young adults with the use of mobile shopping apps, where perceived risk is a contributing factor of behavioral intention. This study focuses on technology acceptance and usage among preservice teachers as opposed to how it feels to be a purchaser of technology.

Technological, Pedagogical and Content Knowledge (TPACK)

Educational technology has used a variety of theories and models to describe in-service and preservice teachers' ability to integrate technology in the classroom effectively. Koelher & Mishra (2008) developed technology, pedagogical, and content knowledge to address the connections between the three critical components of an educator's practice. The TPACK framework commonly used in teacher preparation programs extends Pedagogical Content Knowledge (Shulman, 1986) by extending Shulman’s original framework through the consideration of technology, which allows for a modern view of education. As shown below, TPACK has three significant components and four interrelated aspects. Technology knowledge

refers to teachers' knowledge of new and emerging technology and their ability to be integrated into the curriculum.

Content knowledge (CK) is specific to the subject the teacher is responsible for teaching their students, whereas Pedagogical knowledge (PK) refers to the understood instructional practices and methods to promote student learning. Extending these ideas throughout the framework brings discussion of the interrelated aspects of each. For example, TCK, or Technological Content Knowledge, challenges educators to combine technology with student learning objectives of course-specific content. Similarly, Technological Pedagogical Knowledge (TPK) encourages introspection into how technology mediates instructional strategies, either helping or hindering the success of the teacher's pedagogical practices. Pedagogical Content Knowledge (PCK) is noted by Shulman (1986) as how specific teachers place content knowledge about students and how they translate content into effective instructional methods.

Preparing preservice teachers for the contextual factors related to TPACK has become a question for researchers looking to expand the boundaries of this concept in teaching and learning (Mishra, 2019). The contextual boundary surrounding the TPACK model elicits a response to the factors affecting the learning that is independent of each school, classroom, or learning environment.

TPACK, as one framework, is complex as it seeks to bring attention to the relationships between these constructs to identify how educators should integrate technology in their classrooms. TPACK is widely used in teacher preparation programs to assist teacher educators in translating educational practices to preservice teachers. Recently, Mishra (2019) included a dotted line surrounding the framework to consider a teacher's contextual knowledge. Since CK

refers to content knowledge, contextual knowledge in the framework can be labeled XR, signifying X as a variable factor.

Integrating TPACK with other theoretical models of technology acceptance, such as TAM, highlights the need to extend this with other integral theories in preservice teacher education (Hsu, 2016). Additionally, higher levels of TPACK have accounted for higher levels of technology acceptance (Joo et al., 2018).

TPACK has not been heavily used within agricultural education but has shown to be effective in understanding the role of technology among preservice and in-service teachers (Stewart et al., 2013). For example, Stewart et al. (2013) found that preservice teachers view technology as a form of classroom management compared to in-service teachers. Additionally, TPACK has recently been used by Gregg et al. (2023) to discuss Ohio SBAE teachers' self-efficacy during the COVID-19 pandemic, which showed a decrease due to the emergence of technology usage among teachers. As educators continue to be expected to increase their use of technology, considering their experience in their teacher preparation program can have a meaningful impact on their overall teaching ability (Morey et al., 2023).

2.6.2 Technology Standards in Teacher Education

As technology has evolved exponentially over the past several decades, technology integration is a common issue across many industries, specifically education. Teacher preparation programs are designed to ensure that future educators receive proper training to ensure they are ready to be a part of a digitally literate society. This means ensuring students possess the skills to use technology for lifelong learning. National guidance has given direction for technology policy in education and identified areas of improvement and consideration.

Prior guidance on the navigation of challenges to integrating educational technology mirrors issues that are still present today. For example, in *A Nation at Risk,* the federal government recommended that students take a semester-long computer science course that introduced them to the "world of computers, electronics, and related technologies" (1983, p. 22). The most recent guidance from accreditation for higher education was the Council for Accreditation of Educator Preparation (CAEP) in 2015, which provided guidance for considering technology integration on behalf of teacher education programs when preparing preservice teachers. Following that, in December 2016, the Department of Education released the most recent guidance on how teacher preparation programs should consider technology integration for preservice teachers. Specifically, this policy brief explicitly suggests the use of program-wide technology integration through coursework and field experiences alongside teacher educators and other teacher mentors. While recent guidance on educational technology emerged, there is still a large gap in guidance for teacher education programs.

CAEP's most recent guidance for accreditation standards for teacher education programs was released in 2022 and expanded by adding two additional standards. Notably, the change from 2015 to 2022 is evident from the language being used to describe how to prepare preservice teachers. For example, in 2015, Standard 1: Content and Pedagogical Knowledge outlined the role technology plays in enhancing classroom teaching and learning. Before this release, the 2015 recommendations explain the need to apply technology in novel approaches to assist with advancing learning on behalf of students (CAEP, 2015).

As an extension of the Department of Education, the Office of Educational Technology (OET) is the visionary for integrating technology into our current education system within the US (OET, 2022). This office guides how to integrate technology in 16 educational institutions

appropriately. In 2016, the OET released Advancing Technology in Teacher Education Policy Brief. This would later become a portion of the 2017 National Educational Technology Plan (NETP) Update Reimagining the Role of Educational Technology in Education. The policy brief expands on four guiding principles teacher preparation programs should incorporate at the secondary level to prepare future educators.

The four main goals of the NETP include (1) provide opportunities for preservice teachers to integrate educational technologies to provide more engaging activities, (2) Develop a preservice educators program to include more than one stand-alone course by revisiting concepts of technology integration throughout the program, (3) Develop standards frameworks and/credentials for advancing competencies in technology integration and (4) provide opportunities to develop digital literacy skills.

Following the call to increase teacher education programs' ability to prepare educators for technology integration, the OET has most recently provided a 2024 National Educational Technology Plan (NETP) titled: A Call to Action for Closing the Digital Access, Design, and Use Divides. This is the most recent version of the 2017 NETP report, which heavily focused on teacher preparation programs. The 2024 NETP focuses specifically on educational technology in the K-12 education system, including identifying appropriate methods for closing the expanding digital divide among students in various contexts. While the 2024 NETP does not have guidance for teacher education programs. However, the "recommendations in each section…are most intended for states, districts or school building" (NETP, 2024 pg. 9). The lack of direction for the teacher preparation program in the 2024 NETP should be addressed through gaps in the current plan.

There are many concepts that teacher education programs should consider implementing to keep future educators well-equipped for teaching. For example, the use of Universal Design for Learning (UDL) and teachers' digital literacy skills are suggestions made in prior NETP that are prevalent among current teacher preparation programs. There are also new ideas suggested by the 2024 NETP that have been encouraged by researchers to integrate into their programs. Digital Citizenship, a term popularized by Mark Riddle (2015), places teachers in the position of educating students on how to not only use technology for learning but also how to integrate it as a member of a democracy as well as the need for "Everywhere, all-the-time learning," which can be suggested by the impact COVID-19 had on education.

2.6.3 Teacher Education Programs

Preparing teachers to understand technology in the classroom has become an essential aspect of teacher preparation programs. Within teacher education programs, there are many aspects to consider, including teacher educators' ability to demonstrate effective technology use (Foulger et al., 2017), understanding preservice teacher beliefs of technology (Farjon et al., 2019), and how teacher education programs provide opportunities for preservice teachers and current in-service teachers who may return for advanced degrees to learn technology (Garziano, 2018). Research in educational technology in an international context has typically focused on preservice teachers and teacher preparation programs (Scherer, 2019).

A review of the literature by Starkey (2020) provides insight into what researchers have done to understand how teacher preparation programs should prepare preservice teachers for the digital age. Starkey (2020) introduces digital competence in teacher education as a three-dimensional construct, including generic digital competence, digital teaching competencies, and professional digital competencies. Generic digital competencies focus on using technologies for

presentations, collaborations, and basic hardware. Digital teaching competencies explore how educational technologies are introduced through teacher education programs. Professional digital competencies extend past teaching and learning into the broader school system of which they are a part (Starkey, 2020).

Preparing educators during the COVID-19 pandemic was a challenge for many teacher education programs across the world (Quezada et al., 2020). An autoethnography done by Quezada and colleagues (2020) illustrates the struggles of transitioning to an online model for one teacher education program during COVID-19, including the changes faculty had to conduct to modernize their curriculum. During this time, teacher educators were required to adopt practices outside of their normal plans by integrating technology to engage with students (Ruggiero & Mong, 2015). For example, many preservice teachers were required to conduct more video recordings of themselves presenting materials or discussing situations in the classroom to show mastery of understanding (Ersin et al., 2020).

Professional digital competence encompasses the skills needed to integrate technology within a specific job (Lund et al., 2014). Instefjord and Munthe (2017) found the responsibility among teachers to be complex but directly related to the methods their teacher education programs utilized to prepare them. The importance of developing digital competence development among preservice teachers ensures that the teacher can instruct the students on how to utilize technology for learning (Elstad & Christophersen, 2017). Developing professional digital competence has been attributed to the importance of role models who demonstrate successful practices along with exemplary use of technology during teacher education (Gudmundsdottir & Hatlevik, 2018). Preparing preservice teachers requires a higher level of skills required by teacher educators to prepare future teachers (Foulger et al., 2017).

When attempting to develop preservice teachers to provide relevant instruction to students in the 21st century, it is impossible not to consider the integration of technology because of its endless presence (Brenner & Brill, 2016). Technology has now become an essential requirement for teachers to be able to live up to the expectations of their jobs in teaching and learning (Ruggiero & Mong, 2015). When considering how best to prepare preservice teachers for technology integration, many are still deciding how to implement the best technology in teacher education programs (Agyei & Voogt, 2011). Modern perspectives describe considerations when investigating all aspects of programmatic considerations throughout the course work and other relevant experiences during their tenure in the program. For example, Clausen et al. (2021) have suggested that integrating Teacher Education Technology Courses (TETC), which utilize ISTE standards, can enable preservice teachers to be exposed to a holistic approach to technology integration; however, teacher education programs often do not deliver technology education to preservice teachers using the same programmatic and curricular methods. The literature has identified program models along with aspects of teacher education programs to help guide technology competency among preservice teachers.

SQD Model. A study by Tondeur et al. (2012) found that the levels of preservice teachers' TPACK were increased through integrating methods of the SQD Model into teacher education programs. Specifically, the SQD model provides a framework for teacher educators to adopt while teaching preservice teachers how to integrate technology, including 1) Modeling, 2) Reflection, 3) Collaboration, 4) Feedback, 5) Authentic Experiences, and 6) Instructional Design (Tondeur, 2018).

Technology integration models are meant to provide a conceptual framework for educators to use when considering how to integrate technology into the classroom. Technology

integration models need to meet criteria to demonstrate adequate training on behalf of the teacher education program. Kimmons and Hall (2016) developed six criteria for evaluating teacher education models for technology integration to assist preservice teachers. Determining quality in teacher education was proposed through six criteria with guiding questions for each. The six criteria include (1) compatibility, (2) fruitfulness, (3) technology role, (4) scope, (5) clarity, and (6) student focus (Kimmons & Hall, 2016).

PICRAT. Kimmons et al. (2020) proposed a new theoretical model for technology integration to be used in teacher education programs. PICRAT is conceptually derived from two separate technology perspectives, which consider both the teacher and student usage (Kimmons et al., 2020). Students' engagement with technology is described as Passive, Interactive, or Creative in relation to classroom instruction (PIC). Kimmons et al. (2020) further suggest Replacement, Amplification, and Transformation to signify RAT in PICRAT. DEFINE RAT

Standalone Course. The 2017 NETP update explicitly asks for teacher preparation programs to offer educational technology exposure in a one-course format and as a standalone unit in a methods course. Teacher education programs have notoriously offered standalone educational technology courses, which may require more exposure to fully prepare preservice teachers (Lyublinskaya & Tournaki, 2016). Wilson et al. (2020) examined conceptual and practical knowledge acquisition from evidence across research and found a lack of consistency amongst program areas. For example, Cohen (2017) finds certain course design features like field observations, reflection, hands-on learning, and lesson plan examples should be included as high-quality strategies to implement in a teacher education course on technology integration. Cohen (2017) found that most teacher education programs only included modules or short units regarding technology integration during a student's time in their program. Adequately

incorporating each of these experiences would require much more time than a single one-semester course would allow (Kent & Giles, 2017). However, finding ways to encompass technology integration throughout the entire program is heavily encouraged. For example, Graziano (2018) found that when an online standalone technology course for preservice teachers is used, they should focus on individual skills and include aspects such as integrating content knowledge, which is challenging in a short semester.

Technology Infusion. Fougler et al. (2017) suggest that when technology is the focus of the courses, students often drive curriculum development for technology, omitting the idea of integration. In order to address technology integration issues in teacher education, technology infusion is a method which includes integrate technology into curriculums, modeling experiences, reflective practices and developing students' technology self-efficacy (Foulger, 2020).

Micro Credentialing. Micro Credentialing has been posed as an opportunity to integrate technology throughout an educator preparation program instead of a standalone course (Clausen et al., 2021). Teacher education programs should maintain standalone courses, but there is an opportunity for continual development through each aspect of a preservice teacher's experiences. To prepare preservice teachers, teacher preparation programs should showcase skills they will need to transfer to their future students, including researching the wealth of knowledge available on the internet (Blackley & Walker, 2017).

Field Experiences. There have been many suggestions on integrating the best practical examples to assist preservice teachers with integrating technology into their future classrooms (Yildiz Durak, 2021). For example, current practicing educators could provide practical examples of technology used in the current educational setting (Jin et al., 2023). Another

example includes field studies, which have been suggested as an opportunity for preservice teachers to learn from teachers who are known for technology integration (Nelson & Hawk, 2020). Modeling is an effective strategy to develop preservice teachers' ability to integrate technology by understanding how others do it (Admiraal et al., 2017). However, more than just modeling is needed due to the variability of the preservice teachers' prior knowledge of educational technology (Eutsler & Perez, 2022).

Collaborative working environments where preservice teachers work together to find areas for potential integration are important for exposing preservice teachers to integrating technology into their curriculum (Tondeur et al., 2017). Categorizing educational technologies into technology suites has also been recommended as an approach to handling all the technology options educators face (Amador et al., 2015).

Student Teaching Internship. Student teachers will enter schools with varying levels of technology, warranting the need to investigate student teachers throughout their courses and school placements (Beacham & McIntosh, 2014). Buss et al. (2018) found that teacher candidates' ability to utilize technology varies. However, the experiences they gain during student teaching affect how they perceive the use in their future classrooms. Specifically, the amount of technology exposure a cooperating teacher provides their student teacher can directly impact the confidence level that student teachers have when implementing technology (Foulger et al., 2014). Tondeur et al. (2017) found that preservice teachers' experience during their student teaching internship was vital to their implementation during their first year. Digital competence of preservice teachers by integrating technology alongside current educators can increase knowledge of educational technology (Morey et al., 2023). Student teachers need relevant

experiences when deciding how to integrate technology during their teacher education program best to receive feedback (Admiraal et al., 2017).

2.6.4 Teacher Educators and Educational Technology

It is the responsibility of the teacher education program to equip preservice teachers with the skills necessary to make effective changes in their classrooms. Teacher educators have recently been identified as gatekeepers of technology integration knowledge because of the opportunity they have to implement strategies into their practice for other students to learn from (Tondeur et al., 2019). This means that teacher educators, those who teach future teachers, should have a deep understanding of what it takes to be a 21st-century teacher (Uzun, 2016). Being tasked with preparing preservice teachers with technology requires teacher educators to remain abreast of current trends in technology (Foulger et al., 2017). Teacher educators invested in using practices to promote technology were beneficial for preservice teachers if they were exposed to those practices (Tondeur et al., 2019).

Foulger et al. (2017) answered the call from the National Educational Technology Plan (2017) by developing Teacher Educator Technology Competencies (TETCs). The research team developed 12 competencies addressing how technology should be used at the post-secondary level and how to incorporate practices for preservice teachers (Foulger et al., 2017).

1. Teacher educators will design instruction that utilizes content-specific technologies to enhance teaching and learning.
2. Teacher educators will incorporate pedagogical approaches that prepare teacher candidates to effectively use technology.

3. Teacher educators will support the development of the knowledge, skills and attitudes of teacher candidates as related to teaching with technology in their content area.
4. Teacher educators will use online tools to enhance teaching and learning.
5. Teacher educators will use technology to differentiate instruction to meet diverse learning needs.
6. Teacher educators will use appropriate technology tools for assessment.
7. Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments.
8. Teacher educators will use technology to connect globally with a variety of regions and cultures.
9. Teacher educators will address the legal, ethical, and socially responsible use of technology in education.
10. Teacher educators will engage in ongoing professional development and networking activities to improve the integration of technology in teaching.
11. Teacher educators will engage in leadership and advocacy for using technology.
12. Teacher educators will apply basic troubleshooting skills to resolve technology issues.

Teacher preparation programs should provide students with the opportunity to integrate various educational technologies into practice (Aslan & Chang, 2017). Studies in technology

have assessed the ability of the student teacher to utilize technology for learning; however, they have not been identified by teacher educators (Uerz et al., 2018). Teacher educators have many opportunities to integrate various methods that develop preservice and in-service teachers' technology knowledge. However, a study by Brenner and Brill (2016) found that while many of the teacher education faculty were modeling and reflecting, there was a lack of experiential learning opportunities in the classroom. Similarly, from the sample of early career teachers studied, the teachers who did experience technology integration methods lacked experience from an expert which did not allow the learning to be translated into practice (Brenner & Brill, 2016).

2.6.5 Preservice Teachers and Technology

While preservice teacher beliefs about educational technology have been widely researched, beliefs, attitudes, and knowledge are crucial components to integrate into teacher education programs (Wilson et al., 2020). Farjon et al. (2019) found attitudes and beliefs to be the strongest predictor among first-year preservice teachers when deciding the appropriate methods to integrate technology. Further, Agyei and Voogt (2011) found that preservice teachers' technology-related skills were the strongest predictor of technology integration in the classroom. When considering skills preservice teachers possess, Nelson and Hawk (2020) found that utility value beliefs, how useful technology would be, were more important than beliefs of importance in educational technology. Tondeur et al. (2016) also found that teacher education programs lack practical examples for preservice teachers, calling this a priority to include in educational programs. Showcasing how educational technology can benefit teachers beyond student learning has increased technology acceptance and usage (Teo, 2018).

While preservice teachers are known to be more technology savvy, this only sometimes translates into their ability to use educational technology resources to enhance instruction

(Graziano, 2018). Similarly, as students become more accustomed to advanced versions of personal/mobile technologies, preservice teachers should allow their students to use them effectively to advance learning (Graziano, 2018). While the hardware that preservice teachers use is standard, the software is becoming more of a focus of study. In a study of 712 preservice student teachers, Dincer (2018) found that technology literacy and self-efficacy were significantly low, considering they had prior experience with technology in their teacher preparation programs. This was in contrast to Kent and Giles (2017) who found that the self-efficacy of preservice teachers is impacted by the experiences provided by their teacher education programs. As a result, Dincer (2018) identified a need for more preservice teacher preparation as a barrier to adequate technology integration.

2.6.6 Educational Technology in Agricultural Education

Research in agricultural education has had ample research addressing issues with technology in teaching and learning in formal and informal learning environments. For example, Smith et al. (2018, 2018, & 2019) provide three different studies to investigate the effects of smartphone usage in SBAE programs to teach forestry identification skills. Their findings identify that smartphones offer an opportunity for teachers to utilize the technology they are most comfortable in operating (2018b). Student motivation did not change regardless of whether the teaching materials were accessible on a device or on a piece of paper (2019). However, the student's attention was rated low because of the repetitive nature that goes along with lower-order thinking skills like memory or repetition. Smith et al. (2018a) concluded that there was no significant difference regarding the achievement of groups of students who received tree leaves digitally or in a physical format. Student interaction from the use of the type of formative

assessments may have contributed to the experimental group's higher achievement (Smith et al., 2018a).

Many trends have stayed consistent in research on educational technology integration, including distance education, faculty usage, and current SBAE teachers' technological integration in their classrooms. However, there was an increase in the overall variety of tools being used to provide opportunities to students in formats they may not have been used to using (Williams et al., 2014; Williams et al., 2014).

Technology education methodology among faculty in agricultural education has been another area of research that has gained momentum in recent years as efforts have been made to identify best practices in the field. For example, a study by Sandlin et al. (2013) found that faculty were largely successful in technology integration when allowed to focus on developing technology-based instructional material and when given adequate time and assistance from experts. Providing educators adequate opportunities to explore ways to integrate technology is no easy feat and requires understanding the technology beyond day-to-day usage (Williams et al., 2014a). For example, Nelson and Thompson (2005) found that a major barrier to technology integration included concerns about a lack of adequate compensation for faculty to incorporate educational technology for distance courses, followed by a lack of incentives or rewards for these extra measures. Since this study focused on providing distance education, conducting those classes during that time required much more work on behalf of the faculty (Nelson & Thompson, 2005).

Previous research conducted by Stewert et al. (2013) among preservice and in-service teachers has identified a philosophical difference that should be brought to attention. They identified that while current educators saw the value of integrating technology to assist student

learning, student teachers perceived technology as an opportunity to assist with their poor classroom management (Stewart et al., 2013). Ball et al. (2007) conducted focus groups of 16 student teachers and 15 cooperative teachers. In this study, they mentioned that the uncertainty of technology was an issue that required them to adapt in unexpected ways.

Within agricultural education, content-specific technologies have been called upon to evaluate preservice teachers' future use of agriculture technologies in instruction (Burrows et al., 2021). For example, Kleinjan (2020) found that in-service SBAE teachers show a higher level of technology self-efficacy when they have received over 20 hours of professional development. Professional development was typically introduced to the in-service SBAE teachers from their professional organizations (Kleinjan, 2020). Previous research conducted by Stewart et al. (2013) among preservice and inservice teachers has identified a philosophical difference that should be brought to attention. They identified that while current educators saw the value of integrating technology to assist student learning, student teachers perceived technology as an opportunity to assist with their poor classroom management (Stewart et al., 2013). Additionally, adaption to technology challenges has been identified as a barrier to successful integration. Ball et al. (2007) conducted focus groups of 16 student teachers and 15 cooperative teachers. From this study, they identified that the uncertainty of technology was an issue that required them to adapt in unexpected ways.

2.7 Summary

The literature review encompasses two main theoretical frameworks used to describe the use of technology in education: the Unified Theory of Acceptance and Usage of Technology (UTAUT) and Technological, Pedagogical, and Content Knowledge (TPACK), which provides a lens to understand how preservice teachers utilize and potentially adopt various classroom

technologies. Phenomenology was discussed through two mainstream philosophical beliefs, including the lens of Husserl and Heidegger, which are foundational in developing the qualitative research tradition. The National Education Technology Plan (NETP) provides context to the current state of technology in education. The review addresses teacher preparation programs, highlighting how they prepare preservice teachers for technology integration within their program. Research on teacher educators has also been covered, as preservice teachers are instrumental in understanding the phenomenon. Understanding these frameworks and backgrounds is essential to understanding how preservice educators are being prepared to enhance teaching and learning practices in the digital age.

Chapter 3 Methodology

3.1 Chapter Overview

This chapter provides insight into the methodological considerations used to answer the research question. First, the research design and rationale are discussed. Next, the sample and sampling method and recruitment strategies are identified. Instrumentation, as well as the role of the researcher, is considered. Then, the researcher describes the data collection procedures, including the interview protocol, IRB approval, and data management practices. Following data collection is the process by which the data will be analyzed. Finally, trustworthiness, credibility, ethical considerations, and assumptions are addressed in this section.

3.2 Problem Statement

The problem that serves as the focus of this study is the lack of technology preparation for preservice teachers during their teacher education programs (Short et al., 2021). The most recent guidance for teacher preparation programs comes from the Department of Education Office of Educational Technology, which outlines guiding principles to prepare preservice teachers (OET, 2017). More recent guidance, including the 2024 National Educational Technology Plan (NETP), has suggested “teachers need to experience these new instructional

models as learners through…..teacher preparation programs" (USDOET, 2024, p. 23). There is still debate on the best methods for teacher education programs to adopt to prepare preservice teachers to integrate technology in the classroom (Nelson & Voithofer, 2022), as preservice teachers do not possess the ability to adequately integrate technology into the classroom without the assistance of their teacher education program (Dincer, 2018). A meta-analysis by Wilson et al. (2020) found that when preservice teachers complete one technology integration course, it has a large effect on their technological knowledge (TK). Additionally, the ability of the teacher educator to integrate technology in the classroom is impactful on preservice teacher technology beliefs and adoption (Li et al., 2016). Research in School-Based Agricultural Education (SBAE) has lacked investigations of preservice teachers' experiences with technology integration during their time in their teacher education program. Morey et al. (2023) have identified the need to develop technologically competent SBAE teachers, but there is a lack of evidence that identifies specifically how to prepare them.

3.3 Purpose Statement

The purpose of this qualitative phenomenology is to investigate the technology-related experiences of preservice School-Based Agricultural Education (SBAE) teachers in their teacher education programs. While research has examined the experiences of preservice teachers during their teacher education program, many omit considering technology's impact on teaching and learning in agricultural education. Specifically, this study explores the coursework, field experiences, and practical application of preservice teachers integrating technology during their student teaching semester.

3.4 Research Question

This investigation involves the student teaching experience of preservice teachers. This qualitative transcendental phenomenology addresses one main research question with three sub-questions to explore the beliefs about knowledge of technology in education as they prepare for their future career in education.

How do School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology into their teaching and learning?

Sub Questions:

- What are the experiences of preservice SBAE teachers during their student teaching practicum?
- How do preservice teachers use technology to address responsibilities outside of teaching?
- How do preservice teachers implement educational technology as a tool to promote learning?

3.5 Paradigm, Ontology and Epistemology

Research paradigms allow for various worldviews to be considered. They are a vital aspect of social inquiry because they provide a lens the researcher uses to guide their study (Creswell & Creswell, 2023). A constructivist worldview was adopted to explore the epistemological belief systems of preservice teachers. As constructivist paradigms derive from a relativist ontology, which recognizes multiple realities within the research participant group (Denzin & Lincoln, 2018), this study focuses on the varied experiences of preservice SBAE

teachers as they integrate teaching and learning. *Ontology*, defined as the nature of reality, addresses how preservice teachers choose to integrate technology within their educational contexts and how this shapes their pedagogical practice (Guarino et al., 2009). Multiple realities are present among preservice teachers, and many factors have been known to impact their epistemological beliefs. When multiple realities exist, there is a need to differentiate how knowledge is drawn upon through the framework of epistemological belief systems (Bahari, 2010).

The question of epistemology seeks to discover the nature of truth and knowledge. Being able to identify the epistemological foundations of others requires researchers to study the context in which participants fully understand what they are saying (Creswell & Poth, 2018). The role of the researcher is critical to understanding how our epistemological beliefs are placed beside the participants in which we are extracting knowledge (Leavy, 2022). Crotty (1998) identified objectivism, constructionism, and subjectivism as the foundational forms of epistemologies that decide the potential for legitimacy in knowledge. Following the research paradigm of constructivism, the researcher adopts a subjectivist epistemological perspective (Leavy, 2022, p. 13). Considering personal experiences with phenomena, it aims to derive the essence of the experiences of individuals. Notably, transcendental phenomenology researchers typically have held a subjective epistemological lens (Luft, 2011).

Constructivism and subjectivism have many similar tenants. This research used constructivism but included definitions of subjectivism because of the individual experience the participants have, which comes from the same belief of multiple realities. Subjectivist epistemologies understand knowledge development when subjects (preservice teachers) prescribe meaning to objects (classroom technology) based on perceptions and knowledge

(Crotty, 1998). Similarly, constructivist positions that participants subscribe meaning to experiences of the world as they are a part of the world they are trying to interpret (Crotty, 1998).

3.6 Research Design

3.6.1 Qualitative Inquiry

Social science research has common approaches, including quantitative, qualitative, and mixed methods inquiry (Creswell & Creswell, 2023). Leavy (2022) includes arts-based research and community-based participatory methods to the list of mainstream research approaches. Choosing an appropriate methodological tradition requires researchers to determine the "best means for gaining knowledge of the world" (Denzin & Lincoln, 2018. Pg. 198). It is also critical to consider the philosophical underpinnings of the chosen methodology as it will determine how a researcher gains insight into human experiences. Qualitative research aligns with constructivist and interpretivist worldviews, which require consideration of multiple individuals' subjective realities (Leavy, 2022, p. 13). Qualitative research was chosen for this study because the research questions seek to explore the experiences of preservice teachers during their time in their teacher education program.

Phenomenology was the most appropriate method to answer the research question: What is the experience of preservice teachers with classroom technology during their teacher education program? Phenomenological methods in educational research have employed a variety of strands to investigate human experiences, including transcendental, hermeneutic, and existential phenomenology (Beck, 2021). Further, phenomenology is not only defined by the procedures

and data collection; it also focuses on data analysis, and researchers should make careful decisions in their research design (Moustakas, 1994).

Phenomenological research has commonly been described as having two mainstream methodological underpinnings known as Transcendental and Hermeneutic (Mott & Haddad, 2024). Transcendental was chosen as the approach for this phenomenological study since the researchers' aim was to uncover the individual experiences of the participants (Peoples, 2021). Hermeneutics allows researchers the ability to co-construct knowledge with the participants (Creswell & Poth, 2018). The researcher was aware of their personal biases that may affect the study because of the similar experiences as the participants. Therefore, they chose to isolate experiences which led to further confirmation of the chosen method. Transcendental phenomenology allows the researcher to examine preservice teachers' epistemological belief systems of knowledge related to technology and the participant's subjective realities. Cilesiz (2011) has recommended the use of transcendental phenomenology when investigating the use of educational technology. By employing this approach, the researcher was better able to understand how student teachers perceive, interact with, and choose whether to integrate technology into their instructional decisions.

3.6.2 Researchers Role

Founding philosophers of phenomenology implore the researcher to be free of suppositions before enacting a phenomenological investigation (Moustakas, 1994 p. 28). Phenomenological reduction must be taken on by the researcher in the forms of bracketing and imaginative variation. In this study, the primary researcher kept a journal of the experience as they understood it from their perspective as a former educator, a cooperating teacher for a student teacher, a researcher, and a practitioner.

Transcendental phenomenology seeks to discover epistemology rather than ontological foundations to emphasize the importance of the relationship between the subject's consciousness and the object in question. When determining essentialism in technology, there are many characteristics that require imaginative variation. Technology can be defined as a binary between hardware and software. However, modern technologies such as hardware have evolved to include transportable wearables and provides users with multiple purposes.

Breaking down technology by dimensions can help explain how technology has multiple components that make it one. Hardware is only the shell that mobilizes the internal process which can enhance accessibility. Therefore, the hardware would be considered an essential aspect to determine the capabilities of various technologies for learning. Understanding the value of the technology requires considering the accessibility of its users.

3.6.3 Reflexivity of the Primary Researcher

My bachelor's degree is from a four-year Land Grant University with a School-Based Agricultural Education (SBAE) teacher preparation program. This heavily influenced my perception of the experiences of the participants since we may have had similar experiences. Technology has been a recurring theme throughout my professional career as an educator and technology integration specialist. Within the classroom, I was able to experiment with various technologies within a student-centered model of learning focused on preparing students for careers in the agriculture industry.

During my second year of teaching, COVID-19 changed the way I was able to teach agricultural concepts to students from a suburban area. This increased my interest in learning how emerging technologies can facilitate learning for students in a virtual and in-person setting. My time as an Educational Technology Specialist at Carnegie Mellon University focused on

assisting educators in implementing a Lightboard and the Meta Quest 2, a virtual reality headset for a public speaking course. The combination of these experiences greatly impacted my perspective of technology usage, which framed this study by working as an educator and assisting with the integration of emerging technologies in virtual and in-person learning contexts.

3.7 Participants

3.7.1 Participants

The population of interest for the study was preservice SBAE teachers in four-year teacher education programs. Therefore, preservice SBAE teachers were included because they have direct experience in teacher education programs, as preservice SBAE teachers are expected to complete a student teaching semester during the last year of their teacher education programs. During student teaching, preservice teachers are expected to take on the responsibilities of their cooperating teacher, like taking attendance, submitting lesson plans, and teaching classes daily (Krysher et al., 2012). Since preservice teachers have completed university coursework, they have insight into whether what they have learned is applicable to their student teaching experience. This study was approved by the Virginia Tech Institutional Research Board (IRB).

Educational researchers adopting phenomenological methods must find participants who have meaningful experiences of the phenomena (Beck, 2021). Combining multiple sampling techniques can potentially increase participation in qualitative research (Peoples, 2021). The American Association of Agricultural Education (AAAE) is a professional organization that seeks to assist in developing research in the agricultural education discipline. AAAE is

represented by three regions: Southern, North Central, and Western. The National AAAE website lists 51 Agricultural Education Institutions across 15 states and the University of Puerto Rico in the Southern Region (American Association of Agricultural Education, 2024). First, the researchers collected the email addresses of each of the SBAE Teacher Education Program leaders from the university's websites. From the 51 institutions listed on the AAAE website, the researcher was able to find the information and email 36 programs across the Southern Region (Appendix B). The researcher utilized snowball sampling when they asked the program leaders to submit the names of current student teachers in their programs (Parker et al., 2019). Recruiting from agricultural education institutions in the Southern Region allowed for a homogenous group of participants with similar experiences.

The second recruitment method was through The National Association of Agricultural Educators (NAAE). NAAE offers student membership to preservice SBAE teachers to encourage continued participation in their professional organization. Following IRB approval, NAAE leadership was contacted and asked to provide the names of the preservice teachers enrolled in a post-secondary SBAE teacher education program. A recruitment email was sent to the student members of NAAE to solicit the opportunity to participate in a study regarding their experiences during student teaching. After cross-referencing the names and contact information of the name provided by teacher educators through the AAAE listserv and the NAAE membership information, if a person had yet to be contacted twice, the researcher sent a follow-up email one week after their original email.

3.8 Data Collection

3.8.1 Semi-Structured Interviews

This study aimed to gain insight into preservice teachers' experiences during their student teaching semester. Based on the recruitment methods mentioned above, nine participants from five different teacher education programs decided to participate in the study. The interview protocol is an aspect of the methodological process that requires deep consideration to ask participants questions that are well-developed and may inform the phenomenon. The researcher explored prior literature on teacher education, educational technology, and agricultural education, which were reviewed to develop the *a priori* table (Appendix A). An a priori table gives insight into the logic the researcher used to take literature and formulate research and interview questions for the study (Creswell, 2014). Following each interview, the transcript was analyzed to determine whether a follow-up interview was needed for each participant (Sloan & Bowe, 2014). Two participants responded to the researcher's email regarding conducting follow-up interview.

Moustakas (1994) strongly encourages the use of the Long Interview method when conducting transcendental phenomenology studies. This method indicates the amount of time needed with a participant to derive rich descriptions of their experiences (Moustakas, 1994). In this study, while the long interview methods suggest interviews ranging from one to two hours, some of the participants' interviews only lasted 45 minutes. To enhance the depth of the data from the participant's, semi-structured interviews were employed alongside the Long Interview method. This approach allowed for flexibility in response to participants' answers while guiding the conversation appropriately. As van Manen (1990) notes, the integration of participants' viewpoints is critical in phenomenological inquiry. Additionally, it was beneficial to have the

flexibility to ask questions beyond the original protocol since they would arise during the interview (Charmaz, 2014).

3.8.2 Document Analysis

While some qualitative researchers do not mention combining other data sources in analysis, other researchers have encouraged achieving triangulation when studying lived experiences (Peoples, 2021). Morgan (2022) proposed a model to guide document selection in qualitative research. Authenticity, credibility, representativeness, and meaning were considered when deciding which documents would appropriately answer the research questions (Morgan, 2022). Triangulation was achieved in this study by integrating two additional data sources using document analysis (Denzin & Lincoln, 2018).

Document analysis prescribed by Gorichanaz and Latham (2016) uses a phenomenological perspective in the analysis by placing the document as an instrumental object within the phenomenon of interest. In this study, each participant was asked to provide any course syllabi for courses they had taken in their teacher preparation, as well as the lesson plans, they developed prior to and during student teaching. Overall, the nine participants of the study shared a total of 29 lesson plans and 26 course syllabi. Preservice SBAE teachers must take courses on curriculum, teaching methods, and pedagogy to prepare them to deliver classroom instruction. Collecting the syllabus from these courses highlighted what knowledge the participants may have developed before entering student teaching. In addition to the course syllabi, lesson plans serve as a source of information to understand preservice teachers' TPACK competence (Schmidt et al., 2021). Preservice teachers are typically expected to submit some variation of a lesson plan to either their cooperating teacher or university supervisor. Insight into

these two sets of documents helps identify how information regarding technology is taught and documents ways they planned to use technology in their lessons.

3.8.3 Memoing

Memoing is a common data collection tool used in many qualitative research methods, including grounded theory and phenomenology (Clarke, 2005). Organizing one's beliefs prior to any investigation has been suggested among researchers as a method of strengthening researcher awareness of bias (Saldana & Omasta, 2016). Memoing during the interviews or observations of artifacts acquired from the research participants were further analyzed later during the study (Miles et al., 2014). Additionally, memoing was described by Creswell and Poth (2018) as an additional source of data to support the theoretical position of a study by reflecting and connecting prior behavior and experiences.

In addition to memoing before and after the interviews were conducted, the researchers also kept memos throughout the entire data collection and analysis process. After each interview, I would document memos of any immediate thoughts, noteworthy quotes from the participants, or questions that arose during the interview. From the data collection, memos were also created based on the themes that would emerge from the course syllabi as well as the lesson plans from the participants. These memos included reflecting on emerging themes, a record of challenges throughout the study or how the experiences connected the participants together. Memoing was prevalent during data collection as the participants' experiences

3.9 Data Analysis

The central problem under investigation for this study is the inability of preservice teachers to effectively use technology in the classroom. Specifically, this study seeks to explore

the experiences of preservice SBAE teachers during their student teaching semester. While interviews serve as a critical data collection point to help describe the participants' current experience, relevant documents were included in the analysis (Bowen, 2009). This section will describe the data preparation procedures, data analysis procedures, data management, and trustworthiness criteria.

Data was collected from interview transcripts, the collection of documents including course syllabi from the participants, and lesson plans they created and/or implemented during their teacher education program. Following the conclusion of the interview, the participants were asked to share these documents with the researcher. After transcribing the interviews transcripts were uploaded into Atlas.ti, a common qualitative data analysis (QDA) software. Additionally, the documents collected from the preservice teachers were uploaded into a file on the researcher's computer before analysis.

The researcher utilized inductive open coping to analyze the data from the transcripts and the documents provided by the participants (Miles et al., 2020). Open coding allowed the researcher to develop their own sense classification when analyzing the data in a study. By employing open coding, the researcher was able to break down the qualitative data into smaller, manageable segments and assign different labels to help capture the essence of the participants' experiences. During open coding, the researcher maintained open to any theme that may have come from the multiple data sources rather than being constrained. The open coding process is iterative, which requires continuous refining of codes to ensure they reflect the content presented in the data. After open coding, the researcher thematically organized the codes.

Clarke and Braun (2014) six-phase process for thematic analysis includes (1) Familiarizing yourself with the data, (2) Developing initial codes, (3) Discover themes, (4)

Review potential themes, (5) Define and name themes, and (6) Disseminate findings. This process was followed for each lesson plan, syllabus, and interview transcript provided by the participants. Bowen (2009) posits integrating content analysis and thematic analysis to analyze documents in a qualitative study. While content analysis organizes data into categories related to the research questions, thematic analysis is a recursive process that provides the researcher with flexibility with the documents in the study (Braun & Clarke, 2006). Analyzing lesson plans and syllabi is unique because they possess much subjectivity. Maintaining flexibility in thematic analysis provided a practical way to analyze these documents (Morgan, 2022). With verbatim examples from the transcripts, the researcher created individual textural descriptions for each participant. Creating individual textural descriptions of the participants allowed for the diverse experiences of each of the preservice teachers to be highlighted and given equal credibility.

3.10 Data Management and Security

Data management requires the researcher to consider how the participants' privacy is respected throughout the study. The researcher was responsible for preparing interview transcripts for data analysis by removing all identifying information of the participants. Each participant was given a pseudonym, and the names of any person(s) mentioned during the interview were changed. The transcripts were stored on the researcher's password-protected computer. Also, all communication between the researcher and the participants was conducted on a private email account handled by the university.

3.11 Trustworthiness, Credibility, Reliability, and Transferability

Lincoln and Guba (1985) provide guidance for researchers who seek to explain how their research findings are worthy of attention. They developed four criteria for trustworthiness, which can be understood to be comparable to quantitative validity and reliability. In qualitative

research, trustworthiness is defined by four criteria, namely, credibility, transferability, and dependability. Since qualitative research has always been in question among quantitative researchers, it is vital for them to state how they maintain rigor in their research processes (Beck, 2021). While Lincoln and Guba (1989) would reject their original proposition of using trustworthiness criteria, it is still common among mainstream qualitative research.

Merriam and Tisdell (2015) define credibility as the internal validity of quantitative research. Member checking was used for credibility by understanding that participants' experiences are under investigation in transcendental phenomenology (Moustakas, 1994). After the final data collection point of the study, the researcher presented the participants with the findings to ensure they believe their experiences were captured appropriately (Creswell & Creswell, 2023). Simply providing transcripts to the participants is not enough because the participants will have nothing against which to compare their understanding. Therefore, after the data was analyzed, the researcher contacted the participants again by providing the clean transcripts with their individual textural descriptions.

Transferability in qualitative research accounts for the potential of external validity, which explores the ability to apply the study in other contexts (Creswell & Creswell, 2023). Lincoln & Guba (1985) implore researchers to develop rich descriptions to provide transferability. Data saturation is a process used to ensure transferability within phenomenology as well. Phenomenological descriptions should account for the phenomenon's experiences and the study participants (Beck, 2021). While this study focuses on preservice SBAE teachers, this study could also be applied to other contexts since student teachers are all exposed to and will have to utilize technology.

Beck (2021, p. 118) states, “You cannot have credibility without dependability”. Patton (2014) describes dependability as a method to provide a logical sequence of the research process. Since replicating qualitative research is often impossible, dependability is defined as the consistency between the data provided by the participants and the findings derived by the researchers (Merriam & Tisdell, 2015). Since phenomenology seeks to understand the experiences of participants, having textual descriptions allows for the dependability of the results (Moustakas, 1994).

3.12 Summary

The methods chapter of this research study outlines the research design, sampling techniques, data collection procedures, and data analysis process employed in this study. It adopts a constructivist paradigm to explore the participants' subjective realities through a transcendental phenomenological methodology. The research question explores the lived experiences of preservice SBAE teachers during their student teaching semester with technology in the classroom. Also, sub-questions are provided to address specific aspects of the phenomenon, like curriculum development, professional responsibilities outside of teaching, and how to best utilize technology to enhance student learning. The population of interest was current preservice SBAE teachers in their student teaching semester who the researchers believe to have used technology in the classroom. The researcher’s role, reflexivity, and trustworthiness criteria are explained to provide readers with an understanding of the entire study.

Chapter 4 Results

4.1 Chapter Overview

Chapter four presents the findings from the data provided by the participants. The findings emerged after completing a thematic analysis of all data sources collected during the study. This chapter will introduce the participants with individual descriptions to better understand their perspectives through the themes. Following the participant introductions, five themes have emerged from the data, and the findings are presented. Relevant experiences from the participants were described with quotes to provide evidence. The themes from this study include *Teacher Education Programs, Support & Expectations, Succession of Technology Integration, Technology Strategies for Teaching and Learning, and Technology Challenges During Student Teaching.*

4.2 Problem Statement

The problem that serves as the focus of this study is the lack of technology preparation for preservice teachers during their teacher education programs (Short et al., 2021). The most recent guidance for teacher preparation programs comes from the Department of Education Office of Educational Technology, which outlines guiding principles to prepare preservice teachers (OET, 2017). More recent guidance, including the 2024 National Educational Technology Plan (NETP), has suggested "teachers need to experience these new instructional models as learners through…..teacher preparation programs" (USDOET, 2024, p. 23). There is still debate on the best methods for teacher education programs to adopt to prepare preservice teachers to integrate technology in the classroom (Nelson & Voithofer, 2022) as preservice

teachers do not possess the ability to adequately integrate technology into the classroom without the assistance of their teacher education program (Dincer, 2018). A meta-analysis by Wilson et al. (2020) found that when preservice teachers complete one technology integration course, it has a large effect on their technological knowledge (TK). Additionally, the ability of the teacher educator to integrate technology in the classroom is impactful on preservice teacher technology beliefs and adoption (Li et al., 2016). Research in School-Based Agricultural Education (SBAE) has lacked investigations of preservice teachers' experiences with technology integration during their time in their teacher education program. Morey et al. (2023) have identified the need to develop technologically competent SBAE teachers, but there is a lack of evidence that identifies specifically how to prepare them.

4.3 Purpose Statement

The purpose of this qualitative phenomenology is to investigate the technology-related experiences of preservice School-Based Agricultural Education (SBAE) teachers in their teacher education programs. While research has examined the experiences of preservice teachers during their teacher education program, many omit considering technology's impact on teaching and learning in agricultural education. Specifically, this study explores the coursework, field experiences, and practical application of preservice teachers integrating technology during their student teaching semester.

4.4 Research Questions

This investigation involves the student teaching experience of preservice teachers. This qualitative transcendental phenomenology addresses one main research question with three sub-

questions to explore the beliefs about knowledge of technology in education as they prepare for their future career in education.

How do School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology into their teaching and learning?

Sub Questions:

- What are the experiences of preservice SBAE teachers during their student teaching practicum?
- How do preservice teachers use technology to address responsibilities outside of teaching?
- How do preservice teachers implement educational technology as a tool to promote learning?

4.5 Descriptions of Participants

Naomi

Naomi's student teaching placement was at a rural high school with an enrollment of 1200 students. Naomi had a sudden change in her student teaching experience when her cooperating teacher notified her that she would be required to teach from a rolling cart and a plastic container to store materials they may need in each class. Naomi was a part of a school that provided students with one-to-one technology expectations. Following the COVID-19 pandemic, many schools started providing each student with a personal laptop device used for school-related work. She found herself using technology every day in her classroom, which was also required under the expectations of her cooperating teacher. This change was a challenge

from the first day of student teaching, and it would impact Naomi's experience throughout the entire semester.

She would be responsible for teaching Animal Science, Veterinary Science, and Greenhouse Management courses. Two of the courses' curricula were specifically designed to only incorporate ICEV certifications, which required Naomi to deliver only certain content in a specific way through a digital platform. These were courses that she dreaded teaching because of the required structure set by the cooperating teacher. She believed the students in that class could better understand the material when technology was not the focus.

Mia

Mia was assigned a cooperating teacher who divided their time between teaching middle school and high school classes. Mia's student teaching semester provided great insight into her idea of a "technologically balanced classroom." Mia was able to visit her cooperating teacher the semester prior, and it introduced her to the upcoming expectations of her student teaching program. Both schools Mia taught at adhered to a one-to-one technology policy. However, Mia found a need to ensure that her students in middle school had the opportunity to engage in hands-on lessons to break the technology-driven school routine they were used to.

While there were many types of technology Mia used during student teaching, she found several challenges when trying to develop her personal routine. Mia's teacher preparation program provided a course designed to teach digital applications and technologies at the beginning of her program. While the course had much to offer, it lacked critical aspects that she believed would have been beneficial to integrate during her time in college. She also mentioned that the experiences during her teaching methods courses were beneficial, but practical implementations would have been better, in her opinion.

Taylor

Taylor's student teaching placement was at a two-teacher high school agriculture program in a suburban setting. While Taylor was assigned to one teacher, there would be many opportunities to visit and learn from the other agriculture teacher. Having two perspectives provided great insight into various technology management strategies that have molded her perception of how she would like to integrate technology in her future classroom. Her student teaching placement did not have a technology restriction policy, but her cooperating teacher did, which was helpful when considering classroom management. However, Taylor enjoys using digital platforms where students are expected to create deliverables like Canva and TikTok. She hopes to carry these ideas into her future classroom. Taylor's limited exposure to educational technology from her teacher educators was an area she mentioned would be helpful to integrate for others. She suggested displaying various platforms on one type of device and encouraging practice with technologies alongside their coursework in their teacher preparation programs.

Lilly

Lilly's student teaching placement was not far from her hometown, but she felt as though she were in a much different place. Much of Lilly's decision regarding classroom technology integration centered around guidance from her cooperating teacher and the behavior of the students. Her cooperating teacher was supportive of trying new and innovative tools in the classroom and Lilly found it beneficial to have meetings discussing how she planned to use this tool in practice. Lilly faced many challenges in the classroom that led to her decision to limit student usage. This would become a factor Lilly says will help shape her future classroom decisions, as she plans to start teaching this upcoming year.

Macy

Macy was able to be in a two-teacher agriculture program, which offered another perspective on teaching methods and practices. The high school is in a suburban area outside of a metropolitan city. With the community continually being developed to attract more people to move into the area, Macy could see her classes grow during her student teaching semester. Students continuously being added to Macy's class is what led her to introduce expectations early in her semester. Along with her classroom expectations, the school's zero phone policy pushed her desire to create an engaging classroom for her students.

Macy did not have many technology-related issues, and when she did, she could even ask some of the students for help. They became so used to being on their computer that she eventually realized that while they may not be on task on their computers, they are acting like they are. Her students were used to computers and felt comfortable, which was why she wanted to deter them from technology. Any time classroom instruction was facilitated with technology, the students felt they were never absorbing the material being given to them. Macy's student teaching experience gave insight into the benefits associated with technology integration, but she wants to ensure that she prioritizes balancing technology in her future classroom.

Sabrina

Sabrina's experience with technology during student teaching was driven by the guidance given to her by her cooperating teacher. Students in her cooperating teacher's class were accustomed to his specific utilizations of technology for learning. Sabrina was surprised by the students' ability to navigate a Chromebook with such ease. There were days when she did not need to give students directions because they were able to navigate for themselves. Over time, Sabrina was required to adapt her practice to keep the students actively engaged.

Lana

Lana was given complete freedom by her cooperating teacher to try integrating technology into her lessons. Lana helped him navigate many of the technologies currently in place at the school, which he had not fully utilized. Luckily, Lana was able to receive help from another agriculture teacher who also had a student teacher from the same university. This duality between instructors made it difficult for Lana to navigate on her own, but as a positive result, she was able to seize this moment and turn it into an opportunity for self-guided learning. She was able to develop lessons that used artificial intelligence. Lana mentions having experiences early on in her teacher education program that influenced her technology integration. Despite her success with some types of educational technology, issues with student cell phone usage persisted as she transitioned into a teaching position this year. She will give careful consideration to these issues.

Cassandra

Cassandra's transition to a second student teaching location during the semester illuminated the stark differences technology can have on student behavior. At her first school, she found it challenging to get students off their phones. Cassandra's second student teaching site had a strict policy banning students from using their phones during class. In addition to the strict phone policy, her cooperating teacher was very helpful and encouraged using various platforms, including the Smart Board. Prior to student teaching, Cassandra suffered challenges integrating technology as a replacement for traditional paper assignments.

Isla

Isla felt the monotony after going through PowerPoints and primarily advancing slides and reading the students' materials. To Isla, education appeared to be little more than entertainment for her students. When comparing it to real-world expectations, she was surprised

at how few students had the ability to create something as simple as a coherent email. Isla found that she needed to instruct students on how to access certain websites and platforms, or they wouldn't be able to do it. Her cooperating teacher did not utilize digital learning management systems, which were difficult to navigate because the school prioritized digital over paper copies.

Table 1

Demographic Data of the Participants

Pseudonym	Gender	Post Graduation Plans
Cassandra	Female	Teach Agriculture
Isla	Female	Attend Graduate School
Lana	Female	Teach Agriculture
Lilly	Female	Teach Agriculture
Macy	Female	Teach Agriculture
Mia	Female	Teach Agriculture
Naomi	Female	Attend Graduate School
Sabrina	Female	Teach Agriculture
Taylor	Female	Teach Agriculture

4.6 Theme 1: Teacher Education Programs

The first theme, *Teacher Education Programs*, describes the influences of the former student teachers' experience in their teacher education programs. Since each of the participants was enrolled in a four-year institution, there were inevitable similarities between the experiences across programs. This theme was divided into three sub-themes: Teacher Educator Technology Usage, Preservice Teacher Needs, and Technology Experiences During Their Program.

4.6.1 Teacher Educator Technology Usage

The participants were asked by their college professors to describe the usage of educational technology. According to the participants, each of their professors barely utilized

educational technology that mirrored what the student teachers were using in their practicum classrooms. When asked about how her teacher educators utilize technology in the classroom, Macy shares this insight into her experience:

> I feel like they were very well-versed, but at the same time, we didn't get that much experience with them. It mostly was just PowerPoints that they went through, but they didn't use hardly any of the websites that we would use within our high school classrooms or anything like that.

However, Macy did share that she found some of the tools she utilized to be very beneficial:

> The biggest thing that we would use is a Google document by QR code for access…that was always the biggest thing other than AET, obviously. But that was just like the maximum amount of technology that we would be exposed to.

Isla's experience was much like Macy's: her teacher educators would utilize tools in their classrooms to discuss with the preservice teachers. While she did make mention the attempts her professors made to integrate technology, it was never in greater depth other than simply asking them if the preservice teachers enjoyed using technology. Isla stated that her usage was very low:

> It was probably almost every lecture was like a PowerPoint, but usually they tried to kind of split it up like we would do in the classroom and do, like, an activity that went along with something we did. I remember doing like the word cloud things…So, I would say they did it [used technology] pretty well…using it more along the lines to answer a question or use it in our class or in our lecture during class, and then they would be like did y'all like that. This can also be something that you use in your classroom during student teaching.

Sabrina also felt similarly, and she even mentioned that the expectations of the professors were not aligned with how they themselves were teaching. Sabrina shared, "I think it was very little. I think it could have been more, considering where we're at, and the expectations they had did not align with how they were trying to teach." This point was also reflected by Mia, who experienced professors who were not able to meet the demands of the Learning Management

System (LMS) they were using in their course. The course syllabi provided by Mia had a section elucidating the use of an LMS, which did not meet the reality as experienced during the course.

Taylor's sentiment towards her teacher educator's technology usage mirrors that of the other participants. Taylor states, "They [her teacher education professor] only used PowerPoint or Canvas. Really, that's it. Not many other resources were used. They mainly lectured most of the time."

4.6.2 Preservice Teacher Needs

Participants were asked: "Since going through student teaching, what do you believe your teacher education program could have done to better prepare you to integrate technology in the classroom?" Many of the participants shared a need for a more thorough demonstration that could be applied to real-world scenarios. For example, the participants described a desire for better modeling strategies to be demonstrated so they have ample materials with which to help integrate technologies into their lessons.

From the course syllabi collected, there was no explicit use of technology by the teacher educators but there were lectures/class topics on "Teaching with Technology". Another course syllabi dedicated a section of their class to discuss how you could use "Technology in Delivering the Message". There would be discussions of technology but there would often not be any explicit usage of technology during the courses they taken.

Macy describes that the way she was taught during college does not reflect how she taught as an agriculture teacher during student teaching. Therefore, she felt a disconnect between her own education and the education she was giving her students:

> So, I feel like maybe a little more demonstration ...would really be beneficial because, like I mentioned earlier, a lot of the times it was lecture, or we have big Post-It notes that we would put up on the walls around the classroom and that would be the activity. And so I feel like a lot more demonstration of how technology should be used, or maybe how it shouldn't be used in the classroom would be really helpful.

Lana agrees with Macy that it would have been helpful to include demonstrations by their teacher education professors to help conceptualize how to integrate modern technologies in their classrooms. Lana shares:

> I think if they would have made it a lot more palatable for us and kind of easy to replicate when they asked us to do the technology listing because we would have already seen it and seen it done somewhat effectively and how it worked for them. They tell us to just try it on our own and put our own flair on it.

Lilly discussed how it would be beneficial to have a course on how to use these tools even for herself since she did not have any prior technology education courses before college:

> If we had a simple class of just how to use Windows or how to use Google, how to use anything like that, just the basics, it would make a world of difference for well for me I'll say if on a personal note it would for me I didn't get much technology education prior to college and college didn't offer that.

Sabrina discusses that she would have liked to have seen assignments in her teaching methods course extend beyond the typical methods of technology integration icon in her courses. She also would have liked to see her professors live up to the expectations they were requiring of their students:

> Their technology usage and what they expected of us in our classes was very little. I think it could have been more considering where we're at [in our teacher education program] and the expectations they had did not align with how they were trying to teach… other times they told us we needed to be technologically literate, but to be honest, neither of our professors are advanced in technology themselves enough to teach us the modern advances.

In addition to being exposed to technology needed for instruction, participants needed experience using technology for their roles as FFA advisors. Another need demonstrated by the

student teachers would be the use of technologies like the Agricultural Experience Tracker (AET), that many Agricultural Education programs are required to use. Lana describes her use of AET during student teaching to be relevant nearly every day in some classes. Lana shared the following sentiment relating the frequency in which she used AET, “They also used AET quite a lot to update their SAE, supervised agricultural experience, hours. We have affiliated membership at...so every week on Thursdays, we update SAE hours for all the students that were in our classes”.

Taylor shared a similar sentiment and found AET to be very beneficial for her day-to-day life as a student teacher. She received assistance from her cooperating teacher on how to integrate AET into a component of a lesson and she stated, “Every day I did a question of the day. The students would log into AET and log [their response] in a journal that would also be graded.” Later in the interview she was asked, “Now, having gone through student teaching, what are things you wish your teacher education program would have introduced to you?” Taylor shared, “I really wish we would have had a run-through of AET because, during student teaching, I didn't get a ton of experience with it… I wish there's like a mini crash course”. Taylor also added that this idea could include other types of technologies. She suggested even a comprehensive list would be helpful: “just a list of educational resources we don't have to be taught through on the different types and how they're used but just one that we could possibly use and kind of let us explore them, even that would just be fine.”

4.6.3 Technology Integration Through Teacher Education Program

The participants had various experiences during their teacher education programs that they felt the need to discuss in both a positive and negative regard. Each program had a different

method of integrating educational technology throughout their program. This provided varied experiences for each of the participants. Lana her introductory teaching course as being

Alternatively, a couple of participants did have an educational technology-specific course, but they did not find it to be very beneficial. For example, Mia had a course specifically designed to teach students how to use educational technology. Still, she did not find it to be beneficial because it did not align with the technologies they were using during student teaching:

> I didn't find it all that useful to be honest. They could definitely do other things to help with that, especially because they were very Apple-software - heavy and very Microsoft Heavy programs and platforms when you don't really use that in schools at all. So that was one thing that I didn't like and like I know like others.

Taylor would echo the sentiment shared by Mia, “So we had an educational technology class and that kind of got us familiar with a lot of apps, not necessarily websites and useful materials.”

Another experience shared among participants was having to create a technology-specific lesson plan or teach a lesson that focused on the use of specific technology. These assignments would typically require preservice teachers to develop a lesson plan where the focus of the lesson was using instructional technology. Sabrina discusses a time when she had to make assignments that required integrating technology:

> They wanted us to do one lesson where we pick a technology and then at the end you discuss it like after your lesson’s over…. This is the technology I used and here is how it's beneficial, and here's how you can access it. That's the only time they really brought it up.

Isla agreed and expanded on the idea to say that there were other lesson plans that required them to incorporate other content areas as well, “You needed to have a lesson plan that included reading, writing, and then one that was technology based.”

Participants reflected on their experiences with educational technology during their interviews. For example, Macy described one of her courses, having a two-week unit intending to impart knowledge on how to implement technology in the classroom.

> We had, I remember for sure, in my methods of teaching last fall, we had an entire two weeks where we specifically talked about ways of implementing technology in your classroom and ways of trying to tell if you needed to implement technology if you needed to kind of fall back on technology.

In this same course, Macy recalls having graduate students who were former educators discuss technology with preservice teachers. Having these experienced educators share resources with their class was very helpful for Macy:

> And so we had some of our doctoral students come in and they had taught for years and they had come in and given us a list of multiple different applications that we could use to benefit. Not, to complete your whole lesson on technology, but ways that could be a good supplement to add in to help with the learning.

Naomi described being visited by current educators who provided lesson plans and gave advice on how to integrate technology in a modern classroom. Naomi discussed agriculture education teachers who visited her teacher education program and shared lessons that she would later use during student teaching, "So we had a couple different speakers and a couple different ag teachers from across the state. I know I used two of his lesson plans while I was student teaching."

4.7 Theme 2: Support and Expectations

Support and Expectations developed as a theme that describes the participants' experiences when deciding how best to integrate technology into their instructional time. This theme mentions how cooperating teachers and others in the school would help student teachers think through practical solutions for their problems. Also, this theme identifies the participants' technology expectations in the classroom and how they have adopted these procedures. Two

subthemes are used to explain this theme: 1) Assistance with technology and 2) Technology Expectations.

4.7.1 Assistance with Technology

When asked about the assistance they were provided when integrating technology into the classroom, the participants each explained how their cooperating teacher was instrumental in helping them integrate technology. The help provided by the cooperating teacher was either very detailed or would not come unless it was prompted by the student teacher. This help would often be in small spur-of-the-moment situations when they needed assistance. Nearly every participant was able to describe a moment. Sabrina discussed how her cooperating teacher was helpful during the first few days of the semester by introducing her to important digital platforms she would be required to operate:

> Everything that I did from Wednesday, Thursday, Friday was on his computer, and he would show me, OK, this is the Google Classroom. I'm going to add you to all of it because you have your school e-mail. Here's how you use it. I want to show you from my computer. So then when you get yours, you can use it and then you know how to use it on mine too.

While the participants had various experiences many believe they will implement technology in similar ways as their cooperating teacher. The student teachers who had cooperating teachers who actively used technology in their classrooms were able to describe specific assistance they were provided. Many cooperating teachers were able to help the student teachers whenever they were in their time of instruction by helping them with simple solutions such as navigating technology like the Promethean boards or the smart boards. They would also consult their cooperating teacher with new ideas they wanted to implement new technology in their lessons.

A few participants shared that their cooperating teacher was not the most technology savvy. As Lana describes, “I very much helped my cooperating teacher as opposed to him helping me”. These instances resulted in these students not having productive feedback and guidance to help develop their teaching practice. Another situation included when the cooperating teacher was not having their Canvas course page developed for their courses. Isla stated, “He didn't even have a canvas page set up for his classes. I was able to find help from his co-teacher. He was more of a hands-on kind of guy”. Isla was able to find assistance from their other agriculture teacher at the school.

The participants also discussed other individuals who were in the school to assist with technology either at the beginning or anytime throughout the semester. This often included either a library media specialist or a specific instructional technology specialist. Librarians and technology specialists in the school were of great assistance during student teaching. They would often assist with resolving technology issues in the classroom. Macy described a situation where they were able to repair a Promethium board in the classroom:

> There was a technology center like our tech specialist and there was two of them and they were phenomenal. We had Promethean boards in the classroom, and we also had a printer in the Ag building and so they would come over and they would help us constantly...they helped us quite often with any technology issue we had.

In addition to helping resolve technology issues, the library media specialist would assist the student teachers with utilizing tools in the library. These included using label machine, laminators or bulletin board tools. Participants also utilized librarians to be guest speakers to help their students with research papers or learn how to utilize tools to improve classroom engagement.

4.7.2 Facilitating Technology Expectations

Finding ways to enforce rules and classroom policies regarding the use of digital technology was a challenge for the student teachers. Since all the schools the student teachers were in had a one-to-one technology policy, it was required that they incorporate technology into their lessons. Lana had an experience where they were highly encouraged to have students use their Chromebooks "because of how much the school had pushed it, being like, we have these Chromebooks for a reason. We want you to be able to use them as much as you all can". This encouragement also stemmed from not having to print materials or purchase any resources. The participants would describe how difficult it was using technology for hands-on activities. Naomi mentions that because of her situation, she had very limited access to any resources:

> The day before I started student teaching, my teacher was required to transition to different classrooms throughout the day. So, we didn't have a lot of materials to use and especially for vet science, I had to kind of come up with things to use cause our whole classroom was put in a Conex container. So uh, it was very easy to fall on technology in that way because everything could just be on a computer.

The expectation to integrate technology was a requirement from the school's perspective. Technology expectations are often teacher dependent. The participants discussed how their cooperating teacher did not have high expectations for the students in the classroom, which would lead to inappropriate technology use on behalf of the students. These expectations were challenging to navigate since the student teachers were required to enforce all the same rules but did not have any idea of what to do if the issues escalated. When the participants were asked how they would position technology in their classroom, they discussed when it's appropriate to use certain technologies in the classroom. They understand the desire of the students to be on the phone because the student teachers share that desire as well. However, they also believe the distractions take away from the learning. Isla shared, "I feel like students do not know how to

use their cellphones without it taking over their attention, and it often stops students from attempting their work."

Since student teaching required the participants to start in the middle of the academic school year for secondary schools, they often had to carry on any procedures and practices that their cooperating teacher instilled. Technology expectations in the classroom now became the responsibility of the student teacher to monitor and reinforce. Maintaining technology expectations was challenging when the new student teachers would step into their new classrooms. Efforts to sustain technology expectations included having to set their own rules for the classroom. Cassandra's expectation was like others but would require the students to stop using their devices if they were caught being off task:

> My expectation was for them to just stay on task and not be doing other things on my computer…I would often warn them and often start having to follow through with what I was saying. If I did catch them continuously doing it...I would take away their computer privileges.

The student teachers would describe the many daily responsibilities in the classroom that were challenging to manage. Additionally, one area of concern for many participants included ensuring students were using technology as directed by the teachers. Many of the cooperating teachers had technology expectations for their students. However, they would not even be able to uphold strict policies for their classrooms. If the cooperating teacher had low expectations for their students, the student teachers would have greater challenges because of the lack of consistency. However, if the school had a strict no cell phone policy, they would often find success reinforcing consequences because of the school policies carried out by the school's administration.

4.8 Theme 3: Succession of Technology Integration

The third theme, *Succession of Technology Integration,* describes the experiences from the participant's perspective from the beginning of their time in student teaching to the end. During their student teaching semester, they developed their pedagogy and learned to experiment with new methods in the classroom with technology. The participants describe how they would experience themselves developing confidence throughout their time in the classroom. This would allow for more experimentation throughout the semester. When allowed to decide whether to use technology or not, they often choose to limit technology usage on behalf of the student. Developing the technological pedagogical knowledge of the preservice teachers was aided by the ability to make decisions on how to integrate them into the classroom.

Several participants described the beginning phases of integrating technology into the classroom as being instrumental to their usage. When the participants were asked what influenced their decision to integrate technology, they described a variety of experiences they often relied on. Many of the preservice teachers went into student teaching relying on the experiences from their teacher education program and how they felt about certain technologies when they were students. Having those past experiences to reflect on was useful, but those technologies would now be considered outdated in the classroom. Additionally, there were resources and conversations that were heavily reflected on to assist with initially deciding how to integrate technology. One subgroup of participants was provided a technology resource bulleted list of websites to explore at their leisure. This was only made evident by two of the participants from that group, who mentioned it was being distributed to them. Microteachings were also reflected on and often led to the participants utilizing those technologies again. However, the way in which the technology was being used was different than before. Mia describes this as

making it only slightly easier the second time she used it. Conversations among other colleagues and peers during their time in their program were discussed as they reflected on their few experiences using technology.

The participants shared that they used the former experiences and knowledge to guide their initial decisions to integrate technology. This often came with success on behalf of the student teacher because they felt confident in using the technology that day for their lesson. However, over time, the success would subside because they would often become over-reliant after finding success in initial integration. Overusing certain technologies could lead to student exhaustion and potentially lead to more passive engagement, as described by the participants. Several of the participants shared how their students would not be engaged with popular technology assessment tools like Kahoot. After not finding success with these tools, the participants went back to the drawing board and often experimented with different technologies they would find. Cassandra describes her process of reflecting on technology while blending in new experiences and opinions of her students.

> I typically rely on experiences and past use and knowledge and saying Oh yeah, I remember doing that. I liked doing that, so I'll use it too and see what everyone thinks about it. And then after I used it, people enjoyed it. So, I was like, well, I'll use it again because we like it.

These are the experiences when the preservice teachers would finally find the balance between teaching and instructional practices. Many of the participants found themselves using various types of teaching methods that still required the use of technology for assessment purposes. Participants described how, as their student teaching practicum semester proceeded, they would become more comfortable and start to rely on new experiences to guide their usage.

They would also discover what was appropriate for different classrooms depending on the content and grade levels they were teaching. Some classes required students to utilize technology in a specific way that prevented the participants from perceiving themselves as successful in those content areas. However, when given the opportunity to choose the method of technology integration, some participants found a balance that aligned with their personal teaching styles. Naomi experienced this feeling in her Greenhouse Technology course:

> In that class, we would do more outside and hands-on lessons. So, I felt it was easier to see the students learning. I would try to get them in small groups and then just have more of a discussion with them and maybe put some pictures on the board.

The end of student teaching is when most of the participants describe their confidence in teaching to rise. When the participants were asked how they would like to implement technology in their future classrooms, many reflected on their student teaching experience. The succession of technology that these participants are expressing will become an integrative process as they still have the desire to integrate emerging technologies.

4.9 Theme 4: Technology Strategies for Teaching and Learning

The fourth theme, *Technology Integration,* illustrates how preservice SBAE teachers chose to utilize technology as a method to aid in their teaching as well as promote student learning. The participants described a wide variety of instructional strategies used during student teaching that they could reflect on. The lesson plans developed by the preservice teachers during their student teaching semester were also present in this theme. Having the lesson plans and the participants recount their experiences allows for this theme to include a variety of methods chosen by the preservice teachers.

Preservice teachers used technology for two daily uses: presentation and assessment. While the lesson plans provided by the participants would state equipment and materials as, "Smartboard, computer, or Powerpoint". The preservice teachers used audio and visual techniques daily during student teaching. Developing PowerPoints and slideshows to aid in the student teachers' lectures included finding relevant graphics, pictures, or videos. Using various digital platforms on the student's device for assessment was a common strategy among the preservice teachers. Popular assessment platforms such as Blooket, Quizlet, and Kahoot were heavily relied on by the preservice teachers. The preservice teachers mention using these instructional tools throughout their lessons; however, this was a common tool used for pre-assessment strategies as well as activities to reinforce learning. Cassandra's lesson plan stated, "For that reason, I made multiple interactive games such as Kahoot, Quizlet, Blooket, and Jeopardy for students to play regularly so that students would feel confident in their answers and attempt to do well on the exam." These tools were perceived as a common and straightforward method of assessing students. When the preservice teachers described their experiences of using technology to assess student learning, they often assessed their ability to identify various types of flowers, crops, animals, and trees. Utilizing these tools was beneficial in providing appropriate strategies for the content knowledge, as mentioned by several of the preservice teachers which was an aspect they struggled with when developing lesson plans.

The participants would utilize technology to have students conduct research and present their findings to the class. This was a strategy employed by many of the preservice teachers because they were using it as a strategy from their cooperating teacher. Mia describes having the students research a disease common in livestock animals and create a poster for their classrooms. This was also a similar strategy utilized by Macy who had to revise assignments and

expectations as she discovered the significant lack of engagement with research projects. From her lesson plans, Macy presented students with a "Research Presentation outline worksheet" on various topics such as Animal Science and Horticulture.

Another technology integration method used during the participants' student teaching semester was the use of technology for self-directed lessons. Having the students pursue independent learning adventures that required the strict use of their personal devices was an instructional strategy employed by the preservice teachers. The participants describe the use of iCEV to guide their entire lesson and limit the amount of instruction given by the teacher. If the student teachers were required to use iCEV, they would often modify the lesson to make it more engaging for the students. Naomi mentions, "iCEV gives you assignments and projects you have your students do, but I tried to take those and kind of manipulate them to make them more engaging." From Naomi's lesson plan, iCEV was a consistent technology that would be listed, and she would use this platform for direct instruction purposes.

The preservice teachers described their process of balancing hands-on learning during student teaching. While several of the preservice teachers were afforded the opportunity to have many resources available during student teaching, others were required to find innovative ways to utilize technology in replacement of hands-on learning experiences. Naomi, having limited access to tools to teach Veterinary Science concepts in her classes, required the students in her class to view different tools and techniques online. Similarly, Mia used a simulator to help present how to conduct electrical wiring prior to experimenting with the equipment.

Learning Management Systems (LMS) are commonly used by every preservice teacher. The participants used Google Classroom, Canvas, and Schoology to aid in delivering instruction to their students. This was a common responsibility the student teachers used daily. While the

preservice teachers mentioned using LMS themselves in college, they believe this was an aspect their teacher education program should incorporate. Having the experience of using an LMS during student teaching was mentioned as clarifying the methods for instruction and providing opportunities for their students. Sabrina describes her experience using Google Classroom:

> Every student had their own Computer and then they would use it based on what we were doing for the assignment. So, if there was something posted on Google Classroom, they would access that, click the link, go to wherever they needed to go to, to complete it. It might have been an instruction sheet or a guided note. Or a reading or a video link, whatever they had access to. All the material that I was showing them so they could look at it later and then they would use that too. But most of the time, I mean, it was immediate. Get your computer out. Open it. Read what's on Google Classroom and start or canvas.

When the participants were asked if they had experience integrating new technologies in the classroom that they were not accustomed to, they recounted several experiences. For example, Artificial Intelligence (AI) was utilized by the participants for a variety of reasons. Lesson planning assistance provided by AI helped them develop many instructional materials while saving a lot of time for the student teachers. Sabrina describes her uses for AI, "I often used it [AI] for worksheets and to generate rubrics for assignments." AI was also utilized to help student teachers take on their FFA advisor responsibilities to help students develop speeches for upcoming competitions or chapter-wide events.

4.10 Theme 5: Technology Challenges During Student Teaching

The fifth theme, Challenges with Technology Integration, describes the participants' struggles with technology integration in the classroom. A few of the participants shared similar experiences that provided the necessary evidence to include this as a stand-alone theme. The issues included students, the physical technology in the classroom, and even concerns the student

teachers expressed for which they would like to hopefully find solutions. These issues also include challenges with classroom technology management.

Since students are equipped with technology at their fingertips, there is a challenge with technology in the classroom. Cell phones are an issue and will continue to be until policies driven by educational leaders limit their usage. When the student teachers were asked to describe how they manage technology in the classroom, their main challenges were with physical devices since students have advanced technologies like cell phones, wireless headphones, and smartwatches. The student teachers would have to do a check of their students at the door. Taylor recalls having to make sure they were not hiding wireless headphones underneath their hair or hats:

> Most of the time it was Air pods that the struggle was kids would hide it underneath their hair. So, a lot of times when they walk in the classroom, I'd make them pull their hair back just so I can make sure. And they're like, I promise they're not there.

The student teachers faced a variety of challenges during their practicum semester. Many of the challenges can be described as classroom technology management. This aspect of their experience was described by exploring how technology had an impact of the student teacher's ability to conduct classroom instruction. Managing the one-to-one classroom requires certain skills as opposed to the traditional classroom. Overall, the participants described many challenges students face using technology in their classrooms during their practicum. For example, from the lesson plan and reflection provided by Isla, she states, "There were issues when running the Jeopardy game through the main screen, but we ended up just using Blooket (an activity they had done before) a couple more times." The experiences were very similar across the student teaching group as they had to manage nearly identical situations. The

challenges required extra time from the student's teacher's attention and class time that would take away from instructional time. This disruption was also a concern for the teachers because it would create a more stressful situation for them to work in.

Additionally, students sometimes did not know how to use certain digital platforms. Sabrina stated, "They would always complain about using technology. They would say I don't know how to do this or why can't I just do this on paper". These situations would require the student teacher to hope the student has the digital literacy to complete any assignment given to them. This would continue to take away from the time spent learning the material. An example that was frequently described was the inability of the students to properly compose emails or even submit assignments using their learning management system.

While having technology in the classroom is beneficial for students, it can also distract students from completing their class assignments. This was a constant issue for the student teachers who tried to navigate having students stay engaged throughout the lesson. Most of the issues were uncontrollable because the students were able to pose as though they were on task but would easily be able to do other things on their devices. One lesson plan collected from the participants identified the use of "GoGuardian" to help eradicate the opportunity for students to navigate off topic from their assignments on computers. However, many student teachers found ways to help manage this issue. For example, Macy discussed using external software that would allow her to manage her students' screens to help them stay on task.

Managing the one-to-one classroom requires certain skills as opposed to the traditional classroom and is not a skill someone could master in a semester. The technology was beneficial to the classroom environment because of the affordances they provide. However, the cost comes in the form of ensuring every student has access during class. Students would often arrive at

school without their technology, which would restrict them from being able to be a part of the class that day. Mia states, “They have their devices, but they're not charged, and they must get a charger from the library. And that just takes away from like instructional time from their time”. This would require the student to either borrow a charger or even borrow a device from the library. Sometimes, this would be an easy solution to the problem, but it would sometimes become a distraction and intrude on instructional time. For example, if enough students forgot to bring their device others may not be able to secure one for themselves. Naomi describes a situation that she believes causes an issue among students’ technology usage affecting other students:

> I had a student as he was leaving, he threw his Chromebook out his window with the rest of his schoolwork… that kid never once opened his Chromebook, but he was given a rental every single day…one day I had another student, she forgot hers one day and it was the end of the world I mean, straight A student great kid and would actually use her Chromebook for school. This was challenging

Other experiences that were shared by the student teachers include sporadic internet outages. Not having internet in the classroom disabled any student from accessing any content or information on their personal devices. This would often create anxiety on behalf of the student teachers because they had to reconsider how they were going to provide instruction to their students since their devices were unable to retrieve any information. The student teachers who experienced internet outages would be at a loss of how to navigate this challenge. Since these participants had experienced their first semester in college during the COVID-19 pandemic, they have become accustomed to only learning via technology. They often described challenges in identifying ways to navigate this barrier. However, some student teachers could pivot during an internet outage by moving the lesson to an outside facility like a greenhouse or a shop to continue instruction.

Additionally, another common use of technology by the student teachers was to facilitate student behavior which could impact their lesson design. For example, choosing to have students engage with virtual fields and expert speakers on various topics through videos allowed students exposure to different parts of the agricultural industry; however, Lilly was often discouraged from bringing in outside speakers because of the overwhelming classroom management that would be required:

> I couldn't bring in people. That I knew in the community to come and talk because there was just the kids weren't going to be good enough for that and I didn't want someone to just completely hate being there and Never come back. I would bring some kind of real-world access to the classroom without bringing it and personally to the club or going out. Because we couldn't do field trips.

While AI benefitted the Student Teachers during the lesson creation process, it also provided challenges for the preservice teachers during student teaching. ChatGPT and Bard were common types of AI that were discussed among preservice teachers. They would often find their students copying and pasting information directly from any chatbot they were able to access either on the school internet or on their personal cell phones. This was an opportunity that required the preservice teachers to overcome challenges in their lessons and their assessment strategies.

4.11 Summary

Chapter four provides the results for the qualitative data collected from the participants through their interviews and documents collected. Five themes emerged from the data that describe the experiences of preservice SBAE teachers during their teacher education program. The themes were *Teacher Education Programs, Support & Expectations, Technology Strategies for Teaching and Learning, and Technology Challenges During Student Teaching.* Overall, the

results provide insight into how teacher education programs can best prepare preservice SBAE teachers to integrate technology into the classroom.

Chapter 5 Discussion

5.1 Chapter Overview

The previous chapter displays the results of this study, highlighting major themes that have been analyzed by the data. Chapter 5 will provide a discussion of the findings from this study as they are from the data. Additionally, this chapter will include a discussion of the research questions and findings in relation to broader literature, identify the implications for theory and implications for practice, and provide recommendations for future research. Ultimately, this study addresses a gap in the literature on teacher education programs by

highlighting the experiences of preservice SBAE teachers. This knowledge will be beneficial to teacher educators to assist in preparing preservice teachers to navigate the complex landscape of technology integration in the agricultural education classroom.

5.2 Problem Statement

The problem that serves as the focus of this study is the lack of technology preparation for preservice teachers during their teacher education programs (Short et al., 2021). The most recent guidance for teacher preparation programs comes from the Department of Education Office of Educational Technology, which outlines guiding principles to prepare preservice teachers (OET, 2017). More recent guidance, including the 2024 National Educational Technology Plan (NETP), has suggested, "teachers need to experience these new instructional models as learners through…..teacher preparation programs" (USDOET, 2024, p. 23). There is still debate on the best methods for teacher education programs to adopt to prepare preservice teachers to integrate technology in the classroom (Nelson & Voithofer, 2022) as preservice teachers do not possess the ability to adequately integrate technology into the classroom without the assistance of their teacher education program (Dincer, 2018). A meta-analysis by Wilson et al. (2020) found that when preservice teachers complete one technology integration course, it has a large effect on their technological knowledge (TK). Additionally, the ability of the teacher educator to integrate technology in the classroom is impactful on preservice teacher technology beliefs and adoption (Li et al., 2016). Research in School-Based Agricultural Education (SBAE) has lacked investigations of preservice teachers' experiences with technology integration during their time in their teacher education program. Morey et al. (2023) have identified the need to develop technologically competent SBAE teachers, but there is a lack of evidence that identifies specifically how to prepare them.

5.3 Purpose Statement

The purpose of this qualitative phenomenology is to investigate the technology-related experiences of preservice School-Based Agricultural Education (SBAE) teachers in their teacher education programs. While research has examined the experiences of preservice teachers during their teacher education program, many omit considering technology's impact on teaching and learning in agricultural education. Specifically, this study explores the coursework, field experiences, and practical application of preservice teachers integrating technology during their student teaching semester.

5.4 Discussion of Research Questions

This investigation involves the student teaching experience of preservice teachers. This qualitative transcendental phenomenology addresses one main research question with three sub-questions to explore the beliefs about knowledge of technology in education as they prepare for their future career in education.

How do School-Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology for teaching and learning?

Sub Questions:

- What are the experiences of preservice SBAE teachers during their student teaching practicum?
- How do preservice teachers use technology to address responsibilities outside of teaching?
- How do preservice teachers implement educational technology as a tool to promote learning?

This study was developed around one research question and three sub questions to address the gap in literature on SBAE teacher education programs. Based on the findings, this section will present the themes from chapter 4 in relation to the research questions. Along with the themes, a Table 1 below will assist bridging the results to the discussion of each question.

Table 2

Emerging Themes

Themes	Representative Quotes
Teacher Education Programs	"I remember for sure in my methods of teaching last fall, we had an entire two weeks where specifically talked about ways on implementing technology in your classroom deciding how to integrate technology appropriately".
Support & Expectations	"I would run any technology by her I wanted to use by her. Then, we kind of talked about it before I go and do a lesson with it. She talks me through how to do it." "If I did catch them continuously doing it...I would take away their computer privileges"
Succession of Technology	

Integration	"At first, I didn't know how to do much at all but overtime, I became more familiar. I do think the learning experience was much more complicated than it maybe should have been."
Technology Strategies for Teaching and Learning	"If I did a lecture, I used Nearpod very frequently, not only to have a presentation and kind of do a lecture style. With what I was doing with the content I was teaching, but also allowing students to have active listening skills and kind of answer questions."
Technology Challenges During Student Teaching	"The Wi-Fi went out at both schools like two different times….So I had like 30 minutes to come up with how they're going to take a test that was supposed to be completely on their Chromebook."

Research Question 1: How do School – Based Agricultural Education (SBAE) teacher education programs prepare preservice teachers to integrate technology for teaching and learning?

The preservice teachers that were interviewed in this study come from five different four-year SBAE teacher education programs. The teacher education programs provided the preservice teachers with similar experiences to help develop their ability to integrate technology for teaching and learning. Four themes from the data emerged to aid in answering this research question: *Teacher Education Programs, Support & Expectations, Succession of Technology Integration, and Succession of Technology Integration.* The preservice teachers describe various experiences that attempt to assist in understanding technology's role and potential in the classroom. While there are numerous experiences described by the participants, there are needs not addressed within teacher education programs that were expressed. The findings that

underscore the themes presented in this section explain coursework, teacher educators, peers and mentors, and field experiences.

All the participants recall having experiences throughout their courses in their teacher education program, which incorporated technology for teaching and learning. Technology should be an aspect of teacher education programs focused on preparing students to enter the classroom (Tondeur et al., 2017). However, the experiences were program-dependent and varied from a component of one course or integrated throughout many courses in the program. Participants also discussed how they would have requirements in their courses that would be specific to applying methods of integrating technology into their lesson plans or microteachings. Graded lesson plans would often have a place to indicate what type of technology was being used but never asked how it was being used. This was discussed by the participants as being a passive check-off box they did not have to worry about. The lesson plans provided by the preservice teachers indicated a lack of emphasis on meaningful technology integration. One of the teacher education programs required the preservice teachers to create a specific lesson plan dedicated to technology integration. While this was considered valuable, the preservice teachers were required to identify which technology they would use every time they created a lesson. Another method teacher education programs used was having the preservice teacher conduct microteachings. These often short, mini-lesson style assignments would allow the preservice teachers to exercise their pedagogical strengths and weaknesses in a simulation in front of their peers. The preservice teachers recall having to integrate technology, but it was usually never above a PowerPoint presentation due to the restricted amount of time allowed to conduct the mini-lesson.

Participants also discussed that their teacher preparation programs needed to provide a clear intention of technology integration. This could be attributed to situations where technology

was an afterthought instead of intentional implementation in the teacher education curriculum (Sleeter, 2014). From the participants' experiences and the course syllabi, there were few experiences that required the preservice teachers to intentionally integrate technology. Many requirements included checking off boxes on lesson plans where an acceptable response for technology usage was "computer" or "used PowerPoint for lecture." These shallow descriptions lack insight into how this technology will further the learning in the classroom. The preservice teachers discuss low-quality experiences integrating technology before their student teaching practicum.

The participants identified teacher educators, peers, graduate students, and other SBAE teachers as helpful when learning about technology integration. While many participants described their teacher educators as not using technology for innovative purposes in the classroom, they did have to create units and assignments in classes directed toward topics of technology integration. Many participants recount using specific technologies because of a recommendation by another student in their course who practiced integrating the tool before. Additionally, graduate students would often be former educators and had first-hand experience integrating technology into the classroom. Undergraduate and graduate students were both helpful resources for preservice teachers to help discover emerging technologies that can be used for classroom instruction, when the teacher educators invite outside practitioners to share their experiences with the participants.

During the participants' time in their teacher education program, they were expected to visit current educators' classrooms. Conducting these field experiences were helpful to allow student teachers to conceptualize how technology could be integrated in the classroom. This was

also another opportunity for the preservice teachers to collaborate with current teachers within their discipline.

Previous research suggests that SBAE teacher education programs are not preparing teachers to integrate technology into the classroom. As a result, teacher education programs are not providing the scaffolding required to build technology competency among new and preservice teachers (Voithofer & Nelson, 2021). The participants in the study do not feel prepared to integrate technology in the classroom even if they did have some experience in their teacher education programs.

While the teacher education programs exposed the preservice teachers to technology in the classroom, the preservice teachers still expressed their need for it. For example, the participants stated that their teacher educators rarely utilized educational technology beyond the required learning management system and presentation tools for lectures. Having the pre-service educator's model of how to integrate technology to align with learning objectives in lessons was a need mentioned by the participants that would be helpful for them. Similarly, being provided a list of resources in their methods course was only helpful when they were given the opportunity to practice using the technology.

Overall, the teacher education programs provided the preservice teachers with experiences related to developing their knowledge of technology used for teaching and learning. There were many experiences offered to the preservice teachers, but there is still room for growth as described by the participants. More meaningful implementation on behalf of the teacher educators would allow for a deeper understanding of the technology being used. After going through student teaching, the preservice teachers believed they have a better understanding of what it will require of them when they enter the classroom.

Sub question 1: What are the experiences of preservice SBAE teachers during their student teaching practicum?

The preservice SBAE teachers were able to provide a wide variety of experiences that required the use of technology during their student teaching practicum. To illustrate these experiences, this research question utilized data from four themes: *Support and Expectations, Succession of Technology Integration, Technology Strategies for Teaching and Learning, and Technology Challenges During Student Teaching*. From the data, themes emerged that will tell the stories of technology integration. Describing the experiences of student teaching included learning to adapt and overcome challenges, managing technology in the classroom, and finding support.

Adjusting to the demands of student teaching was required by each participant regardless of their student teaching location. This required learning to adapt and overcome the obstacles set before them. Issues would arise. For example, participants described having internet outages in their school classrooms. This was an issue since technology was a requirement of every lesson. Also, the preservice teachers would spend a lot of time developing their current lessons and often fail to consider backup plans. While the internet outages affected several participants, other events would take place that would cause the others to experience similar feelings of anxiety. As the semester continued, the participants described becoming more comfortable. This comfortability allowed them to start thinking about their practice in the classroom more intentionally.

Another shared experience among the participants was enforcing rules regarding cell phones and technology usage in the classroom. The preservice teachers experienced setting rules

and expectations for their students while they were teaching with various levels of outcomes depending on their placements. The preservice teachers suggested that cooperating teachers who had higher expectations of their students regarding school technology policies had less pushback from students. This was evident as the participants had to relay consequences to students who were not abiding by the school and classroom rules.

The participants identified their cooperating teachers as instrumental in helping them learn how to navigate the requirements for teaching and learning that required the use of technology. At the beginning of their student teaching semester, the participants described being introduced to the instructional requirements that utilized technology. The cooperating teachers would share their Learning Management System (LMS) to allow for the student teacher to take on the responsibilities of the classes they would teach. Additionally, the student teaching site would have either a school technology specialist or a library media specialist who helped with technology. The technology specialist would assist when issues regarding technology in the classroom or digital technologies were an issue. The library media specialist played many roles and was very beneficial to the student teachers, including resource allocation, providing lessons to their students, and helping print and create instructional materials.

Sub question 2: How do preservice teachers use technology to address responsibilities outside of teaching?

This question was addressed through two themes: *Teacher Education Programs and Support & Expectations.* Being an SBAE teacher includes taking on responsibilities for running your school's chapter of the National FFA Organization, and the preservice teachers described taking on these responsibilities during student teaching. Participants whose student teaching locations utilized the Agricultural Experience Tracker (AET) often experienced this

responsibility for the first time. While their cooperating teachers were helpful in demonstrating to the preservice teachers how to use AET, they often mention how it would have been helpful to have had exposure to this during their teacher education program. The participants discussed using the Agricultural Experience Tracker (AET) during student teaching but were often only introduced to the program during their student teaching experience.

Sub question 3: How do preservice teachers implement educational technology as a tool to promote learning?

Preservice teachers are expected to utilize technology for a variety of reasons during their teacher education program. During the early years of their teacher education program, they are expected to act as students learning information from the content area and teaching methods classes. The preservice teachers' reflections on their time in their teacher education program were indicative of which types of technology they used. The participants recount their experiences integrating technology to promote learning throughout the data emerging in two themes *Strategies for Teaching and Learning* and *Succession of Technology Integration*. Data from the participants to explore this research question came from the interviews and lesson plans they provided. The methods chosen by the preservice teachers to integrate technology allow for examining their TPACK ability as well. Participants' overarching use of technology in the classroom to promote learning was directed by their prior knowledge of technology, experiences in their teacher education program, and the guidance of peers and cooperating teachers.

When the participants recalled lessons they taught during their student teaching practicum, each of them discussed various types of technology at different levels. One of the more common methods of technology integration was the use of formative assessment tools like Kahoot, Quizlet, and Blooket. During student teaching, the participants would also use formative assessments to have students identify or recall information previously provided to them. This was often a way to engage students since these tools each included some form of reward for correct answers, which the participants mentioned as a driving force for using those tools.

Using technology to replace paper and pencil assignments and assessments was commonplace at the participants' student teaching locations. Since every placement enforced a one-to-one technology policy, every student would have access to any material distributed by their teacher. Participants described using technology to ensure access for each student, which was helpful when differentiating instruction for students in their classrooms. This practice was often to assist in cutting down the number of resources the school was using.

The participants' knowledge and application of many of the technologies they chose to integrate were from their own experiences or their cooperating teachers. The cooperating teacher was often the largest influence on the usage and adoption of technology. Preservice teachers should be aware of other individuals in schools who assist teachers with classroom instruction. For example, many participants described the assistance of school technology specialists and librarians to assist with technology integration. In addition to resolving technology problems, these individuals also provided guidance for students seeking opportunities to engage their students in research for their classroom. Finding positive technology-related experiences is a critical task among SBAE teacher education programs that should be

The participants were responsible for ensuring proper integration of Learning Management Systems (LMS) throughout the courses they taught. For example, the preservice teachers were responsible for creating and maintaining various online LMS platforms across the participant group, including Google Classroom, Canvas, and Schoology. This was often a task required by students' teachers, and they took on it right before their first days in the classroom. They were also not introduced to this during their teacher education program but were required to maintain and even design these courses during their student teaching practicum.

One of the more common ways technologies were utilized in the classroom was for research and presentations. This strategy was common for all the preservice teachers, but it was not included in the lesson plans collected; instead, it was recalled by memory. Participants mentioned being encouraged by their cooperating teachers to have students conduct research to keep them engaged during the lesson. Whether this strategy was helpful to the students' learning was undetermined.

Preservice teachers have been known to experiment more readily with emerging technologies within a school setting. What was considered emerging technology by the participants included using Artificial Intelligence (AI) for lesson preparation and in-class activities. The participants described using a wide variety of digital AI platforms, such as ChatGPT, Bard, Claude, Magic School AI, and Brisk. AI presented challenges for the teachers who would encounter students using it against academic standards within the school. However, the participants discovered many benefits when AI was integrated into the classroom. For example, using AI to assist by generating PowerPoint presentations, assessments, lesson plans and assignments saved time on behalf of the preservice teachers. Additionally, the participants

believed using AI was beneficial and allowed for more creative lessons when the technology provided a specific purpose outside of a general chatbot feature.

Overall, the preservice teachers had the opportunity to take knowledge from their preservice experiences and apply it in a real-life setting during student teaching. Student teaching provided a chance to experiment with new technologies and consider the impact of their usage. While the participants describe their adjustment period with technology as being a struggle that would eventually fade as the semester continued.

5.6 Implications for Theory

This study was framed using an extended model of the Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh et al., 2003). The extended model utilized TPACK to help explain performance expectancy and effort expectancy among the participants' usage of technology. This study places UTAUT amongst a new discipline, context, and population. UTAUT as a framework was used to understand how teacher education programs prepare preservice teachers to integrate technology into the classroom. The findings from this study offer valuable insight into how this theory can be expanded upon for future usage in research with similar goals.

Performance Expectancy and Effort Expectancy are part of the UTAUT model (Venkatesh et al., 2016). This study explored preservice teachers' experience with technology regarding their integration methods, requiring a focus on preservice SBAE teachers' technological pedagogical knowledge (TPK) (Wilson et al., 2020). Analyzing the preservice teachers' TPACK through lesson plans and experiences helped them understand the current

ability levels with technology. The technology was often not easy to integrate at first when the teachers did not properly research how it could assist teaching and learning in the classroom.

Social Influence was actualized through the assistance of the preservice teacher's cooperating teacher, school technology specialists, and their peers. The findings from the study identified the positive influence of cooperating teachers on the adoption of technology by preservice teachers. Usually, the cooperating teachers would assist in their initial learning of school-specific platforms and programs the preservice teacher would have to use. Additionally, the school technology specialist was very influential in determining the technology usage of the preservice teachers. This finding could extend the theoretical boundaries by encouraging colleagues to share how they utilize technology. Seeking out positive social influences can be crucial when integrating technology for teaching and learning.

The participants' placement sites enforced a one-to-one technology policy, so they had access to technology during student teaching. The administration at the teaching sites insisted on teachers using technology daily in their lessons. Understanding how the facilitating conditions of middle and secondary public schools impact technology integration among teachers would extend UTAUT. Facilitating conditions is a construct that shows the direct usage of technology-dependent the organization under study. An extended model of UTAUT was the framework for this study to understand factors that influence technology integration practices of preservice SBAE teachers.

5.7 Recommendations for Teacher Education

From this study, many findings identify areas of SBAE teacher education programs that should be reconsidered to assist preservice teachers in integrating technology into the classroom. First, SBAE teacher education programs should take a holistic view of preparing preservice

teachers to integrate technology. This could include evaluating the field experiences, microteaching, assignments, student teaching, and other degree-related requirements. Since not all teacher education programs are not required to have technology standards, those that don't should consider adopting and reviewing guidelines by ISTE or the Office of Educational Technology.

Second, teacher educators have been identified as not preparing preservice teachers to integrate technology. Further, teacher educators should consider identifying how they integrate technology into their college courses. Exposing preservice teachers to technology through modeling is a well-documented strategy, which was also suggested by the participants of this study. Preservice teachers should be required to intentionally consider the integration of technology into their lesson plans and micro-teachings and have students integrate technology according to the learning goals or Bloom's Taxonomy to indicate how their technology will assist students in learning concepts. Additionally, teacher preparation programs should consider evaluating the Teacher Educators' Technology Competencies (TETC) by Foulger et al. (2017) and identify how preservice teachers should use similar guidelines to aid in their preparation for student teaching.

The participants described what their teacher education program did to best prepare them for teaching with technology. From the interviews, only one teacher education program actively has a course teaching preservice teachers how to integrate technology. Otherwise, the technology integration would be an assignment or microlesson the preservice teachers were required to teach. SBAE teacher education programs should adopt a model of technology integration such as TPACK to help identify how their content can promote learning among the students (Saubern et al., 2020).

Finding positive technology related experiences is a critical task among SBAE teacher education programs (Nelson & Hawk, 2020). Teacher education programs should partner with school districts in the area to allow teachers to have more exposure to technology in an array of settings. Having this experience prior to student teaching would greatly benefit preservice teachers by observing how educators introduce technology in their classrooms. Participants in this study described the assistance provided by other teachers, even before student teaching, as being integral to understanding technology. Exposure to experiences in the classroom will allow preservice teachers to see how students and teachers utilize technology to promote learning.

5.8 Recommendations for Future Research

Future research could further examine how teacher education programs prepare teachers to integrate technology by following early career SBAE teachers. This insight would allow us to illustrate the experiences that continue with teachers after graduation. This will also allow the discipline to stay relevant to current trends and technology expectations. As technology advances, so will the way humans interact with it. Teaching and learning will continue to meld with policy shifts in education to fully understand the effects of technology.

Future research should also analyze how UTAUT could be used to understand the behavioral intention of technology integration within SBAE research. For example, Smalley (2024) recently utilized this framework to investigate preservice training needs related to teaching agriculture. Research that includes preservice teachers' behavioral intention with technology could include investigating UTAUT as applied to Artificial Intelligence adoption in secondary and post-secondary agricultural education.

Limitations

Phenomenology as the chosen method should be considered as a limitation of the study. Other qualitative approaches could have provided deeper insight into the experiences of preservice SBAE teachers. While multiple sources of data were collected, the study could have used observations to further investigate the experiences of the preservice teachers. Additionally, the researcher could have interviewed other individuals, including their cooperating teachers. Any of these pieces of data could have contributed to the findings of this study.

Another limitation of the study was that the participant group was not representative of the sample population. While this study utilized various sampling strategies to recruit participants, the participant group was primarily white females. This may have been for several reasons, which could have created a time constraint for other participants. Participants were emailed in March of 2024. This is a busy time for students as they are applying for jobs, graduating from college, and ending student teaching. Even though this may have limited the number of individuals who may have been able to apply, the research still met the needed amount for phenomenology (Peoples, 2021). Since this study focused on four-year teacher SBAE teacher education program from the Southern Region of AAAE this could have been expanded to a nationwide call for participants.

Another limitation was that the researcher had insider knowledge of the experiences of the preservice teachers. This is a limitation because this may create unintentional bias since the researcher had similar prior experiences as the participants. During the interviewing process the researcher kept a journal to try to ensure the experiences were not conflated with my own.

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Appendix A: Alignment and A Priori Tables

Literature	**Proposition**	**Research Questions**	**Interview Questions**
"Teacher education programs should emphasize technology rich experiences in the	Student teaching is an experience that can help explain how	How do preservice SBAE teachers describe their	• What types of technology do you recall having access to during student

field for preservice teachers" (Nelson & Hawk, 2020) Technology use during student teaching has been identified as an important element to explore in preservice teacher preparation (Sweet Moore et al., 2023).	preservice teachers experience technology.	lived experiences of technology integration during their student teaching semester?	teaching? • How do you describe any rules or policies set in place that mediated the use of technology at student teaching site? • How did you find technology to be helpful while student teaching? • What challenges occurred with technology in the classroom? • How do students commonly use technology in your classroom?
Teacher education programs can introduce new and emerging technologies to preservice SBAE teachers (Coley et al., 2015). Teacher education technology competencies provide guidance of how teacher educators should integrate technology for preservice teachers (Foulger et al., 2017).	Teacher preparation programs act as the introduction for how to use technology for teaching and learning purposes.	How are preservice teachers exposed to and learn about the use of technology in their teacher preparation programs?	• How often did your teacher education professors use new or emerging technology in their teaching? • What technologies were used by your professors? • What technology were you expected to use as part of your preservice program? • What experiences did you have with using educational technology prior to student teaching? • How was the use of technology communicated prior to student teaching?
Mcbride and Talbert (2022) found	Agricultural technologies are	How do preservice	• What agricultural technologies are

SBAE students need more experiences provided by their teachers to be prepared to use agricultural technologies.	recommended to provide students with meaningful learning experiences.	teachers use various technologies as a tool to promote learning?	used for classroom instruction? • What types of digital platforms did you use in the classroom? • How did you use technology in the classroom for specific lessons?
Teacher utilization of technology can alleviate teachers of time-consuming tasks related to teaching, administrative tasks or extra duties as assigned (Haleem et al., 2022).	Many responsibilities of an SBAE teacher require the use of technology.	How do preservice teachers experience responsibilities that occur with technology outside of teaching?	• What responsibilities related to teaching did you have that required technology use to complete? • What responsibilities as an FFA advisor did you have that required the use of technology? • For what other professional responsibilities did you find technology to be helpful?

Appendix B: Southern Region AAAE Recruitment Emails

Solicitation Email for S-AAAE

Subject: Requesting Names of Student Teachers for Dissertation

Good Morning,

I am emailing to request your help identifying potential participants for my dissertation. Specifically, my study is recruiting preservice SBAE teachers who are currently in their student teaching semester. This study will ask the participants to describe their experiences integrating technology during student teaching. My hope is you all would be able to **provide a list of student teachers from your institutions who may be willing to participate in my study.** With your list of potential participants, your identification of teachers is not a commitment to this study. If you are willing and able to assist me, you can respond directly to this email, reply to loganjl@vt.edu.

To provide background information, my study's overall goal is to describe the experiences of preservice teachers with technology integration in the agricultural education classroom. I hope to learn more about how current preservice teachers are being trained to integrate technology through their teacher preparation programs, professional experiences and mentoring opportunities.
Additionally, I hope to learn how to better assist teacher preparation programs in developing course work or training on teaching with technology.

Lastly, if you have any questions, suggestions, ideas, or comments for me, please do not hesitate to contact me at Brett.Milliken@oregonstate.edu. I am eager to begin this study and hope that the findings will be useful for both teacher educators and agriculture educators.

Thank you and have a great day!

Logan Layne
Virginia Tech
PhD Candidate
Agricultural Extension and Education

Appendix C: Recruitment Email for NAAE

Subject: Requesting names of preservice SBAE teachers

Greetings!

I hope this message finds you well. My name is Logan Layne, and I am a PhD student at Virginia Tech. I am reaching out to invite you to participate in an important research study

focused on uncovering preservice teachers' experiences integrating technology in the classroom during their student teaching semester.

In today's rapidly evolving educational landscape, technology plays an increasingly crucial role in shaping teaching and learning experiences. As part of this study, we aim to explore your experiences regarding technology in the classroom, including how you use technology for learning and how it has become integrated into school culture.

Participation in this study will involve sharing your experiences, reflecting on your tenure in your teacher preparation program, personal experiences, and activities undertaken during your student teaching semester. By understanding preservice teachers' beliefs and their readiness to integrate technology, we can better support the development of effective teaching practices in agricultural education. Your contribution to this research will greatly enhance our understanding of the challenges and opportunities associated with technology integration in agricultural education. Your responses will remain confidential, and your input will be invaluable in shaping future teacher education programs.

If you are willing to participate or would like more information about the study, please click on the following link: https://forms.gle/eninHW6X9TWX31B39

Should you have any questions or concerns, please do not hesitate to contact me at loganjl@vt.edu. Thank you for considering this invitation to participate in our research study. Your insights are highly valued, and we look forward to hearing from you soon.

Best regards,
Logan Layne
PhD Candidate
Virginia Tech

Appendix D: Interview Protocol

Study Title: A Transcendental Phenomenology of preservice teachers experience during student teaching

Introduction

- Greetings

- Explain to the participant the study's purpose.
- Provide an overview of what types of questions will be asked.
- Ensure confidentiality among any information that is shared during the interview.
- Ask them if they would like to choose a pseudonym.
- Ask for permission to audio record and transcribe the interview.
- What questions are there?

Interview Guide

1. Can you provide examples of technology used in your classroom?
2. How do you find technology to be helpful in your personal learning?
3. What types of technology do you recall having access to during student teaching?
4. How do you describe any rules or policies set in place that mediated the use of technology at student teaching sites?
5. How did you find technology to be helpful while student teaching?
6. What challenges occurred with technology in the classroom?
7. How do students commonly use technology in your classroom?
8. How did your cooperating teacher help when integrating technology?
9. How do your peers in your agricultural education program discuss technology in the classroom?
10. How do other professional colleagues discuss technology in schools?
11. What agricultural technologies are used for classroom instruction?
12. What types of digital platforms did you use in the classroom?
13. How did you use technology in the classroom for specific lessons?
14. What responsibilities related to teaching did you have that required technology use to complete?
15. What responsibilities as an FFA advisor did you have that required the use of technology?
16. For what other professional responsibilities did you find technology to be helpful?

Appendix E: Consent Form

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Consent to Take Part in a Research Study

Title of research study: A Transcendental Phenomenology of the Lived Experiences of SBAE Student Teachers Integrating Technology in the classroom.

Principal Investigator:

I. **Purpose of this Study**
- The purpose of this study is to describe the lived experiences of SBAE preservice teachers' experiences with technology in the classroom.

II. **What should I know about being in research study?**
- We will explain the details of the study activities in an email to those teachers who identify an interest in participating in the study.
- The study will include an individual interview, researcher observation of your teaching activities in your instructional spaces, and document analysis of your course planning materials.
- Whether or not you take part is up to you. You can choose not to take part.
- You can agree to take part and later change your mind.
- Your decision will not be held against you and will not impact your access and participation in the professional development activities.
- You can ask all the questions you want before you decide.

III. **Risks**
- There are no risks with associated with participating in this research study.

IV. **Extent of Anonymity and Confidentiality**
- All participants information will be password protected on the researcher's personal computer. The participants will choose a pseudonym to go by throughout the interview and any descriptive information will be removed to provide complete anonymity for the participants.

V. **Compensation**
- There will be no compensation for participation in this study.

VI. **How many people will be studied?**
- We plan to include 10-15 current preservice agricultural education teachers who are currently participating in their student teaching semester.

VII. **What happens if I say yes, I want to be in the research?**
- You will be invited to participate in an interview conducted in person at a location of your choice or hosted on Zoom. The session will take no more than one hour. Also, we would like to review your planning documents for the classes/course you select.

VIII. **What happens if I say yes, but I change my mind later?**
- You can choose to cease participation in this study for any reason and it will not be held against you.

IX. **What happens to the information collected for the research?**
- The information from the participants will be used for their dissertation and potentially publishing in relevant academic journals.

X. **Questions or Concerns**
- If there are any questions or concerns please contact the Principal Investigator Donna Westfall-Rudd, PhD at mooredm@vt.edu or Logan Layne at loganjl@vt.edu

Your signature documents your permission to take part in this research. We will provide you with a signed copy of this form for your records.

Signature of subject _____ Date _____

Printed name of subject

Signature of person obtaining consent | Date

Printed name of person obtaining consent

Appendix F: IRB Approval Form

Division of Scholarly Integrity and Research Compliance
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
http://www.research.vt.edu/sirc/hrpp

MEMORANDUM

DATE: April 22, 2024

TO: Donna Marie Westfall-Rudd, Logan Joshua Layne

FROM: Virginia Tech Institutional Review Board (FWA00000572)

PROTOCOL TITLE: A Transcendental Phenomnology of the Lived Experiences of SBAE Student Teachers Integrating Technology in the Classroom

IRB NUMBER: **24-415**

Effective April 22, 2024, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104(d) category (ies) 2(ii).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Determined As:	**Exempt, under 45 CFR 46.104(d) category(ies) 2(ii)**
Protocol Determination Date:	**April 22, 2024**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol.