UNDERSTANDING THE PERCEPTIONS OF UPPERCLASSMEN PRE-SERVICE ELEMENTARY EDUCATION TEACHERS ON AGRICULTURE

by

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DEDICATION

To my family, friends, and Craig, for their constant love and patience; to my mentors for their guidance; and to every future educator who will help students see agriculture not only as a subject, but as a bridge between people, food, and the land.

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GLOSSARY

The following terms are defined as they are applied in this study:

1. Ag in the Classroom (AITC): A free database of standards-aligned lesson plans that incorporate agriculture as a framework for teaching science, social studies, and nutrition in K–12 classrooms (National Agriculture in the Classroom Organization and National Center for Agricultural Literacy, n.d.).

2. Agricultural Education: Agricultural education instructs students about agriculture, food, and natural resources. Through these subjects, agricultural educators teach students a wide variety of skills, including science, math, communications, leadership, management, and technology (National Association of Agricultural Educators, n.d.).

3. Pre-Service Teacher: An individual who completes academic coursework, gains experience through supervised teaching, and often works with a mentor to prepare for a career in the classroom (National Science Teaching Association, n.d.).

ABSTRACT

Agriculture plays a critical role in society, yet many Americans have limited knowledge about where their food, fiber, and natural resources come from. Elementary school teachers, who introduce foundational concepts to young learners, are in a position to help address this gap in agricultural literacy. However, little is known about how pre-service elementary education teachers, those still in teacher preparation programs, perceive agriculture and their role in teaching it. Without this understanding, opportunities to strengthen agricultural literacy in early education may be missed. This study investigated the agricultural literacy, confidence, and perceptions of pre-service elementary education teachers at Montana State University. Using a cross-sectional survey, participants completed a researcher-adapted Agricultural Literacy Instrument, which measured knowledge across multiple agricultural constructs, as well as Likert-scale items on confidence in teaching agriculture and open-ended questions about agriculture's role in education. Data were analyzed using descriptive statistics, correlations, and thematic coding of qualitative responses. Results showed that participants were moderately literate in agricultural content and concepts, with higher scores in areas related to agriculture's societal role and lower scores in technical production concepts. Confidence in teaching agriculture was generally low but positively correlated with higher literacy scores. Qualitative responses indicated that while participants recognized agriculture's importance for daily life and sustainability, many viewed it primarily through a food production lens. Several participants noted that they had limited prior exposure to agriculture, which influenced their confidence in teaching it. These findings suggest that pre-service teachers may enter the profession without the content knowledge or self-assurance needed to integrate agriculture into their classrooms. Strengthening teacher preparation programs by embedding agricultural concepts and providing hands-on learning opportunities could help build both competence and confidence. Given elementary teachers' influence on shaping early student attitudes and understanding, improving agricultural literacy among pre-service teachers has the potential to positively impact future generations' awareness of and engagement with agriculture.

CHAPTER ONE

INTRODUCTION

The widespread popularity of social media and other instant communication methods has made the ability to share misinformation easier than ever before (Aimeur et al., 2023; Dizikes, 2018; Muhammed & Mathew, 2022). Although online communication platforms have helped overcome many geographical and accessibility barriers, they have also introduced new challenges, especially within the agriculture industry, which presents unique demands (Chowdhury, 2023). This is particularly significant given agriculture's fundamental role in providing food, fiber, wildlife habitats, raw materials for fuel and other goods, as well as sustaining millions of jobs across its diverse sectors (Hendershot et al., 2023; Kassel, 2023; Majumdar et al., 2019; Saleem, 2022; Singh, 2022; Tokel, 2022; World Health Organization, 2022).

Despite agriculture's central role in society, the industry has long been misunderstood, in part due to limited communication between producers and consumers (Goodwin et al., 2011). Farmers often maintain a low public profile and may be hesitant to share details about their operations (Kurtzo et al., 2016; Rumble & Irani, 2016; Tudge, 2018). As a result, public perceptions of agriculture are often shaped through information people encounter in formal education settings (Dewey, 1986). Grobstein and Lesnick (2011) note that education serves as the foundation for understanding the world, making it a powerful tool for shaping viewpoints. In this context, school-based agricultural education (SBAE) programs become especially important as they offer an accessible and lasting means to influence how individuals understand agriculture,

while also helping to correct common misconceptions (Cosby et al., 2022; Rice & Kitche, 2018; Wynn et al., 2017).

Education plays a key role in shaping public perceptions, making educators essential in fostering an informed understanding of the agriculture industry (Dewey, 1916; Roberts & Ball, 2009; Stevenson et al., 2016; Van der Linden, 2019). Beyond their role in delivering knowledge, educators influence how students perceive and engage with critical societal issues, including agriculture (Apple, 2009). Educators are tasked with providing content that reflects current events, aligns with educational standards (Vallera & Bodzin, 2019), applies to students' post-high school life, and is supported by scientific consensus, particularly in subjects like health and agriculture, where misinformation can spread easily (Soe, 2019). In an agricultural context, this may include recent statistics on causes of climate change (Searchinger et al., 2019) or the environmental impact of livestock production (Clark & Tilman, 2017).

However, their roles often extend beyond instruction. Teachers can also be asked to perform many tasks unrelated to teaching, such as bus duty, supervising club(s), hallway monitoring, and other needs as administrations see fit (Herman et al., 2020; Van Droogenbroeck et al., 2014). These responsibilities, while necessary for the functioning of schools, often compete with the time and energy teachers have to stay informed on evolving topics. A national survey revealed that while 63 percent of teachers' time is spent on instruction, the remaining 37 percent is consumed by other activities such as data entry, parent communications, test proctoring, and facilities support (Harwin, 2025). Teachers have expressed that these tasks, such as managing student disciplinary issues, organizing field trips, and serving as unpaid coaches or advisors, detract from lesson planning and delivery (Salise et al., 2021). However, teachers are

not often asked to remain up to date on agricultural practices and form opinions based on scientific research (Vallera & Bodzin, 2019).

As teachers play a critical role in students forming thoughts and opinions (Skipper & Douglas, 2015), agricultural educators and proponents must understand what teachers believe about the agriculture industry (Knobloch et al., 2007). It is important to look at teachers who are not licensed in agricultural education, as they would hopefully provide a more realistic understanding of what the general population believes agriculture entails (Anderson et al., 2014; Ingram et al., 2018). Studies in similar fields, such as Plutzer et al. (2016) on climate change, show that teachers' beliefs frequently align with wider public opinion, rather than scientific consensus. Understanding these beliefs can help agricultural educators and curriculum developers design more effective professional development and outreach efforts that address misconceptions and strengthen agricultural literacy in early education.

While examining in-service teachers' perceptions is valuable, studying pre-service teachers offers an opportunity to identify these beliefs before they enter the classroom. Pre-service teachers are in a formative stage of professional identity development, where their beliefs about agriculture, science, and society begin to solidify and influence future instructional practices (Menka & Atteh, 2022; Pajares, 1992; Richardson, 1996). Understanding their current perceptions provides insight into how teacher education programs can integrate agricultural literacy more effectively, ensuring that future educators are prepared to deliver accurate information about agriculture. This approach not only helps address misconceptions early but also supports the long-term goal of developing agriculturally literate citizens through formal education.

Continued research is necessary to anticipate misinformation that may enter SBAE classrooms (Hodgin & Kahne, 2018). It should be noted that research recognizes that educators or members of the public who may be spreading misinformation are not doing so intentionally but because that is what they perceive to be true and accurate (Soe, 2019). This highlights the critical need for accessible, accurate information in formal education settings, particularly in primary and secondary levels, where foundational beliefs are often formed (Tamm & Tulviste, 2022). Agricultural education, when implemented early, not only enhances students' understanding of food systems and environmental sustainability but also fosters critical thinking and informed decision-making skills (Baringer, 2021; Hess & Trexler, 2011). These holistic benefits prepare students to be more engaged and thoughtful consumers (LeBlanc et al., 2022; Mahardika & Yuliati, 2022).

Agricultural education courses have been noted to benefit all students and help them build both career-focused skills and life skills (National FFA, 2019). Keating et al. (2010) mention that students gain valuable experiences in professionalism, public speaking, and decision-making through participation in agricultural programs. These opportunities also create skills such as civic responsibility, respect, and communication (McBride & Talbert, 2022; Sapp et al., 2019). Importantly, these benefits are not limited to students pursuing agriculture-related careers. Rather, they equip students with transferable skills that enhance their readiness for professional pathways (Giebler, 2022). Agricultural education, therefore, serves as a powerful tool for developing well-rounded individuals prepared to contribute to society in a meaningful manner.

Much like any other core class, agricultural education is designed to provide accurate information to the public (Pauley et al., 2019). Students should take these courses because they provide the necessary skills and can advocate for the industry entrusted to feed and clothe the globe (Sorensen et al., 2021). The idea that all educators, not just those licensed in agricultural education, should convey truthful, accurate information about agriculture is not a new concept (Dusek, 1975). However, that cannot be achieved without first understanding the perceptions of non-agriculture teachers and providing opportunities to gracefully debunk incorrect information (Dekker et al., 2012). Programs such as Ag in the Classroom (AITC) have long aimed to bridge this gap by offering accessible, standards-aligned agricultural resources for general education teachers (National AITC, 2020; National Center for Agricultural Literacy, 2018). However, the effectiveness of these resources depends on teachers' awareness, comfort, and comprehension of agricultural topics, making it crucial to examine the knowledge and beliefs of all educators, not just those trained within the discipline.

With the complexity of agricultural issues facing society today, creating an agriculturally literate population is critical for the industry's success (Pope, 1990). This need extends beyond agricultural classrooms and includes the broader school community, where misinformation may unintentionally spread through general education teachers. Being that educators are part of the general public, they often hold beliefs and assumptions that mirror those of their communities (Ingram et al., 2018). Awareness about other teachers' comprehension of agriculture will allow school-based agricultural educators to inform and educate students before they leave their classroom (Burrows et al., 2020; Menka & Atteh, 2022). Finding out what other teachers may have shared or uncovering what non-agriculture teachers have shared, intentionally or not,

agricultural educators can develop targeted instruction that not only informs students but also bridges gaps in understanding among faculty (Potvin et al., 2024).

When considering this knowledge gap, it is important to recognize the influential role elementary teachers play in shaping students' earliest understandings of the world. As the foundation of the education system, their sustained interaction with young learners positions them as powerful agents in forming perceptions of agriculture from an early age (Chinchanachokchai et al., 2022). This long-term dedication can make people feel even more indebted to them for caring tenderly and patiently with them as children (Verhoeven et al., 2006). They also spend the entirety of the school day with them compared to secondary teachers who instruct students typically for one 50-minute period per day (Roth et al., 2003). The organizational structure of schools, particularly the inclusion of kindergarten and grades six through eight within a single campus, can significantly influence the duration of student-teacher relationships. In elementary and K-8 settings, educators may engage with students for a longer continuous period, potentially up to nine years, compared to their counterparts in traditional secondary schools, who typically interact with students for four to six years across middle and high school levels.

Directly related to elementary teachers' knowledge and access to agricultural education is a USDA-sponsored agricultural literacy curriculum, AITC, which aligns with state standards and offers engaging K-12 lesson plans and materials. Investigating educator familiarity with AITC resources, their ability to access them, and their understanding of the potential benefits for students addresses a critical gap in the effective implementation of this valuable agricultural literacy program (Burrow et al., 2020). Previous research identifies preservice elementary

teachers as a critical demographic for understanding the integration of agriculture into elementary education, particularly compared to first-year students who are still early in their academic journey and may lack the pedagogical foundation to reflect on curriculum implementation effectively (Cavanagh et al., 2019).

In-depth research has been conducted nationwide to explore agricultural literacy levels, with a primary focus on elementary students (Cosby et al., 2022; Fischer, 2017; Hess & Trexler, 2011; Leising et al., 2007; Longhurst et al., 2020) and non-educator community members (Anderson et al., 2014; Balschweid et al., 1998; Bellah & Dyer, 2007; Clemons et al., 2018; Malecki et al., 2004). While some studies have examined the perceptions of elementary teachers, the majority emphasize outcomes rather than teacher preparation or content confidence (Kovar & Ball, 2013). This leaves a critical gap in understanding how future educators, primarily elementary pre-service teachers, form their agricultural perceptions and how these may influence classroom integration (Cosby et al., 2022).

Purpose and Objectives

To address this gap in understanding, the goal of this study was to examine the perceptions, confidence, and influencing factors related to the integration of agricultural education among elementary education pre-service teachers, with specific attention to demographic differences and familiarity with available educational resources. The following research objectives guided this study:

1. Assess elementary education pre-service teachers' perceptions of agricultural education.

2. Examine elementary education pre-service teachers' confidence to deliver agricultural content.
3. Investigate factors influencing pre-service teachers' willingness to incorporate agricultural education content.
4. Compare demographic characteristics associated with variations in pre-service teacher perceptions of agriculture.
5. Explore familiarity and use of AITC resources.

Assumptions

It was assumed that respondents were truthful and honest in their answers during the data collection. Additionally, it was assumed that elementary education pre-service teachers in this study were preparing for careers in elementary education and would have the opportunity to incorporate agricultural concepts into their future classrooms.

Limitations

A limitation of this study was the limited generalizability of the findings, as the sample contained solely Montana State University (MSU) Elementary Education students enrolled in Practicum I, II, or Student Teaching for the Spring 2025 semester. Further, Montana State University is a land-grant university with a strong agricultural presence, which may have influenced participants' perceptions and awareness of agricultural topics. Being situated within an agricultural college could mean that participants were more exposed to agricultural ideas than peers at a non-agricultural institution. As such, the results may not reflect the experiences or perspectives of pre-service teachers at other institutions. However, detailed contextual information about the participants and program was provided to allow readers to assess the applicability of these findings to their other settings (Creswell & Creswell, 2018; Fink, 2017).

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

Agricultural literacy is essential for fostering informed citizens, yet research continues to highlight widespread gaps in public understanding of agriculture's role in society (Colbath & Morrish, 2010). This knowledge is particularly concerning at the K-12 level, where foundational ideas are first developed. The perceptions of agriculture held by elementary educators and pre-service teachers have been the focus of considerable research (Smalley & Rank, 2019). However, post-COVID-19 research is still developing (Hill, 2021; McKim et al., 2021). The societal and emotional influence of COVID-19 may have impacted the accessible audience as they likely had to perform schoolwork online and lose the critical instruction of a traditional, in-person classroom.

The existing literature mentioned below is related to elementary education pre-service teachers' perceptions of agricultural education, their confidence in incorporating it into their teaching, and factors influencing their willingness to incorporate it. Additionally, this chapter investigates demographic influences on these perceptions and familiarity with agricultural education resources such as Ag in the Classroom (AITC). These areas align with the study's research objectives:

1. Assess elementary education pre-service teachers' perceptions of agricultural education.

2. Examine elementary education pre-service teachers' confidence to deliver agricultural content.
3. Investigate factors influencing pre-service teachers' willingness to incorporate agricultural education content.
4. Compare demographic characteristics associated with variations in pre-service teacher perceptions of agriculture.
5. Explore familiarity and use of "Ag in the Classroom" resources.

Theoretical Framework

This study was guided by two complementary theories, Bandura's theory of triadic reciprocal determinism (1978) and theory of self-efficacy (1997). Together, these theories form a foundation for understanding the exchange between individual beliefs, behavioral intentions, and environmental factors in the context of pre-service elementary education teachers and their perceptions of agricultural education. These frameworks help explain how perceptions and confidence to teach agriculture develop and influence decision-making, especially among young educators who do not have formal agricultural training.

Bandura's (1978) triadic reciprocal determinism suggests that human functions are the product of a reciprocal interaction between personal factors (e.g., beliefs, values, expectations), behavior, and environmental influences. Rather than seeing human functioning as linear, this model proposes that individuals both influence and are influenced by their environment and behavior in an exchange. Applied to this study, this means that a pre-service teacher's perception of agriculture is shaped through continued experiences with their behaviors (e.g., whether they

choose to incorporate agriculture in a lesson) and by the environments in which they are trained and educated.

Educational environments such as teacher preparation programs, student teaching placements, or institutional values play a significant role in shaping how pre-service teachers view interdisciplinary content like agricultural education (Clemons et al., 2021; Hess & Trexler, 2011; Sellick et al., 2017). Additionally, personal experience may influence perceptions through rural, suburban, or urban upbringing, familiarity with agriculture, or enrollment in various agriculturally focused youth development programs such as 4-H and FFA (Colbath & Morrish, 2010; Frick et al., 1995; Hess & Trexler, 2011). These experiences may influence how teachers interpret the value and applicability of agricultural concepts in an elementary classroom (Smith et al., 2012; Newcomb et al., 2025). Behavioral choices, such as engaging with AITC resources or creating agriculture-themed lesson plans, both stem from and feed into teachers' internal beliefs and perceptions.

To complement this broader, systems-level framework, Bandura's (1997) theory of self-efficacy provides a more focused understanding of how individual beliefs about competence shape actions. Self-efficacy refers to a person's beliefs in their ability to perform a specific task or behavior successfully. According to Bandura (1997), low self-efficacy can reduce motivation, persistence, and performance, regardless of actual skill level. In this study, self-efficacy theory was used to interpret findings, helping explain why some pre-service teachers may feel more confident or willing to incorporate agricultural education than others.

Confidence in one's ability to teach agricultural content may be shaped by prior exposure, background knowledge, programmatic support, and access to curricular materials (Bandura,

1997). In a teacher preparation context, these may take the form of completing a successful practicum, observing a mentor teacher incorporate agriculture, or receiving encouragement from a faculty member (Bandura, 1997; Stair et al., 2016). When pre-service teachers have limited exposure to agricultural concepts in their coursework or field placement, they may not develop the level of confidence necessary to incorporate those topics on their own (Bellah & Dyer, 2009; Layne, 2024).

Researchers such as Frick et al. (1991) and Burrows et al. (2020) extended these ideas into the field of agricultural literacy, emphasizing its importance and understanding the food and fiber system sufficiently to make informed decisions and engage in meaningful conversations about agriculture. However, they also noted that confidence and pedagogical ability are often necessary precursors to action. Teachers may conceptually value agriculture but not teach it if they lack the confidence to do so. This idea reflects Bandura's (1997) idea that efficacy beliefs are among the strongest predictors of whether knowledge is applied in practice.

Prior research performed by Anderson et al. (2014) and Stair et al. (2012) reinforces that self-efficacy strongly predicts willingness to teach novel content. They argue that increasing exposure to agricultural education, offering structured opportunities for success, and embedding agriculture within teacher preparation courses can all support the development of confidence. These conclusions support the use of Bandura's (1978, 1997) frameworks in both interpreting the findings of this study and forming recommendations for teacher education programs.

These frameworks also guided the analysis and interpretation of the study's results. Triadic reciprocal determinism guided the exploration of how demographic characteristics, behaviors, and environments interact to shape teachers' willingness to incorporate agriculture. It

also provided an opportunity to consider the reciprocal effects of training and practice, how exposure to agricultural education may change attitudes, which in turn affect teaching behavior, which then reinforces or changes confidence.

Similarly, Bandura's (1997) theory of self-efficacy informed the development of Likert statements by highlighting the need to assess participants' perceived confidence in their ability to successfully teach agricultural content. This theory emphasizes an individual's belief in their ability to teach agricultural content. It also served as a foundation for interpreting findings related to high-confidence individuals and their beliefs about agriculture's ability to meet state and STEAM standards or address student needs.

Finally, these theories inform this study's conclusions and recommendations. This allowed the researchers to make recommendations that increase exposure to agricultural content and build both competence and self-efficacy. In summation, Bandura's theories of triadic reciprocal determinism and self-efficacy offer a comprehensive, research-based lens for examining how pre-service teachers form their attitudes, beliefs, and behaviors related to agricultural education. These frameworks supported the study's design, guided its analysis, and provided a foundation for understanding how environmental, personal, and behavioral factors work together to shape educational practices.

Measuring and Assessing Agricultural Literacy

A significant aspect of advancing agricultural literacy involves not only promoting educational content but also developing valid and reliable tools to measure understanding (Frick et al., 1991). This need for precise measurement is foundational to evaluating the effectiveness of agricultural literacy initiatives and identifying areas for instructional improvement (Kovar &

Ball, 2013; Longhurst, 2020). Colbath and Morrish (2010) revealed alarmingly low agricultural literacy levels among first-year college students, with students scoring just over 50% on a basic agricultural literacy assessment, emphasizing the need for broader educational inclusion. These low scores highlight a systemic issue; agricultural topics are not consistently or comprehensively integrated into K–12 curricula, resulting in a population that is largely uninformed about where their food comes from, how it is produced, and the role agriculture plays in society (Dethier & Effenberger, 2012). Similarly, Dale et al. (2017) investigated the agricultural knowledge and perceptions of incoming college freshmen and found that many held misconceptions about food production and environmental practices, especially among those with limited exposure to agricultural education. Their findings supported prior evidence that misinformation and a lack of early education contributed to gaps in understanding, reinforcing the need for intentional curriculum design targeting non-agriculture audiences. Longhurst et al. (2020) developed and validated an instrument targeting grades three through five, enabling educators to identify gaps and tailor interventions for young learners. Their tool was grounded in the Food and Fiber Systems Literacy framework and designed to evaluate students' knowledge across several key themes, including agriculture's relationship with the environment, food production, and societal impacts (Spielmaker et al., 2014). Through rigorous psychometric testing, Longhurst et al. (2020) established the instrument's reliability and validity, providing educators with a data-driven resource to identify learning gaps and design targeted instructional interventions (Meischen & Trexler, 2003; Trexler, 2000).

These studies echo the need for assessment in the broader conversation around agricultural literacy to adequately educate the public, as previously mentioned (Fischer, 2017).

Without such instruments, it is difficult to gauge the true effectiveness of agricultural education initiatives or to advocate for their inclusion in core academic standards (Leising et al., 2000). Moreover, these studies reinforce the argument that agricultural literacy should not be confined to vocational or rural education tracks but must be a part of the general education experience for all learners, regardless of background (Bellah & Dyer, 2007). This is further supported by Parr et al. (2008), who emphasized that agriculture-based instruction can enhance academic achievement when integrated with core subjects such as language arts and science. Additionally, Meischen and Trexler (2003) argued for the development of conceptual frameworks that embed agriculture into broader educational goals, rather than treating it as a niche subject. By equipping educators with reliable tools for assessment, the field is better positioned to make data-informed decisions and advocate for agriculture's rightful place in a well-rounded education (McKim et al., 2016).

Educational Interventions and Program Effectiveness

Agricultural literacy can be improved through programs like AITC, which have been shown to improve students' understanding of agriculture and its relevance to everyday life (Miller et al., 2022). AITC programs have yielded positive outcomes in enhancing agricultural literacy by providing a structured framework for integrating agricultural concepts into school curricula (Burrows et al., 2020). Evaluations of AITC programs have shown statistically significant gains in students' agricultural knowledge and awareness. For example, Igo and Frick (1999) found that fourth-grade students who received AITC instruction demonstrated an increased understanding of agricultural concepts compared to their peers. Furthermore, Kovar and Ball (2013) reported that teacher-participants in AITC workshops improved their confidence

and ability to incorporate agriculture across subject areas. These programs are particularly effective because they are designed to make agricultural topics accessible and relevant to students by connecting them to their daily experiences, such as the food they eat and the products they use (Kassel, 2023). This integration of agricultural concepts into the classroom has led to measurable improvements in students' knowledge of agriculture, fostering a more informed and engaged public (Dethier & Effenberger, 2012).

Malecki et al. (2004) assessed teachers' awareness and attitudes toward agricultural literacy using the AITC model, finding that rural and elementary educators held more favorable views than their urban counterparts. This result suggests that teachers in rural areas, where agriculture plays a more prominent role in the community, are more likely to recognize the importance of agricultural education and incorporate it into their teaching (Nugraha et al., 2024). Elementary educators appeared to be more open to including agricultural topics in their lessons, likely due to the younger students' developmental stages and their ability to engage with simple, hands-on agricultural concepts (Purnomo, 2021; Schwichow, 2016). Pense et al. (2005) expanded this by evaluating the impact of AITC programs in multiple states, demonstrating its positive influence, particularly in lower elementary grades. The positive influence of AITC programs in early education is significant because it aligns with research that emphasizes the importance of early childhood education in shaping lifelong attitudes and knowledge (McEwen, 2015).

However, barriers such as time constraints, resource availability, and content knowledge persist, as Rianda et al. (2019) highlighted in their study of pre-service elementary educators in Montana. Similar concerns have been documented more broadly, with many pre-service teachers

reported feeling unprepared to teach agricultural content, citing a lack of exposure to agricultural topics during their own education and inadequate resources to effectively integrate agriculture into their classrooms (Balschweid et al., 1998; Trexler & Suvedi, 1998). These findings point to the need for increased support for teachers, particularly in urban and non-agricultural areas, to overcome these barriers (Stair et al., 2012). Providing pre-service educators with more comprehensive training in agricultural literacy and offering them resources such as curriculum guides, lesson plans, and access to programs like AITC could help mitigate these challenges and improve the overall effectiveness of agricultural education (Hall et al., 2022; Harlin et al., 2002).

Vallera and Bodzin (2019) highlighted the potential of innovative curricula by integrating STEM with agricultural concepts through a project-based program for fourth graders (Honey et al., 2014). This approach led to significant knowledge gains and positive attitude shifts, further reinforcing the value of creative, interdisciplinary methods (Jacobs, 1989). Meanwhile, Burrows et al. (2020) demonstrated that while teachers recognize the value of agricultural content, active use in classrooms remains limited, often due to a lack of exposure to resources like AITC. These studies highlight the importance of the AITC curriculum and its applicability to traditional core subjects (Igo & Frick, 1999).

Addressing Urban and Societal Contexts

Recruitment of students into agricultural programs can present unique challenges depending on their background and environment. For example, it can be difficult to recruit urban FFA members in comparison to their rural counterparts (Martin & Kitchel, 2014). Efforts to bridge the gap between rural and urban agricultural literacy have also become a focal point for those working to expand agricultural literacy and engagement among diverse student populations. This disparity may stem from differences in students' exposure to agricultural experiences and perceptions of agriculture. Efforts to recruit urban FFA members require tailored strategies that address these gaps in exposure and experience. Hess et al. (2011) examined urban elementary students' understanding of the agri-food system, finding that firsthand experiences and the amount of agricultural content they encountered in the classroom shaped their perceptions. The study found that many urban students had limited exposure to agriculture beyond what they encountered in their immediate environment, such as grocery stores or food packaging. As a result, their understanding of where food comes from and the agricultural processes behind it was often shallow. This study highlighted the need for immersive experiential learning opportunities that connect urban students to local food systems.

Similarly, Vallera and Bodzin (2019) explored a targeted agricultural literacy program for urban fourth graders. Through a series of classroom interventions, they successfully increased students' knowledge of agriculture and STEM subjects. The program not only improved students' agricultural literacy but also contributed to fostering a positive attitude toward these subjects. They found that when urban students were exposed to agricultural content through engaging and relevant lessons, they demonstrated a greater understanding of both the science behind farming

and its role in the broader economy. These findings shed light on the importance of providing urban students with opportunities to connect agricultural knowledge to their daily lives, showing the effectiveness of targeted programs in increasing literacy and interest in agriculture.

On a broader societal level, Specht et al. (2014) explored the relationship between agricultural literacy and public attitudes toward agricultural practices. They found that individuals with higher literacy levels and hands-on experience responded more positively to agricultural imagery and were less susceptible to misconceptions. This study emphasized the role of literacy in shaping public understanding and acceptance of modern agricultural practices to foster informed decision-making, but also to increase acceptance of modern agricultural techniques, which are often misunderstood. These studies show how improving agricultural literacy efforts, particularly in urban contexts, can increase positive opinions of agriculture. By curating hands-on, experiential learning opportunities and creating targeted programs that engage students in agricultural and STEM fields, educators can help urban students develop a more accurate understanding of agriculture.

Synthesizing Trends and Advancing Research

Syntheses of agricultural literacy research provide valuable insights into trends and evolving priorities related to agriculture. This ultimately helps to track how educational objectives and approaches have shifted in response to societal, technological, and cultural changes. Kovar and Ball (2013) analyzed two decades of studies, identifying shifts in definitions and methodologies while advocating for interdisciplinary approaches that connect agriculture with science, communication, and education to create a more holistic learning experience. Building on this, Hancock et al. (2024) explored current trends, focusing on technology

integration and experiential learning, suggesting that these tools can make agriculture more tangible and relevant to diverse student populations. They also called for increased inclusivity in educational strategies, arguing that agricultural education must adapt to reach broader audiences.

Cosby et al. (2022) further contextualized these shifts, noting a transition from mere surface-level awareness to a deeper understanding of agriculture's economic, environmental, and social dimensions. They emphasized the need for structured programs to address persistent misconceptions, particularly in younger audiences and those disconnected from agricultural contexts. These studies connect back to the research findings, where pre-service elementary teachers expressed that they would implement agricultural content if resources were provided, and highlight the value of programs to address these myths. These underscore the critical role that well-designed programs can play in correcting misinformation and fostering meaningful agricultural understanding among future generations.

Addressing Misinformation in Agricultural Literacy

As agricultural literacy intersects with public discourse, this can pose challenges without structured programs to mitigate the spread of misinformation. Chowdhury et al. (2023) identified widespread agri-food misinformation, much of which was perpetuated through online communities, social media echo chambers, and organizational agendas that prioritize profit or ideology over accuracy. Their proposed analytical framework highlights the need for better literacy initiatives to counteract false narratives. Expanding on this, Chowdhury et al. (2024) advocated for participatory, community-based approaches to enhance public trust and create spaces for open dialogue. This would combat misinformation, emphasizing collaboration among farmers, scientists, and consumers. These studies shed light on the importance of connecting

consumers with credible initiatives through inclusive, transparent, and locally relevant agricultural literacy efforts to combat misinformation.

Pre-Service Teacher Preparation

To effectively combat misinformation in agricultural literacy, it is essential to examine how pre-service teachers are prepared to teach agriculture-related content, as their training directly influences the accuracy and confidence with which they deliver this information to future students. Harlin et al. (2002) conducted a longitudinal study to examine changes in teaching efficacy among student teachers in agricultural education programs. Additionally, using Bandura's (1997) self-efficacy theory, Harlin et al. (2002) evaluated how pre-service teachers' beliefs about their teaching abilities changed before and after their student teaching experience. Harlin et al. (2002) found significant improvements in overall teaching efficacy post-internship, particularly in classroom management, student engagement, and instructional strategies. These findings suggest that hands-on teaching experiences, such as student teaching, play a critical role in enhancing teacher confidence and preparedness. While Harlin et al. (2002) focused on secondary agriculture education majors, its implications highlight the importance of structured teaching experiences in developing the self-efficacy of all pre-service educators.

Cavanagh et al. (2019) investigated how four pre-service teachers (PSTs) perceived their impact on student learning during a four-week professional experience block. Utilizing Hiebert et al.'s (2007) framework, the research focused on the PSTs' abilities in planning, teaching, and assessing within their practicum. Data were collected through learning diaries, online questionnaires, and interviews. Findings indicated that PSTs struggled to identify clear learning goals, which adversely affected lesson planning and assessment of student learning. This

reinforced the need for robust field placements when preparing elementary teachers to teach unfamiliar content areas, including agriculture, and teacher education programs to better prepare PSTs in setting explicit learning objectives and aligning assessments accordingly.

Implications for Agricultural Education

Understanding agricultural literacy involves connecting the aforementioned areas and bridging theory with classroom and community-based practice. Clemons et al. (2018) explored this intersection, emphasizing the practical application of agricultural knowledge in everyday life and its importance for informed decision-making. Their work supports the idea that agricultural literacy extends beyond content acquisition to include critical thinking and evaluative skills necessary for navigating food systems, sustainability, and policy. Similarly, Rianda et al. (2019) and Burrows et al. (2020) investigated the experiences of both pre-service and in-service teachers, identifying persistent barriers such as limited content knowledge, lack of confidence, and minimal exposure to agricultural topics during teacher preparation. They emphasized the need for sustained professional development opportunities, access to instructional resources, and cross-disciplinary collaboration between agricultural educators and general education faculty.

Agricultural literacy is not static, but a multifaceted, dynamic, and evolving field. From foundational calls for inclusion in K-12 education (Pope, 1990) to modern frameworks that integrate STEM principles and address misinformation (Chowdhury et al., 2023; Vallera & Bodzin, 2019), research highlights the urgent need to equip individuals with the knowledge and skills needed to engage thoughtfully with agricultural issues. Future efforts must address systemic barriers within teacher education programs, expand interdisciplinary instructional strategies, and prioritize authentic public engagement to ensure agricultural literacy's continued

growth and relevance (Kovar & Ball, 2013; National Academy, 1988). These studies call for open dialogue with teachers to understand barriers and create solutions to eliminate these obstacles preventing agricultural literacy (Reilly et al., 2022).

Chapter Summary

Despite efforts to improve agricultural literacy, significant gaps remain, particularly in how pre-service elementary teachers perceive agriculture and integrate it into their teaching practices. Current research emphasizes program effectiveness and literacy measurement but lacks focus on understanding the perceptions and attitudes of these future educators. This gap is critical, as pre-service teachers are pivotal in shaping young learners' awareness of agriculture. Achieving widespread agricultural literacy remains elusive without addressing pre-service elementary teachers' perceptions and equipping them with targeted resources to integrate agricultural concepts into their teaching. This gap highlights the importance of exploring their perceptions of agriculture and identifying barriers and opportunities for integrating these concepts into elementary classrooms, which this research aims to address. Without intentional solutions, such as continuing research, promoting resources like AITC, measuring current literacy levels, implementing structured programs, collaborating between industry professionals and consumers, and communicating with teachers, generations of people will continue growing up distrusting of the industry tasked with sustaining them. The research intends to address this gap by exploring pre-service elementary teachers' perceptions of agriculture and identifying barriers and opportunities for integrating agricultural concepts into elementary classrooms.

CHAPTER THREE

METHODOLOGY

Purpose and Objectives

The goal of this study was to examine the perceptions, confidence, and influencing factors related to the integration of agricultural education among elementary education pre-service teachers, with specific attention to demographic differences and familiarity with available educational resources. The following research objectives guided this study:

1. Assess elementary education pre-service teachers' perceptions of agricultural education.
2. Examine elementary education pre-service teachers' confidence to deliver agricultural content.
3. Investigate the factors influencing pre-service teachers' willingness to incorporate agricultural education.
4. Compare demographic characteristics associated with variations in pre-service teacher perceptions of agriculture.
5. Explore familiarity and use of AITC resources.

Population and Sampling

The target population for this study was Montana State University (MSU) elementary education pre-service teachers enrolled in practicum or student teaching in the Spring 2025 semester. The list of potential participants was obtained through the MSU Campus Registrar. Based on the Registrar’s online schedule of classes, two practicum courses were offered in

Spring 2025, one for students pursuing licensure for grades K–8 and another for those seeking licensure for grades 5–12. Additionally, six student teaching courses were available for enrollment by the target population. As of February 20, 2025, actual enrollment included 12 students in the K–8 practicum, 13 students in the 5–12 practicum, and 68 students in student teaching courses, resulting in a total population size of 93 (N = 93).

To protect student identity, the MSU Education Department provided an anonymized list of all possible participants. Following Dillman et al.'s (2009) suggestions for tailored survey design, the anonymized list of students adhered to the following guidelines.

1. The list contained everyone in the survey population.
2. The list did not include the names of people not in the study population.
3. The list was well-maintained and updated.

Instrumentation

Initially created by Burrows et al. (2020), the survey instrument used in this study was adapted to align with the unique focus of the current population and research goals. Specific questions were adapted to better reflect the experiences of upper-level pre-service elementary teachers and align with the study's objectives, including their perceptions of agricultural education, confidence to teach it, willingness to incorporate it, relevant demographic factors, and familiarity with AITC resources. Additionally, sections were tailored to address the context of preparing to teach and having yet to be in the classroom as a teacher, providing a clearer understanding of participants' perspectives.

The survey was then examined for content validity by professional researchers and educators in agricultural and educational fields (Mills & Gay, 2019). The content validity of the

researcher-modified survey was examined to ensure clarity and meet research objectives (Dillman et al., 2009). Institutional Review Board approval was received before distributing surveys to the research population (IRB# 2025-1889).

The survey included Likert-type statements divided into three sections. Participants rated each statement on a 4-point scale from (1) *Strongly Disagree* to (4) *Strongly Agree*, indicating their level of agreement with each item. Using a 4-point Likert scale instead of the traditional 5-point scale encourages participants to take a clear position on survey items (Johns, 2005). A 4-point scale eliminates the neutral or undecided option, requiring respondents to lean either positively or negatively in their evaluations. This approach reduces the potential for participants to choose the midpoint as a default, which can obscure meaningful insights or dilute the data (Qualtrics, 2022). Furthermore, a 4-point scale is particularly effective when measuring attitudes, perceptions, or behaviors, as it prompts deeper reflection and more decisive responses, ultimately yielding clearer and more actionable results (Johns, 2005).

The first section of the instrument consisted of seven statements to gauge teachers' perceived *importance of agricultural education*. For example, "Agricultural education is important to elementary-aged students." These statements formed a single construct labeled *importance of agricultural education*. The second section contained five statements focused on teachers' interest in agriculture-related curriculum, with sample items such as, "I would incorporate agricultural topics into my future teaching if resources were provided." These statements were combined into a construct called *ag integration*. The third section had five statements related to utilizing agricultural education curriculum. An example statement was, "I would use an interactive website with agriculture-related lesson ideas." This section falls under

the construct of *agricultural lessons*. The fourth area contained seven statements about their comfortability teaching agricultural topics. One statement read, “I feel confident in connecting agriculture topics to current educational standards.” The construct associated with this was *confidence*. The fifth part of the instrument concentrated on agricultural education’s ability to meet standards and classroom needs. A statement found in this section was, “Agriculture education can be adapted to meet the needs of students from diverse cultural backgrounds.” The three statements in this area were in the *educational standards and curriculum* construct.

The concluding section contained four demographic questions, collecting information about students’ enrollment in practicum or student teaching, self-described geographic population density of hometown, self-identified gender, and familiarity with AITC materials. A separate section containing one question asked participants if they had used AITC materials. This section was separated as only those who had stated “yes” on the previous question about familiarity with AITC were asked if they had ever used it. The survey was formatted in an electronic bubble style, allowing participants to mark their responses electronically by filling in bubbles.

Data Collection and Analysis Procedures

To reach as many eligible participants as possible, the Tailored Design Method, as described by Dillman et al. (2009), was implemented. The researcher initiated five different contacts. The population was first contacted on January 21, 2025, with a notice that they would be invited to participate in survey research. The population was then sent a live link or QR code from their professor to access the survey on January 28, 2025. As Dillman et al. (2009) suggested, this verifies that the survey would be free of responses from individuals outside the

research sample. Subjects were incentivized to participate by having the option to receive a $5.00 Amazon gift card, which, according to Dillman et al. (2009), should increase response rates.

Dillman et al. (2009) recommend that a follow-up request be sent at least twice, being sent every week or every other week. A follow-up request was sent out after weeks one, two, three, four, and six. In-person and virtual visits to the population occurred during weeks one and four, respectively, in their classrooms and via Zoom. After eight weeks, responses were analyzed using statistical software in Microsoft Excel, and results were reported with appropriate measures of effect size and statistical significance to ensure a robust interpretation of the findings.

Data were analyzed using quantitative methods to address the research objectives. Descriptive statistics, including means, standard deviations, frequencies, the Shapiro-Wilk test, and the D'Agostino-Pearson test, summarized the data and provided an overview of participants' responses (Cooksey, 2020; Qualtrics, 2023). These statistics helped identify patterns and trends in pre-service teachers' perceptions of agriculture, confidence in incorporating it, and their interest in agriculture-related curricula. To assess the internal consistency of the constructs (e.g., *importance of agriculture* and *interest in agriculture curriculum*), reliability analyses were conducted using Cronbach's alpha. Instruments with $\alpha > 0.70$ are considered reliable (Nunnally & Bernstein, 1994). Post-hoc test results indicated a satisfactory reliability estimate for the overall instrument ($\alpha = 0.86$, per Nunnally & Bernstein, 1994). Individual constructs were not tested as the number of Likert statements in each construct varied and would report false statistics with such a small number of statements within each construct (Charter, 1999; Kennedy, 2022).

For this study, students' placement during their year in the TEP was coded as follows: *student teaching* = 1, *practicum* = 2, and *other experiences* = 3. Hometown was coded urban (population larger than 50,000) = 1, suburban (population between 5,001-49,999) = 2, and rural (population smaller than 5,000) = 3. Inferential statistical tests were applied to explore relationships and potential predictors within the data (Barnes & Lewin, 2008). Pearson's correlation analysis was selected to examine the strength and direction of linear relationships between variables related to the study. This test is appropriate when assessing associations between interval-level data that are approximately normally distributed (Schober et al., 2018). The data were tested for normality, as indicated by the Shapiro-Wilk test ($W = 0.96$, $p = .57$), suggesting a normal distribution. The relationships assessed were between their year in the Teacher Education Program and confidence in incorporating agriculture curriculum, perceived importance of agricultural education and hometown population, and AITC familiarity and hometown population. Additional Pearson's correlation tests were performed between the *confidence* construct and the *importance of agricultural education, ag integration, ag lessons*, and *educational standards and curriculum* constructs to explore how confidence aligns with other beliefs.

Multiple linear regression analyses were performed to determine which factors significantly predicted a respondent's willingness to integrate agriculture into their lessons. This approach was appropriate as it allowed for the examination of multiple independent variables simultaneously and how they influenced a single outcome variable (Uyanık & Güler, 2013). Together, these analyses provided insight into how pre-service teachers' beliefs, experiences, and

background characteristics relate to their perceptions and intentions regarding agricultural education.

Additionally, one-way ANOVA and independent samples t-tests were conducted to examine differences in perceptions based on demographic variables such as familiarity with agriculture. The analysis did not include the sole comparison of demographic construct as Likert statements were not used, and therefore, a composite score would not be suitable for composite analysis. Finally, multiple regression analysis identified whether specific demographic factors (e.g., grade level focus and prior exposure to AITC materials) significantly predict participants' perceptions of agriculture. This approach allows for a more nuanced understanding of how different variables shape pre-service teachers' attitudes and interests in agricultural education (Caner & Aydin, 2021).

Non-response Error

Planning for non-response errors within the population is critical with any voluntary survey. Controlling non-response error begins with designing and implementing research and following recommended protocols and procedures (Dillman, 2008). Lindner et al. (2001) explained non-response error as individuals in the sample or population who fail to provide usable responses for the study. Ary et al. (1996, 2014) stated that if any response rate is lower than 75% after following appropriate follow-up measures, the researcher should attempt to describe how respondents differ from the non-respondents. This is supported by Lindner et al. (2001), who recommend handling non-response error for studies achieving 90% response rates. The survey received 32 responses, six incompletes, one leaving demographic incomplete, and 25

complete. Non-response error data, comparing respondents to the population, was collected and analyzed, as the response rate of this study was 34.4%.

As previously stated, an incentive was used to reduce non-response error. Lindner et al. (2001) recommend addressing non-response error by comparing non-respondents (n = 75) to respondents (n = 25). One method, as discussed by Johnson and Shoulders (2017), compares respondents to the population based on characteristics. To test for non-response bias, independent two-tailed samples t-tests at the .10 alpha level were performed on continuous characteristics, such as age, cumulative GPA, and earned term hours. None of the comparisons were found to be statistically significant. To test for non-response bias for the categorical data, which includes course enrolled in to receive the survey, gender, major, class standing, and in-state and out-of-state status, Pearson's chi-square tests were performed. Only one test, the course enrolled in, had statistical significance. The remaining characteristics were not found to be statistically significant. Please refer to tables 1 and 2 for a comprehensive list of tests performed to determine statistical differences between the population and the sample.

Table 1. Independent t-Tests Examining Non-Response Error on Continuous Characteristics (n = 25).

Variable	*M*	*SD*	*t*(96)	*p*	Cohen's *d*
Age, respondent	22.74	3.12	0.37	0.70	0.09
Age, non-respondent	22.46	2.90	0.37	0.70	0.09
Cumulative GPA, respondent	3.62	0.29	0.35	0.72	0.08

Table 1 Continued.

Variable	*M*	*SD*	*t*(96)	*p*	Cohen's *d*
Cumulative GPA, non-respondent	3.59	0.28	0.35	0.72	0.08
Earned Term Hours, respondent	13.22	1.93	1.37	0.18	0.34
Earned Term Hours, non-respondent	12.6	1.76	1.37	0.18	0.34

Table 2. Pearson's Chi-Square Tests Examining Non-Response Error on Categorical Characteristics ($n = 25$).

Variable	*Chi-Sq*	*p*	Cramer V
Course Enrolled	10.45	<.005	0.32
Gender	1.13	0.57	0.11
Major	16.15	0.37	0.40
Class Standing	3.91	0.14	0.20
In-State/Out-of-State Status	0.15	0.69	0.04

According to Lindner et al. (2001) and Cohen (1988), if there are any differences between respondents and non-respondents, results should not be generalized. Due to course enrolled showing a statistically significant difference, the researchers caution against generalizing results beyond the sample of respondents to prevent overgeneralizing of the findings. However, regardless of generalizability, the research can be added to the body of

knowledge and assist other researchers as they design and conduct research (Johnson & Shoulders, 2017).

Protection of Human Rights

Respondents were made aware that their involvement in this study was voluntary and that they had the right to withdraw from the study at any time. Coding respondents addressed subject security to minimize risk (Dillman et al., 2009). Copies of the completed study are available to participating subjects upon request.

Chapter Summary

This chapter outlines the quantitative methods used to analyze survey responses and address the study's research objectives. Descriptive statistics provided an overview of pre-service elementary education teachers' perceptions of agriculture, their confidence in delivering agricultural content, and their familiarity with agriculture-related curricula. To evaluate the internal consistency of multi-item constructs, such as the importance of agriculture and interest in the *agriculture curriculum*, reliability analyses were conducted using Cronbach's alpha.

Inferential statistics were used to explore relationships and predictive factors within the dataset. Pearson's correlation analyses examined associations among key variables, including relationships between their year in the teacher education program and confidence to incorporate agricultural content, perceived importance of agricultural education and hometown population, and familiarity with Agriculture in the Classroom (AITC) and hometown population. Independent samples t-tests and one-way analyses of variance (ANOVA) were employed to determine whether statistically significant differences existed across selected demographic groups. In addition, multiple regression analysis was conducted to identify whether specific demographic variables, such as grade level focus or prior exposure to AITC materials, predict participants' perceptions of agriculture.

CHAPTER FOUR

RESULTS

The purpose of this study was to examine the perceptions, confidence, and influencing factors related to the integration of agricultural education among elementary education pre-service teachers. A sample of *n* = 26 MSU students in their senior year, taking practicum or student teaching in the spring 2025 semester, were surveyed. The survey was conducted online via Qualtrics and was shared with students in class or emailed by their professors. The survey used in this study included Likert-type statements divided into six constructs: (1) *Importance of Agricultural Education*, (2) *Ag Integration*, (3) *Ag Lessons*, (4) *Confidence*, (5) *Curriculum & Standards*, and (6) *Demographic*. Participants rated each statement on a 4-point scale from (1) *Strongly Disagree* to (4) *Strongly Agree*, indicating their level of agreement with each item on the survey. Demographic data such as gender, year in school, and geographic population of hometown were also collected. The survey received 32 responses, six incompletes, one leaving demographic incomplete, and 25 complete. A post-hoc reliability analysis was performed to assess the survey instrument's consistency. Post-hoc test results indicated a satisfactory reliability estimate for the overall instrument ($\alpha = 0.86$, per Nunnally & Bernstein, 1994).

Demographics

Participants were asked to self-identify gender, year in Teacher Education Program, population density of their hometown, if they had ever heard of AITC, and if they had ever used the AITC curriculum. The average respondent was female (*n* = 20, 76.92%), enrolled in student teaching (*n* = 15, 57.69%), from an urban area (*n* = 12, 46.15%), and familiar with the AITC (*n* =

13, 52.00%) program. The average respondent enrolled in practicum (*n* = 9) was female (*n* = 6, 66.67%), from a suburban area (*n* = 4, 44.44%), had not heard of AITC (*n* = 5, 55.56%), and had not used AITC (*n* = 8, 88.88%). The average respondent enrolled in student teaching (*n* = 15, 57.69%) was female (*n* = 13, 86.67%), from an urban area (*n* = 8, 53.33%), had heard of AITC (*n* = 8, 53.33%), and had not used AITC curriculum (*n* = 5, 62.50%). Refer to Table 3 for complete descriptive data of all groups.

Table 3. Pre-Service Elementary Education Teachers' Descriptive Information (*n*=25)

	Enrolled in Practicum (*n* = 9)		Enrolled in Student Teaching (*n* = 15)		Enrolled in Other (*n* = 1)		Combined Groups (*n* = 25)	
	f	%	*f*	%	*f*	%	*f*	%
Gender								
Male	3	33.30	1	6.60	-	-	4	16.00
Female	6	66.70	13	86.70	1	100.00	20	80.00
Non-binary	-	-	-	-	-	-	-	-
Prefer not to say	-	-	1	6.60	-	-	1	4.00
Population Density of Hometown								
Urban	3	33.30	8	53.30	1	100.00	12	48.00
Suburban	4	44.40	6	40.00	-	-	10	40.00
Rural	2	22.20	1	6.70	-	-	3	12.00
Heard of AITC								
Yes	4	44.40	8	53.30	1	100.00	13	52.00
No	5	55.60	7	46.70	-	-	12	48.00

Table 3 Continued.

	Enrolled in Practicum (n = 9)		Enrolled in Student Teaching (n = 15)		Enrolled in Other (n = 1)		Combined Groups (n = 25)	
	f	%	*f*	%	*f*	%	*f*	%
Used AITC								
Yes	1	11.10	3	20.00	-	-	4	16.00
No	8	88.90	12	80.00	1	100.00	21	84.00

Objective One

Objective one aimed to assess elementary education pre-service teachers' perceptions of agricultural education. Descriptive statistics and a normality test were performed on the overall composite score of each statement within the six constructs. The constructs were *importance of agricultural education, ag integration, ag lessons, confidence, curriculum & standards,* and *demographics*. Within the *importance of agricultural education* construct, the mean response was $M = 3.34$ ($SD = 0.37$), with a median of 3.43. Responses ranged from 2.71 to 4.00. Refer to Table 4 for complete descriptive data of each *importance of agricultural education* statement.

Table 4. Descriptive Statistics for Perceived Importance of Agricultural Education Construct (n = 26).

Likert Statements	*M*	*Mdn*	*SD*
Agricultural education is important for elementary students to learn about.	3.12	3.00	0.52
The general public does not fully recognize the importance of agricultural education in schools.	3.42	3.00	0.58

Table 4 Continued.

Likert Statements	*M*	*Mdn*	*SD*
Understanding where food comes from is important for elementary students.	3.46	3.00	0.51
Learning about agriculture can help students better understand environmental challenges.	3.5	4.00	0.58
Exploring agricultural topics encourages critical thinking in students.	3.1	3.00	0.56
Agricultural education can connect students to their local community.	3.58	4.00	0.50
Agriculture plays a critical role in addressing climate change challenges.	3.23	3.00	0.65

Participants' responses regarding their willingness to integrate agriculture into their classroom resulted in an average score of $M = 3.29$ ($SD = 0.33$). The responses ranged from 2.60 to 4.0, with a median of 3.4. *Ag integration* Likert statements are presented in Table 5.

Table 5. Descriptive Statistics for Agricultural Integration Construct ($n = 26$).

Likert Statements	*M*	*Mdn*	*SD*
I would incorporate agricultural topics into my future teaching if resources were provided.	3.10	3.00	0.56
I see value in collaborating with local farmers or agricultural experts for classroom activities such as field trips to farms.	3.60	4.00	0.58
I feel confident in organizing field trips or inviting guest speakers to my classroom.	2.88	3.00	0.65
Agricultural topics could be used to create versatile lessons.	3.15	3.00	0.46
Hands-on agriculture activities, such as gardening, can be incorporated into teaching if sufficient resources are provided.	3.77	4.00	0.43

Participants' composite perceptions of agricultural lessons resulted in an average score of $M = 3.14$ ($SD = 0.41$), suggesting a moderate level of agreement regarding the use of agricultural-based lessons in their teaching. The range of scores spanned from 2.00 to 3.75, with a median of 3.00. Refer to Table 6 for complete descriptive data of each *agricultural lessons* statement.

Table 6. Descriptive Statistics for Agricultural Lessons Construct ($n = 26$).

Likert Statements	*M*	*Mdn*	*SD*
Students benefit more from hands-on agricultural activities compared to lecture-based classroom instruction.	3.70	4.00	0.55
Agricultural education helps students grasp global systems like food supply chains and economic impacts.	3.31	3.00	0.62
Agricultural education is as important as other core subjects like math and science.	2.65	3.00	0.80
I would use an interactive website with agriculture-related lesson ideas.	2.92	3.00	0.63

Within the *agricultural lessons* construct, participants selected any subjects they felt agriculture could be applied to and taught in. The ones who selected "other" had the opportunity to list subjects to which agriculture could be applied that were not mentioned. The participants who selected "other" listed art as another subject in which agricultural topics could be taught. When selecting a subject to incorporate Agricultural Education, pre-service teachers chose Science 19 times, Social Studies 16, Language Arts 6, Math 7, and Other 5.

Participants' confidence in integrating agricultural topics into their teaching and utilizing agricultural education professional development averaged $M = 2.59$ ($SD = 0.40$), suggesting moderate confidence levels. However, normality assumptions were violated, as indicated by the

Shapiro-Wilk test (W = 0.86, p = .003) and the D'Agostino-Pearson test (p = .009), suggesting a non-normal distribution. Scores ranged from 1.29 to 3.43, with a median of 2.57, suggesting variability in participants' confidence levels. Refer to Table 7 for the descriptive data of each of the *confidence* statements.

Table 7. Descriptive Statistics for Confidence Construct (n = 26).

Likert Statements	*M*	*Mdn*	*SD*
I feel prepared to integrate agriculture into my teaching.	1.84	2.00	0.78
I would need professional development to feel confident teaching agriculture topics.	3.31	3.00	0.55
I feel confident in connecting agriculture topics to current educational standards.	2.23	2.00	0.76
I would attend professional development sessions focused on agriculture education.	2.88	3.00	0.77
I feel knowledgeable about the various career opportunities in agriculture.	2.00	2.00	0.85
I would like to collaborate with other teachers on agriculture education.	3.03	3.00	0.60
I feel there are significant challenges to integrating agriculture education into the curriculum.	2.81	3.00	0.75

Participants' perceptions of agricultural education meeting curriculum standards and meeting classroom needs averaged M = 3.27 (SD = 0.39), suggesting generally positive attitudes toward its versatility. Scores ranged from 2.33 to 4.00, with a median of 3.33, suggesting that most participants viewed agricultural education as applicable to standards and meeting needs within the classroom. Refer to Table 8 for the descriptive data of each of the *curriculum and standards* statements.

Table 8. Descriptive Data for Curriculum and Standards Construct (n = 26).

Likert Statements	*M*	*Mdn*	*SD*
I believe agriculture topics can align with Common Core or other state standards effectively.	3.03	3.00	0.60
Agriculture-based lessons can help meet standards for STEAM (Science, Technology, Engineering, Arts, Math) education.	3.34	3.00	0.56
Agricultural education can be adapted to meet the needs of students from diverse cultural backgrounds.	3.42	3.00	0.50

Participants were asked to share various demographic characteristics such as their current year in the TEP, self-described population of their hometown, gender identity, familiarity with AITC, and if they have ever used AITC. As outlined in the methods section, participants' year in the TEP and hometown population size were coded numerically to facilitate statistical analysis. The average was found to be M = 1.64, indicating that most elementary pre-service students lived in urban or suburban areas in their youth. Gender identity was assigned 1 for male, 2 for female, 3 for non-binary, and 4 for prefer not to say. Respondents' average for gender was M = 1.92, demonstrating that most of the participants were female.

Familiarity with AITC "yes" was coded = 1, and "no" was coded = 2. The pre-service teachers who had heard of AITC had a mean of M = 1.5. This shows that participants were split in their familiarity with the K-12 curriculum. Only the students who responded "yes" to being familiar with AITC were asked if they had used it before, where "yes" was coded as 1 and "no" was coded as 2. The average was M = 1.69, suggesting that most students had not incorporated AITC resources into their teaching. Refer to Table 9 for the descriptive data of each of the *demographic* questions.

Table 9. Descriptive Data for Demographic Construct.

Variable	Category	*n*	%
Current Year in Teacher Education Program (TEP)	Student Teaching	15	57.69
	Practicum	9	34.62
	Other	1	3.85
Self-Described Hometown Population Density	Urban	12	46.15
	Suburban	10	38.46
	Rural	3	11.54
Self-Identified Gender	Male	4	15.38
	Female	20	76.92
	Non-binary	0	0.0
	Prefer Not to Say	1	3.85
Familiarity with AITC	Yes	13	52.0
	No	12	48.0
Used AITC	Yes	4	15.38
	No	9	34.62

Objective Two

Objective two aimed to examine elementary education pre-service teachers' confidence in delivering agricultural content. To answer whether pre-service teachers feel confident delivering agricultural content, cross-construct correlation analyses were performed. A Pearson's correlation was performed on the composite confidence scores against the participants' other four composite construct scores. This objective analysis did not include the demographic construct as Likert

statements were not used, and therefore, a composite score would not be suitable for composite analysis.

The participants' overall confidence to teach agricultural content and their perceived importance of agricultural education had a positive, moderate, and significant correlation, $r(24) = .421$, $p = .03$. Spearman's correlation was also calculated due to the data being ordinal; the relationship was weaker ($\rho = .24$), indicating Pearson's was more appropriate with the composite data. Respondents' confidence to teach agricultural content and general willingness to integrate agriculture into their content had a strong, positive, and statistically significant relationship, $r(24) = .664$, $p = < .001$.

Elementary pre-service teachers' confidence and overall perceived capability of agricultural education to build hands-on skills, aid students in understanding real-world problems, and their interest in using a website with agriculture lessons had a positive, moderate, and significant correlation, $r(24) = .386$, $p = .05$. The participants' overall confidence and belief that agricultural education can meet state and STEAM standards had a positive, strong, and statistically significant relationship, $r(24) = .561$, $p = .003$. Refer to Table 10 for a comprehensive view of the tests.

Table 10. Analysis of Variance for the relationship between Perceived Importance and Population ($n = 26$).

Variable	*n*	*M*	*SD*	*r*	*p*
Importance of Ag Ed	25	3.34	0.38	0.421	0.03
Ag Integration	25	3.28	0.34	0.664	<.001

Table 10 Continued.

Variable	*n*	*M*	*SD*	*r*	*p*
Ag Lessons	25	3.15	0.42	0.386	0.05
Curriculum & Standards	25	3.24	0.36	0.561	0.003

Objective Three

Objective three aimed to investigate the factors that influence a pre-service teacher's willingness to incorporate agricultural education lessons into their teaching. To answer whether any factors influence a respondent's willingness to incorporate agriculture into their lessons, *t*-tests and multiple linear regression analyses were performed. Linear regressions were completed to test predictors of willingness, whereas the *t*-tests and Mann-Whitney U tests were used to check for significance in willingness. Willingness to incorporate agricultural education was set as the dependent variable against year in TEP, familiarity with AITC, hometown population, composite perception scores, confidence to teach agricultural content, and perceived ability of agriculture curriculum to meet standards as independent variables.

To assess whether willingness to integrate agriculture was influenced by year in TEP, AITC familiarity, hometown population, perceptions of agricultural education, confidence, and curriculum and standards, independent *t*-tests were conducted. The average number of years of students in TEP was $M = 1.46$, implying most students were in practicum or student teaching. For their year in TEP, the results indicated a statistically significant different between students in the earlier stages of the program ($M = 1.44$, $SD = 0.58$) and those in their final year ($M = 3.29$, $SD = 0.33$), $t(49) = 14.02$, $p < .001$, Cohen's $d = 3.93$, 95.0% CI [1.59, 2.12]. To confirm this

result, a Mann-Whitney U test was also conducted. The test supported the *t*-test findings, showing a significant difference in median integration scores, $U = 5$, $p < .001$, $r = .86$. Refer to Table 11 for a comprehensive view of all the tests that were performed.

Table 11. Independent T-Tests Examining Willingness to Incorporate Agriculture Based on Demographic Characteristics ($n = 25$).

Variable	Willingness to Integrate		$t(49)$	p	Cohen's d
	M	*SD*			
Year in TEP	1.44	0.58	14.02	<.001	3.93
AITC Familiarity	1.48	0.51	14.99	<.001	4.23
Hometown Population	1.64	0.70	10.71	<.001	3.03
Perceptions	3.34	0.37	0.50	0.62	0.13
Confidence	2.58	0.40	6.87	<.001	1.91
Curriculum & Standards	3.27	0.39	0.23	0.82	0.10

In predicting willingness to the aforementioned factors, none were found to be statistically significant. For transparency of findings, the standard and adjusted R^2 are listed in the table, as the sample size was small. A series of simple linear regressions was conducted to explore potential predictors of willingness to incorporate agriculture. The results indicated that year in the teacher education program (TEP), familiarity with AITC curriculum, hometown population size, general perceptions of agriculture, confidence to teach agricultural content, and beliefs about agriculture's alignment with standards were not significant predictors of willingness. Although some predictors, such as confidence ($R = 0.44$, $p < .001$), showed

moderate correlations, none of the variables produced a meaningful regression model, suggesting that other unmeasured factors may influence pre-service teachers' willingness to integrate agricultural topics into their instruction. Refer to Table 12 for a comprehensive view of the tests.

Table 12. Simple Linear Regressions Predicting Willingness to Incorporate Agriculture (n = 25).

Variable	R	*F*(df)	*p*	R^2 (adj.)
Year in TEP	<.001	<.001 (1, 23)	0.92	-0.04
Familiarity with AITC	0.18	5.14 (1, 23)	0.03	0.14
Hometown Population	0.15	4.05 (1, 23)	0.05	0.11
Perceptions	0.13	3.04 (1, 23)	0.07	0.09
Confidence	0.44	18.16 (1, 23)	<.001	0.42
Perceived Ability to Meet Standards	0.16	4.54 (1,23)	0.04	0.13

Objective Four

Objective four aimed to identify demographic characteristics associated with variations in pre-service teachers' perceptions of agriculture. To answer whether demographic characteristics played a role in students' perceptions of agriculture, an ANOVA, Spearman's correlation, and *t*-tests were performed to test differences in demographic characteristics and their responses to the five constructs. The demographic question pertaining to gender did not use ANOVA, as there was not enough variability to analyze accurately.

A one-way ANOVA was conducted to measure differences in the relationship between participants' hometown population and perceived importance of agricultural education. Hometown population was categorized as urban ($M = 3.38$, $SD = 0.39$), suburban ($M = 3.17$, *SD*

= 0.29), and rural (M = 3.76, SD = 0.3). The results indicate no statistically significant differences among the three groups, F (2,22) = 1.17, p = 0.33, η^2 = 0.096. This suggests that there is a small to moderate effect size. Refer to Table 13 for a comprehensive view of this test.

Table 13. Analysis of Variance for the Relationship between Perceived Importance and Population (n = 25).

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	0.31	9.92	1.16	0.33
Within groups	22	2.89	0.13		
Total	24	3.20	0.13		

An independent samples t-test was completed to test whether willingness to integrate agriculture into their curriculum differed based on participants' year in the Teacher Education Program. The results revealed a statistically significant difference, t(36.74) = 13.29, p < .001, with a large effect size (d = .89), indicating that the year in the TEP had a substantial impact on willingness to integrate agriculture. Participants further along (M = 3.29, SD = .58) had greater willingness than those in earlier stages (M =1.44, SD = .58).

To predict whether their year in the TEP significantly changes willingness to integrate, a simple linear regression analysis was done. A significant regression was not found *(*F (1, 23) = 0.001, p < .001). R-squared was < 0.001, indicating that year in the TEP explained approximately 0.04% of the variance in willingness to integrate. This suggests that their year in the TEP does not significantly predict their willingness to integrate agriculture.

Comparing the year in the TEP to composite confidence scores, the independent samples t-test results did not show statistical significance between groups, t(21.12) = 0.01, p = 0.99.

Participants' years in the program only accounted for 2.0% of the variance in confidence levels, suggesting that the transition from practicum to student teaching does not appear to influence their confidence levels. This had a small effect size ($d = 0.005$), indicating a small impact on confidence.

As previously mentioned, most participants were female ($n = 20$). The lack of variety is not conducive to using ANOVA. An independent *t*-test and Mann-Whitney U test were conducted instead to compare gender with the level of confidence. The results indicated no statistically significant difference in confidence levels between groups, $U = 280$, $z = .66$, $p = .51$. Additionally, the effect size was small ($r = .09$).

For the *curriculum and standards* construct, a Spearman's rank-order correlation was used to assess the relationship between year in the TEP and curriculum and standards composite scores. There was a moderate to strong positive correlation, $rs = .69$, $p < .001$.

Objective Five

Objective five aimed to analyze the pre-service teachers' familiarity with AITC and their use of the AITC resources. To understand the potential connection between agricultural lessons and the pre-service teachers' familiarity with AITC, an independent *t*-test was performed. The results indicate that there was no significant difference in interest in agricultural lessons between those who had heard of AITC ($M = 2.00$, $SD = 0.00$) and those who had not ($M = 1.96$, $SD = 0.28$). This shows no significant impact on agricultural lessons based on familiarity with AITC.

To evaluate if a connection between familiarity with AITC and hometown population was present, a one-way ANOVA was performed. The results were not statistically significant, $F(2,22) = 2.68$, $p = 0.091$, showing no significant differences in familiarity across different hometown

populations. However, the effect size was moderate, $\eta^2 = .20$, suggesting a potential trend toward group differences. Descriptive statistics showed that participants from rural areas were more familiar with AITC than those from suburban or urban backgrounds. A Tukey HSD post hoc test revealed that the comparison between suburban and rural participants approached significance, $p = .089$, with a large effect size ($d = 1.47$). Refer to Table 14 for a comprehensive view of this test.

Table 14. Analysis of Variance for the Relationship between AITC familiarity and Hometown Population.

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	1.22	0.61	2.68	0.091
Within groups	22	5.01	0.23		
Total	24	6.24	0.26		

Chapter Summary

This chapter presented the findings related to pre-service elementary education teachers' perceptions of agricultural education, their confidence levels, and demographic variables associated with their willingness to integrate agricultural content into their classrooms. Objective one assessed participants' perceptions of agricultural education. Results showed that participants viewed agriculture as relevant and applicable to their future classrooms. The mean integration score was moderate ($M = 3.34$, $SD = 0.37$). This indicated a neutral to positive perception. Most participants had not used AITC materials.

Objective two examined participants' confidence in delivering agricultural content. A positive correlation ($r(24) = 0.421$, $p = .03$) was found between confidence and willingness to integrate agriculture. Higher confidence levels were associated with stronger agreement that agriculture was important, met standards, and was beneficial for students.

Objective three investigated predictors of willingness to integrate agricultural education. Linear regressions revealed that variables including year in TEP, AITC familiarity, hometown population, general perceptions, confidence, and standards alignment were not statistically significant predictors of willingness. While confidence showed a moderate correlation, no variable produced a significant regression model.

Objective four explored demographic characteristics associated with confidence and willingness, such as hometown population and year in the TEP. T-tests indicated that rural participants and those in their second year of the program exhibited great confidence in delivering agricultural content. However, these differences were not statistically significant.

Gender did not have a significant influence on confidence levels. Overall, none of the demographic characteristics could predict confidence levels.

Objective five evaluated familiarity and use of the AITC curriculum. Results indicated that familiarity with AITC did not significantly impact participants' interest in agricultural lessons. Only four participants reported having used AITC materials. There was no significant association between hometown population and familiarity with AITC.

CHAPTER FIVE

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

To address this gap in understanding, the goal of this study was to examine the perceptions, confidence, and influencing factors related to the integration of agricultural education among elementary education pre-service teachers, with specific attention to demographic differences and familiarity with available educational resources. The following research objectives guided this study:

1. Assess elementary education pre-service teachers' perceptions of agricultural education.
2. Examine elementary education pre-service teachers' confidence to deliver agricultural content.
3. Investigate factors influencing pre-service teachers' willingness to incorporate agricultural education content.
4. Compare demographic characteristics associated with variations in pre-service teacher perceptions of agriculture.
5. Explore familiarity and use of "Ag in the Classroom" resources.

The limitations within this study were the sample size, self-reported data, cross-sectional design, and disparity between certain demographic information. This study only collected responses from 27% of the population of students taking practicum or student teaching, and an overall more diverse sample would improve external validity. The gender distribution was largely skewed towards female participants, limiting the ability to draw thorough conclusions

about gender differences. The last area for improvement is the self-reported data, which may have biases or inaccuracies in self-assessment.

Objective One

Objective one aimed to assess elementary education pre-service teachers' perceptions of agricultural education. Understanding pre-service teachers' perceptions of agricultural education ensures young children are well-informed consumers and aware of agriculture's presence in their lives (Colbath & Morrish, 2010; Smalley & Rank, 2019). Learning what participants believe about agriculture allows those in the industry to create opportunities to clear misconceptions, provide usable agriculture materials, and offer resources for teachers to increase their understanding (Burrows et al., 2020; Hill, 2021; McKim et al., 2021).

Participants in this study showed an average level of willingness to integrate agriculture into their teaching, $M = 3.29$ ($SD = 0.33$), which may reflect their own agricultural experiences and exposure. Similar to the findings of Kovar and Ball (2013) and Smalley and Rank (2019), participants in this study generally perceived agricultural topics as moderately applicable across their subject areas and useful in their future classrooms. This supports prior research indicating that while elementary pre-service teachers see the value in agricultural education, confidence and familiarity with integration strategies may be limited (McKim et al., 2021; Rianda, 2019).

Results of objective one suggests that participants felt agriculture was relatively important, believed that agricultural topics applied to their subjects, generally recognized the value of agricultural lessons, had moderate confidence to teach agriculture, felt agricultural lessons met curriculum standards, and had not used AITC materials. Much like the findings of Bellah and Dyer (2007), Knobloch et al. (2007), and Spielmaker et al. (2014), pre-service

teachers felt agricultural lessons were useful and could be incorporated but lacked the confidence to incorporate or use them. Consistent with the recommendations of Rice and Kitchel (2018) and Weeks et al. (2020), this finding highlights the need for teacher education programs to provide more targeted training, modeling, and access to agricultural curriculum tools like AITC, so that pre-service teachers can build both competence and confidence in delivering agricultural content.

Objective Two

Objective two examined elementary education pre-service teachers' confidence to deliver agricultural content. According to Bandura's (1997) theory of self-efficacy, individuals are more likely to engage in behaviors they feel capable of performing. There can be a multitude of reasons a teacher may not feel confident teaching agriculture in their classrooms, including limited exposure, lack of content knowledge, and perceived irrelevance to core standards (Knobloch et al., 2007; Kovar & Ball, 2013). Understanding how pre-service teachers feel about incorporating agriculture answers one of the reasons there may be much misinformation regarding the subject (Colbath & Morrish, 2010; Specht et al., 2014). This also provides insight into future professional development opportunities to better prepare non-agricultural educators (Bandura, 1997; Burrows et al., 2020; Weeks et al., 2020).

Results of objective two suggest that pre-service elementary teachers with higher levels of confidence in teaching agriculture are more likely to view agricultural education as important, express greater willingness to incorporate it into their future classrooms, and believe it aligns with state and STEAM standards. Similar to the findings of Balschweid et al. (2000) and Schwichow (2016), respondents in this study perceived agricultural content as a valuable tool for supporting student understanding of complex concepts and providing meaningful hands-on

learning opportunities. These findings reflect the significance of pedagogical self-efficacy, or a teacher's belief in their ability to effectively teach specific subject matter (Bandura, 1997), which plays a crucial role in shaping classroom practices and curriculum integration (Park et al., 2018).

Prior research supports that direct experience, targeted professional development, and exposure to agriculture-based teaching strategies could help pre-service teachers build both competence and confidence in unfamiliar subjects (Anderson et al., 2014; Bowling et al., 2024). This increase in confidence could lead to more frequent and effective use of AITC (Clemons et al., 2018; Stair et al., 2012).

Objective Three

Objective three aimed to investigate the factors that influence pre-service teachers' willingness to incorporate agricultural education lessons into their teaching. It is critical to understand the reasons behind teachers not wanting to incorporate agriculture into their classrooms. Agricultural topics build hard and soft skills through curricular content by teaching contextually unlike other subjects (Roberts & Ball, 2009; Weeks et al., 2020), and being able to see the obstacles that may prevent the inclusion of agriculture can provide opportunities to remove those barriers. By identifying potential obstacles to integration, teacher preparation programs can better support future educators in using agriculture in a meaningful interdisciplinary context (Keating et al., 2010; Vallera & Bodzin, 2019).

This study assessed whether willingness to integrate agriculture was influenced by year in TEP, AITC familiarity, hometown population, perceptions of agricultural education, confidence, and curriculum and standards. Results revealed a statistically significant relationship with a large effect size between students' stage in the TEP and their likelihood of integrating agricultural

concepts, indicating that students in later stages of teacher preparation are substantially more likely to do so. Much like the findings of Stair et al. (2012) and Anderson et al. (2014), this study suggests that as pre-service teachers gain more classroom experience and pedagogical knowledge, their willingness and readiness to incorporate agriculture increases. However, because both studies were conducted within land-grant institutions, it is possible that the agricultural culture of these environments contributed to the participants' increased comfort and enthusiasm for integrating agriculture. Such growth reflects Bandura's (1997) concept that self-efficacy develops through continuous experience and supportive environmental reinforcement.

A series of simple linear regressions were conducted to explore potential predictors of willingness to incorporate agriculture. Regression analyses did not identify any meaningful predictors of willingness to incorporate agriculture, suggesting that no single factor, such as year in the TEP, familiarity with AITC curriculum, or confidence, was strong enough to independently explain participants' intentions. Although some predictors, such as confidence, showed moderate, statistically significant correlations, none of the variables produced a meaningful regression model. This suggests that additional, unmeasured factors may influence pre-service teachers' willingness to integrate agricultural topics into their instruction. Prior research identifies several such factors, including early exposure to agriculture (Trexler & Suvedi, 1998), personal attitudes toward science and environmental topics (Plutzer et al., 2016; Stevenson et al., 2016), access to agricultural teaching resources (Malecki et al., 2004), or the influence of mentor teachers (Smalley & Rank, 2019). Teacher identity formation and values around social relevance and interdisciplinary integration have also been found to affect instructional choices (McKim et al., 2016; Rice & Kitchel, 2018). Although these influences were not directly measured in this study,

they highlight potential avenues for future research. Specifically, examining how teacher preparation programs can better support pre-service teachers in delivering agricultural content across subject areas may strengthen agricultural literacy integration.

The results of objective three indicated that willingness to incorporate agriculture could not be reliably predicted by year in TEP, familiarity with AITC, hometown population, perception scores, confidence to teach agricultural content, or perceived ability of agricultural curriculum to meet standards. Unlike objective one, which described participants' perceptions of agricultural education, these findings from objective three specifically investigated whether these factors could explain or predict integration behaviors. Although prior research suggests that background experiences in agriculture and teaching often shape willingness to integrate agriculture (Knobloch & Martin, 2000; Trexler & Suvedi, 1998), the nonsignificant results here suggest that other influences, such as program structure, faculty modeling, or curricular requirements, may play a stronger role than the variables observed here. Furthermore, this aligns with Bandura's (1978) concept of reciprocal determinism, where both personal beliefs, training, and environmental and contextual factors such as institutional culture, peer modeling, or perceived support systems shape an individual's willingness to teach agriculture.

Objective Four

Objective four aimed to identify demographic characteristics associated with variations in pre-service teachers' perceptions of agriculture. A teacher's background and experience play a large part in their ability to teach a subject. Students may miss out on the agriculture curriculum if the teacher does not feel able to adequately teach it. Studying whether anything predisposes

pre-service elementary teachers to be receptive to agricultural integration gives opportunities to better prepare those who are not likely to have a deeper understanding of agriculture.

Objective four aimed to identify demographic characteristics associated with variations in pre-service teachers' perceptions of agriculture. Results indicated that although rural participants had slightly higher mean perception scores compared to urban and suburban participants, these differences were not statistically meaningful. This suggests that personal history, such as rural upbringing, may interact with environmental exposure and observed behaviors in meaningful ways, consistent with reciprocal determinism (Bandura, 1978). Similarly, participants' responses indicated that the year in the TEP did not have a substantial impact on willingness to integrate agriculture. Their year in the program accounted for 2.0% of the variance in confidence levels, suggesting that the transition from practicum to student teaching has minimal influence on their confidence to teach agricultural content. Understanding when and how confidence and perception are developed could inform the design of more targeted support for pre-service teachers, particularly those from non-rural backgrounds (Knobloch et al., 2007; Trexler & Suvedi, 1998).

Moreover, while year in the TEP did not statistically predict willingness to integrate agriculture, this may be more reflective of their exposure to agricultural content rather than academic progression. Prior research has shown that direct experiences and contextual exposure often have a stronger influence on content integration than time spent in a program alone (Knobloch & Martin, 2000; Smalley & Rank, 2019). Additionally, results suggest that there was no statistical significance between confidence levels and gender. Although these findings are not statistically significant, they may still hold practical significance, highlighting trends that could

inform future programming or curriculum design (Schober et al., 2018). For example, it may be that many pre-service teachers already enter the TEP with relatively high confidence levels, particularly if they have prior teaching experience or agricultural familiarity. Overall, both hometown population and year in the TEP have little significance to their willingness to integrate agriculture and overall confidence. Earlier findings suggested a potential, though not statistically significant, trend in which participants from rural backgrounds reported slightly higher perception and confidence scores, indicating that prior exposure to agricultural contexts may play a role (Knobloch & Martin, 2000; Smalley & Rank, 2019).

Objective Five

Objective five aimed to analyze pre-service teachers' familiarity with AITC and their use of the AITC resources. AITC curriculum is a simple, streamlined way for educators to implement agricultural topics into their teaching. By examining pre-service teachers' awareness of this program, it can be determined if knowledge changes how willing teachers are to use it and if that changes their perceptions of agriculture. Awareness and usage are important to understand if teachers know about it, and the reasoning for not using it.

Results of objective five suggest that familiarity with the AITC curriculum has no influence on interest in agricultural lessons, and that hometown population did not affect whether the pre-service teachers were familiar with the AITC program or not. Only four participants had used the AITC curriculum at the time of the study, and one felt prepared to integrate it into their teaching. While rural participants showed descriptively higher familiarity with AITC compared to their suburban and urban peers, these differences were not statistically significant. Although effect sizes indicated a moderate relationship, effect size alone does not imply practical or

statistical significance (Schober et al., 2018), and these results should be interpreted with caution due to the small sample size, particularly among rural participants. These findings align with prior research suggesting that pre-service teachers often lack exposure to agricultural resources like AITC and may benefit from structured introductions during teacher preparation programs (Knobloch & Martin, 2000; Vallera & Bodzin, 2019).

Although AITC has been promoted as a valuable tool for integrating agriculture into general education settings (Spielmaker et al., 2014; Knobloch & Martin, 2000), the findings of this study suggest that few elementary pre-service teachers are familiar with the program. This limited exposure may indicate that AITC is not widely promoted within teacher education programs or that its integration remains surface-level rather than embedded in coursework. Determining whether educators have used it or heard of it provides the ability to see if AITC needs to be better advertised and made known. Through these findings, it appears that few elementary pre-service teachers are familiar with AITC, suggesting that exposure to resources may not be sufficient to instill confidence. This may also reflect limited or surface-level use of the materials, indicating a need for deeper, more guided integration of agricultural content within teacher preparation coursework (Vallera & Bodzin, 2019).

Implications and Recommendations

This study was critical in determining the perceptions and willingness of elementary pre-service teachers to utilize agricultural education in their classrooms. Understanding these perspectives is important because early educators shape foundational knowledge and attitudes in children, and their confidence and interest in teaching agriculture directly impacts whether agricultural topics are included in elementary instruction (Knobloch et al., 2007; Trexler &

Suvedi, 1998). The goal of this study was to assess the level of agricultural literacy and understanding among pre-service elementary teachers, with the aim of utilizing the findings to better understand where some misconceptions about agriculture may come from. The results of this study could inform curriculum changes within teacher preparation programs, allowing for more relevant and accurate agricultural topics to be taught in ways that build pre-service teachers' confidence and willingness to integrate agriculture (Tudge, 2018) and the potential for inaccurate imagery or shallow understanding to shape students' lifelong perceptions (Baringer, 2021; Specht et al., 2014).

To expand upon these findings and eliminate current limitations, future research should focus on increasing sample size and diversity. While this study found no statistically significant relationship between demographic characteristics such as gender, hometown population, or year in TEP, the limited sample size may have obscured meaningful patterns. While expanding the research to other universities may not substantially increase demographic diversity due to the consistently high percentage of female students in elementary education programs (Skipper & Douglas, 2015), it could provide broader perspectives by incorporating students from different geographic regions, institutional missions, or curricular emphases. Additionally, replicating this study at non-land grant or liberal arts institutions could determine whether institutional context influences pre-service teachers' agricultural literacy and willingness to integrate agricultural concepts. These would improve the generalizability of findings and allow researchers to examine potential regional or programmatic influences on agricultural literacy. Teacher preparation programs and agricultural literacy efforts should prioritize building pre-service teachers' confidence in teaching agriculture by offering scaffolded, standards-aligned experiences that

emphasize relevance, adaptability, and student engagement. Pre-service teachers should partake in field experiences, micro-teaching, and access pre-developed agriculture lessons, such as those from AITC, to feel better prepared and empowered to integrate agricultural content meaningfully (Knobloch & Martin, 2000; Malecki et al., 2004). Elementary education teacher preparation programs should also provide supplemental agricultural content and intentional agricultural education experiences for all pre-service teachers throughout their program, not just student teaching (Smalley & Rank, 2019; Stair et al., 2012).. Ensuring access to curriculum tools such as AITC and integrating agriculture throughout coursework and field placements could better support future educators increase both the competence and confidence needed to integrate agricultural concepts effectively into their classrooms (Rice & Kitchel, 2018; Weeks et al., 2020).

To better understand the foundational perceptions explored in objective one, which assessed pre-service teachers' perceptions of agricultural education, future studies could assess the impact of early exposure to agriculture through agricultural literacy training, standards-based lesson modeling, or integration into foundational education coursework. Further, this potential research would provide valuable guidance for teacher educators and curriculum developers. Intentional exposure to agricultural concepts may shift perceptions and increase agricultural awareness before practicum experiences (Spielmaker et al., 2014; Vallera & Bodzin, 2019).

Regarding pre-service teachers' confidence in teaching agriculture, a longitudinal research design could explore how perceptions and confidence in teaching agricultural content evolve throughout the teacher preparation program and into early career stages. Since confidence is closely linked to self-efficacy (Bandura, 1997) and prior studies suggest that confidence builds

over time with support and experiences (Stair et al., 2012), this work would be highly relevant for teacher preparation programs looking to scaffold confidence development and how to introduce agricultural education for the most impact. Because efficacy beliefs strongly influence whether knowledge is applied in practice (Bandura, 1997), teacher preparation programs should prioritize experiences that build pre-service teachers' confidence in integrating agriculture. This may include embedding agriculture in core methods courses, modeling integration through mentor teachers, and offering feedback that reinforces successful implementation.

To deepen the understanding of factors influencing willingness to incorporate agriculture, future research should incorporate qualitative methods such as focus groups or interviews. These methods would help identify unmeasured variables, such as personal values, teaching philosophies, perceived school support, or peer influence, which may explain why some students are more likely than others to integrate agriculture. This would provide researchers and professional developers a stronger understanding to help reduce barriers to implementation (Anderson et al., 2014; Rice & Kitchel, 2018).

In exploring demographic characteristics associated with variations in pre-service teacher perceptions of agriculture, further research should investigate the practical significance of traits like rural upbringing, school district type, or first-generation college status, even if not statistically significant in a single study. Prior research suggests that students from rural areas or agricultural backgrounds tend to demonstrate greater agricultural awareness and confidence (Rianda, 2019; Nugraha et al., 2024). Examining these factors across multiple institutions could reveal meaningful patterns to recruiters, advisors, and teacher trainers, supporting more targeted programming (Skipper & Douglas, 2015; Stair et al., 2012).

Future research should also examine why AITC resources are underutilized and whether increased, guided exposure within teacher preparation programs improves confidence and interest. Understanding barriers to access or implementation is important because it can guide teacher educators and AITC program developers in embedding agricultural resources earlier and more meaningfully in teacher preparation, which may increase pre-service teachers' readiness to integrate agriculture (Pense et al., 2005; Specht et al., 2014). Therefore, pre-service educators should implement more agricultural education content, professional development, and training into their programs to have a positive effect on pre-service teachers' perceptions about agriculture by increasing awareness. Further, it would be critical to explore the types of resource training that most effectively translate into classroom use to help ensure that pre-service teachers are not only aware of agricultural content but also prepared and willing to use it.

In summary, this study highlights the critical importance of integrating agricultural education outside of CTE classrooms. Findings revealed that while pre-service teachers generally recognize the value of agricultural topics and see their alignment with curriculum standards, they often lack the confidence and exposure needed to integrate agriculture into their teaching. The limited familiarity with AITC materials further reinforces the need for more intentional support within teacher preparation programs. Our elementary teachers, both future and current, need to have an accurate, up-to-date understanding of agricultural knowledge and practical resources. Teachers can enhance their confidence and willingness to include agriculture, empowering students with essential life skills and a deeper understanding of the systems that sustain them.

Chapter Summary

This chapter elaborated on the perceptions, confidence levels, and influencing factors surrounding elementary education pre-service teachers' integration of agricultural education into their classrooms. Through five research objectives, the study aimed to better understand how future educators view agriculture and what might support or hinder its inclusion in their future teaching practice.

Objective one assessed participants' general perceptions of agriculture and their willingness to incorporate it into the classroom. Results showed that while pre-service teachers viewed agricultural content as moderately applicable and valuable, many lacked the confidence to implement it, and few had engaged with AITC materials. Objective two explored teacher confidence, finding that participants who were more confident in their teaching abilities were also more likely to see agricultural education as important, aligned with standards, and beneficial to student learning. When participants showed low confidence but positive attitudes regarding agriculture, the aforementioned frameworks, Bandura's (1997) self-efficacy and Bandura's (1978) triadic reciprocal determinism, helped contextualize the gap between belief and behavior.

Objective three sought to identify factors influencing willingness to incorporate agriculture. While later-stage teacher candidates were more likely to include agriculture, regression analysis indicated that commonly assumed predictors like AITC familiarity, year in the teacher education program (TEP), and hometown population did not significantly predict willingness. These findings suggest other underlying factors, potentially unmeasured, may play a stronger role in shaping integration decisions.

Objective four examined the demographic characteristics associated with variations in perception and confidence. Rural participants reported slightly more positive perceptions, but the differences were not statistically significant. Similarly, factors like year in the TEP and gender showed only small or negligible effects on willingness and confidence, implying that initial attitudes and experiences prior to formal training might play a greater role.

Objective five focused on familiarity with AITC. Most participants were unfamiliar with the resource, and only a few had ever used it. This raises an important question about the visibility and accessibility of AITC materials, especially given their widespread availability and utility for integrating agriculture into core subjects (Pense et al., 2005; Malecki et al., 2004). Although no statistical significance was found between AITC familiarity and willingness to teach agriculture, rural participants seemed slightly more aware of the program. These results show a need for more intentional exposure to agricultural education resources within teacher preparation programs, as limited awareness may hinder pre-service teachers' ability to incorporate agricultural content confidently (Knobloch & Martin, 2000; Smalley & Rank, 2019).

The study's implications highlight the importance of equipping pre-service teachers with both the tools and confidence to integrate agriculture into their teaching. Increasing awareness of AITC, embedding agriculture across disciplines, and offering targeted professional development within pre-service teacher preparation programs can help overcome barriers and support educational equity for agricultural literacy (Knobloch et al., 2007; Vallera & Bodzin, 2019). Although limited by its sample size, cross-sectional design, and reliance on self-reported data, this study offers important insight into where misconceptions begin and where the field of agricultural education can grow. Future research should pursue longitudinal studies, incorporate

qualitative data, and prioritize diverse participant populations to deepen understanding and extend impact.

Ultimately, this study emphasizes the critical role of agricultural literacy in elementary classrooms and the need to prepare all teachers, not just those in CTE settings, to teach accurate, relevant agricultural content. By addressing gaps in confidence, awareness, and training, we can better support teachers and students in developing the knowledge and skills to navigate the increasingly complex food and agriculture systems they depend on every day.

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APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

IRB Protocol #2025-1889-EXEMPT APPROVED

From NoReply@TOPAZTI.com <NoReply@TOPAZTI.com>
Date Wed 3/12/2025 12:34 PM
To Perry, Dustin <dustin.perry@montana.edu>; Droszcz, Faith <faithdroszcz@montana.edu>; Szott, Brenna <brenna.szott@montana.edu>

External Sender

Hello Droszcz, Faith,

Your protocol was reviewed by the IRB and has been approved.

PI: Droszcz, Faith
Approval Date: 3/12/2025
Title: Understanding the Perceptions of Upperclassmen Pre-Service Elementary Education Teachers on Agriculture

Protocol #: 2025-1889-EXEMPT
Review Type: Amendment
Expiration Date: 1/22/2030

Work described under this protocol may now commence. The PI is responsible for ensuring that the protocol accurately describes research practices being conducted.

> Review Category designation determined by the IRB can be found in the final section of your protocol.
> Any changes must be submitted via Amendment prior to implementation.
> Per the Common Rule, research only requires Interim (annual) Review by the IRB if 1) it was reviewed via Full Committee or 2) is regulated by the FDA.
> All research is subject to post approval monitoring.
> All protocol types must be renewed 5 years after approval.
> Inform the IRB once your research is complete so that the protocol may be inactivated.

Please contact your IRB Program Manager with any questions or if you are in need of assistance. Thank you for your diligence in the care of human subjects research participants.

Institutional Review Board for the Protection of Human Subjects | Office of Research Compliance | Montana State University

Access your protocol anytime at https://nam10.safelinks.protection.outlook.com/?url=https%3A%2F%2Fmontanaprod.topazti.net%2F%2FElements%3FemailLink%3D11%252c102%252c13436&data=05%7C02%7Cfaithdroszcz%40montana.edu%7C97a256cc8e8b450409d508dd61947c21%7C324aa97a03a644fc91e43846fbced113%7C0%7C0%7C638774012585596133%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMiIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=isAfw0Dhxb5jYMMPHnR7aEfckGk5zMGuupGQ6bCzvsM%3D&reserved=0.

APPENDIX B

PRE-NOTICE LETTER FOR STUDY AND INVITATION

Outlook

Seeking research participants for a study on perceptions of agriculture!

From Droszcz, Faith
Date Tue 1/28/2025 10:00 AM
To Waller, Karen; Hicks, James; Jacobs, Kristi

Cc Perry, Dustin; Wilson, Sarah

Dear Education Faculty,

My name is Faith Droszcz, and I am a graduate student in Agricultural Education at Montana State University under the direction of Dr. Dusty Perry, my faculty advisor.

I am conducting this research on behalf of the Department of Agricultural and Technology Education to explore the perceptions pre-service elementary education teachers have about agriculture. This study aims to better understand how educators view and connect with agricultural topics, which can influence how agriculture is integrated into elementary education curricula.

I am asking for your assistance in encouraging your students to participate in this research by completing a confidential online survey. The survey consists of 35 Likert-scale questions and will take approximately 10 minutes to complete.

As a thank-you for their time, students who complete the survey will receive a $5 Amazon gift card.

Participation in this study is entirely voluntary and involves minimal risk, no sensitive personal information will be collected, and responses will remain confidential.

If it would be helpful, I am happy to visit your class in person for about 5 minutes to briefly explain the survey and answer any questions your students may have. If this is of interest, please feel free to reach out to coordinate a time.

If your students are ready to participate, they can access the survey through the following link:

https://montana.qualtrics.com/jfe/form/SV_dotK6FCitKs2VGS.

If you or your students have any questions or concerns about the study, please feel free to contact me at faithdroszcz@montana.edu or my advisor at dustin.perry@montana.edu.

Thank you for your time and support in making this research possible!

Warm regards,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Cell: 916-261-6016
Linfield 229

Outlook

Reminder: Encourage your students to participate in a research study!

From Droszcz, Faith <faithdroszcz@montana.edu>
Date Tue 2/4/2025 9:59 AM
To Jacobs, Kristi; Hicks, James; Waller, Karen
Cc Perry, Dustin; Wilson, Sarah

Dear Education Faculty,

I hope this message finds you well!

This is just a friendly reminder about the research study I'm conducting on pre-service elementary education teachers' perceptions of agriculture. If you haven't had a chance to share the survey link with your students yet, I'd be grateful if you could do so.

A big thank-you to those who have already shared the survey and encouraged student participation, I truly appreciate your support!

The survey takes about 10 minutes to complete, and as a thank-you for their time, students will receive a $5 Amazon gift card upon completion. Participation is voluntary, and all responses will remain confidential.

If it would be helpful, I'm also happy to visit your class for about 5 minutes to explain the survey and answer any questions your students may have. To share the survey link with your students, please use this: https://montana.qualtrics.com/jfe/form/SV_dotK6FCitKs2VGS

Thank you to everyone who has already helped with this research, and if you have any questions or need additional information, feel free to reach out!

Best regards,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Cell: 916-261-6016
Linfield 229

Outlook

Re: Reminder: Encourage your students to participate in a research study!

From Droszcz, Faith <faithdroszcz@montana.edu>
Date Tue 2/11/2025 10:20 AM
To Jacobs, Kristi; Hicks, James; Waller, Karen
Cc Perry, Dustin; Wilson, Sarah

Dear Education Faculty,
I hope you're doing well! I'm continuing to collect data for my research study on pre-service elementary education teachers' perceptions of agriculture, and I'd be grateful if you could share the survey link with your students who haven't participated yet. So far, the response rate has been lower than anticipated, and I'd really appreciate any additional outreach to help ensure a strong and representative set of responses.

I'd also love the opportunity to visit your class for a few minutes to talk with students about the survey and answer any questions they may have. Please let me know if this is something you'd be open to. I'd be happy to work around your schedule!

Below is a message you can easily forward to your students:

Subject: Quick Survey Opportunity + $5 Gift Card!
Dear Students,
I hope you're having a great semester! I'm conducting a research study on pre-service elementary education teachers' perceptions of agriculture and would love your participation.
The survey takes about 10 minutes, and as a thank-you for your time, you'll receive a **$5 Amazon gift card** upon completion. Participation is completely voluntary, and all responses are confidential.
Click here to take the survey: https://montana.qualtrics.com/jfe/form/SV_dotK6FCitKs2VGS
Thank you for your time, I truly appreciate your help! If you have any questions, please reach out to faithdroszcz@montana.edu.
Best,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Linfield 229

Thank you again for your willingness to assist my thesis research! Please reach out with a time that works for you if you'd like me to come talk with your students for about a few minutes! Have a wonderful week.

Warm regards,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Cell: 916-261-6016

Outlook

Re: Reminder: Encourage your students to participate in a research study!

From Droszcz, Faith <faithdroszcz@montana.edu>
Date Tue 2/18/2025 9:52 AM
To Jacobs, Kristi Hicks, James; Waller, Karen

Cc Perry, Dustin; Wilson, Sarah

Dear Education Faculty,

I hope you're doing well! I truly appreciate your help in sharing my research study on pre-service elementary education teachers' perceptions of agriculture. Your support has been invaluable, and I'm grateful to those who have already encouraged their students to participate.

As I continue collecting data, I'd love to reach even more students. If you haven't had a chance to share the survey yet, I'd greatly appreciate it if you could pass it along. To make it easy, I've included a message below that you can forward to your students.

Additionally, if it would be helpful, I'm happy to visit your class for about five minutes to briefly explain the study and answer any student questions. Please let me know if that's something you'd be open to. I'd love the opportunity!

Below is the message for your students:

Subject: Quick Survey Opportunity + $5 Gift Card!

Dear Students,

I hope you're having a great semester and staying warm! I'm conducting a research study on pre-service elementary education teachers' perceptions of agriculture and would love your participation.

The survey takes about 10 minutes, and as a thank-you for your time, you'll receive a **$5 Amazon gift card** upon completion. Participation is completely voluntary, and all responses are confidential.

Click here to take the survey: https://montana.qualtrics.com/jfe/form/SV_dotK6FCitKs2VGS

Thank you for your time. I truly appreciate your help! If you have any questions, please email me at: faithdroszcz@montana.edu.

Best,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant

Outlook

Re: Reminder: Encourage your students to participate in a research study!

From Droszcz, Faith <faithdroszcz@montana.edu>
Date Mon 3/3/2025 7:30 AM
To Jacobs, Kristi; Hicks, James; Waller, Karen
Cc Perry, Dustin; Wilson, Sarah

Dear Education Faculty,

I hope you're doing well! I want to take a moment to sincerely thank you for your support in helping me with my research on pre-service elementary education teachers' perceptions of agriculture. Your assistance has been monumental, and I truly appreciate the time and effort you've taken to share my survey with your students.

I originally aimed for 30 responses, and I'm so close. Only 4 more to go! If you're able to send one last reminder to your students, I'd be incredibly grateful. Below is a message you can easily forward to them:

Subject: Just 4 More Survey Responses Needed! ($5 Gift Card Included!)

Dear Students,

Thank you to everyone who has already participated in this research study! I originally aimed for 30 responses, and I only need 4 more to reach my goal. If you haven't taken the survey yet, I'd love for you to participate!

The survey takes about 10 minutes, and as a thank-you for your time, you'll receive a $5 Amazon gift card upon completion. Participation is completely voluntary, and all responses are confidential.

Click here to take the survey: https://montana.qualtrics.com/jfe/form/SV_dotK6FCitKs2VGS

I truly appreciate your help in reaching this final goal—thank you so much!

Best,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Linfield 229

Again, thank you for all your support. It has made such a difference! Please let me know if you have any questions or if I can assist in any way.

Best regards,

Faith Droszcz
Montana State University
Dept. of Agricultural & Technology Education
Graduate Assistant
Cell: 916-261-6016
Linfield 229

APPENDIX C

SURVEY INSTRUMENT

MONTANA
STATE UNIVERSITY

Pre-Service Teachers' Perceptions of Agriculture

The primary goal of this research project (IRB #2025-1889) is to understand the perspectives of Montana State University (MSU) Elementary Education teaching candidates regarding agricultural education, K-12 curriculum and related agricultural issues. By gaining insight into these views, we can better inform MSU pre-service teachers about available curricula and enhance their preparation to collaborate with agricultural education pre-service teachers. You were identified as a potential participant in this study due to your enrollment in a practicum course or the student teaching experience during the Spring 2025 semester. Faith Droszcz, a graduate student of the Department of Agricultural & Technology Education, is leading this study.

If you agree to participate in this study, you will complete a survey that includes questions about your education at MSU, your past and current experiences (if any) in

agriculture, and your thoughts on agricultural education. Participation is voluntary. As a thank-you for completing the survey, you will receive a **$5 Amazon gift code** via email. Choosing not to participate will not affect your grades or class standing in any way. If you have any questions about your participation, please feel free to ask at any time. All records for this study will be kept confidential. Any public reports resulting from this research will not include information that could identify you. Research records will be stored securely, accessible only to the researchers. This research involves minimal risk, as it is conducted confidentially, does not collect sensitive information, and only requires **10 minutes** to complete.

If you have questions about the research, you can contact Faith Droszcz with the Department of Agricultural and Technology Education at Montana State University by phone at (916)261-6016 or by email at faithdroszcz@montana.edu. If you have additional questions about the rights of human subjects, you can contact the Chair of the Institutional Review Board, Mark Quinn, by email at irb@montana.edu.

Select "I agree" below if you agree to participate in this research. By selecting, you understand that you may later

refuse to participate and withdraw from the study at any time, have read the above and understand the discomforts, inconveniences, and risks of this study, and understand that you may refuse to participate and withdraw from the study at any time.

- ○ I agree to participate
- ○ I do NOT agree to participate

Thank you for agreeing to participate in this study. To ensure consistency in terminology, here is our working definition of agricultural education: Agricultural education is a program that teaches students about agriculture, food, and natural resources. It covers the science, business, and technology of plant and animal production, and the management of land and natural resources.

Please read each statement carefully and select the response that best reflects your opinion. For each question, choose one of the following options:
Strongly Disagree, Disagree, Agree, or Strongly Agree.

To answer, click on the option that matches your

perspective. Take your time, and feel free to complete the survey at your own pace. Thank you for your participation!

Perceptions About Agricultural Education

Please read each statement carefully and select the response that best reflects your opinion.

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
Agricultural education is important for elementary students to learn about.	○	○	○	○
The general public does not fully recognize the importance of agricultural education in schools.	○	○	○	○
Understanding where food comes from is important for elementary students.	○	○	○	○
Learning about agriculture can help students better understand environmental challenges.	○	○	○	○

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
Students benefit more from hands-on agricultural activities compared to lecture-based classroom instruction.	○	○	○	○
Agricultural education helps students grasp global systems like food supply chains and economic impacts.	○	○	○	○
Exploring agricultural topics encourages critical thinking in students.	○	○	○	○
Agricultural education can connect students to their local community.	○	○	○	○
Agricultural education is as important as other core subjects like math and science.	○	○	○	○
Agriculture plays a critical role in addressing climate change challenges.	○	○	○	○

Interest in Agriculture Integration

Please read each statement carefully and select the response that best reflects your opinion.

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
I would incorporate agricultural topics into my future teaching if resources were provided.	○	○	○	○
I would use an interactive website with agriculture-related lesson ideas.	○	○	○	○
I see value in collaborating with local farmers or agricultural experts for classroom activities such as field trips to farms.	○	○	○	○
I feel confident in organizing field trips or inviting guest speakers to my classroom.	○	○	○	○
Agricultural topics could be used to create versatile lessons.	○	○	○	○

I would like or use agriculture-based lessons to teach: (Select all that apply)

- ☐ Science
- ☐ Social Studies
- ☐ Language Arts
- ☐ Math
- ☐ Other: _____

Confidence in Teaching Agriculture & Professional Development

Please read each statement carefully and select the response that best reflects your opinion.

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
I feel prepared to integrate agriculture into my teaching.	○	○	○	○
I would need professional development to feel confident teaching agriculture topics.	○	○	○	○

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
I feel confident in connecting agriculture topics to current educational standards.	○	○	○	○
I would attend professional development sessions focused on agriculture education.	○	○	○	○
I feel knowledgeable about the various career opportunities in agriculture.	○	○	○	○
I would like to collaborate with other teachers on agriculture education.	○	○	○	○
I feel there are significant challenges to integrating agriculture education into the curriculum.	○	○	○	○
Hands-on agriculture activities, such as gardening, can be incorporated into teaching if sufficient resources are provided.	○	○	○	○

Educational Standards & Curriculum

Please read each statement carefully and select the response that best reflects your opinion.

	Level of Agreement			
	Strongly disagree	Disagree	Agree	Strongly agree
I believe agriculture topics can align with Common Core or other state standards effectively.	○	○	○	○
Agriculture-based lessons can help meet standards for STEAM (Science, Technology, Engineering, Arts, Math) education.	○	○	○	○
Agriculture education can be adapted to meet the needs of students from diverse cultural backgrounds.	○	○	○	○

Demographic

Please read each of the following questions carefully and answer honestly. Please choose only one.

What is your current year in the Teacher Education Program?

- ○ Final Year/Practicum
- ○ Final Year/Student Teaching
- ○ [ ] Other:

Which of the following best describes the community where you grew up?

- ○ Urban (population larger than 50,000)
- ○ Suburban (population between 5,001-49,999)
- ○ Rural (population smaller than 5,000)

What is your gender identity?

- ○ Male
- ○ Female
- ○ Non-binary
- ○ Prefer not to say

Have you ever heard of "Ag in the Classroom"?

- ○ Yes
- ○ No

Have you ever used "Ag in the Classroom"?

- ○ Yes
- ○ No

Would you like to provide your email in case we need to follow up with additional details?

- ○ Yes
- ○ No

Since you answered "yes" in the previous question, please provide your email in the event we need more details:

Thank you for completing the survey! You are eligible to receive a $5 Amazon gift card for participating in the

survey. Please provide your email if you would like to receive the $5 Amazon gift card. Gift card will be sent electronically within 72 hours of completion.(**Optional** and **not required** to participate.)

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