ABSTRACT

WILLIAMS, MAEGEN RUTH. Factors that Influence North Carolina Agricultural Education Teachers to Integrate Technology in the Classroom. (Under the direction of Wendy J. Warner.)

The purpose of this study was to identify and examine factors influencing the integration of technology into the instructional process in North Carolina Agricultural Education classrooms. The research objectives included determining the availability of educational technology, determining how frequently educational technology is utilized in the classroom, determining the barriers that may inhibit teachers from integrating technology, determining how teachers acquire the knowledge to use educational technology for instruction effectively, and determining the attitudes of Agricultural Education teachers towards integrating technology in classroom instruction. The study was conducted as a census of all North Carolina agriculture teachers teaching in middle and high schools via an online survey. It was determined that teachers have access to a variety of teacher-based devices, software applications, and web services. Although teachers may not use all these technologies on a daily basis, the rate of frequency is appropriate for the type of technologies. However, when agriculture students used technology in the classroom they were typically using basic technology skills, and when compared to teacher use of technology, the students' use is considerably less frequent. The expense of technology was identified as the greatest barrier to technology integration. Another major barrier was time to develop lessons that use technology. Teachers acquired much of their technological knowledge from personal trial and error and interaction with other faculty and staff. Teachers had positive attitudes towards student use of technology, but demonstrated teacher-

centered instruction rather than student-centered instruction when using technology in the classroom.

Factors that Influence North Carolina Agricultural Education Teachers to Integrate Technology in the Classroom

by
Maegen Ruth Williams

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APPROVED BY:

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Wendy Warner Committee Chair	Jim Flowers
_____	
Barry Croom	

BIOGRAPHY

Maegen Williams was born in Robbins, NC to parents Edwin and Ruth Williams. She has one brother, Lucas. Her middle and high school years were spent involved attending and participating in FFA events. Maegen graduated from North Moore High School in 2008.

Maegen completed her post secondary education at North Carolina State University in Raleigh, NC. While at NCSU, Maegen was a member of The Honor Society of Phi Kappa Phi, the Golden Key International Honour Society, and Gamma Sigma Delta. Maegen interned with Carolina Farm Credit during the summer of 2010. In 2011, Maegen graduated summa cum laude from NCSU with her Bachelor's of Science in Agricultural Education.

Maegen continued her education at North Carolina State University to earn her Master of Science Degree in Agricultural Education. During this time, she served as a Teaching Assistant for the Agricultural Institute at NC State.

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CHAPTER 1: INTRODUCTION

President Barack Obama presented the National Education Technology Plan, *Transforming American Education: Learning Powered by Technology,* to Congress on February 24, 2009. The plan "calls for applying the advanced technologies used in our daily personal and professional lives to our entire education system to improve student learning, accelerate and scale up the adoption of effective practices, and use data and information for continuous improvement" (U.S. Department of Education, Office of Educational Technology, 2010, p. vi). The plan also presented recommendations for states, districts, the federal government, and other stakeholders such as our education system should "be clear about the outcomes we seek; collaborate to redesign structures and processes for effectiveness, efficiency, and flexibility; continually monitor and measure our performance; and hold ourselves accountable for progress and results every step of the way" (U.S. Department of Education, Office of Educational Technology, 2010, p. v). The goals of the plan addressed and discussed five essential components of learning powered by technology: 1) Learning: Engage and Empower, 2) Assessment: Measure What Matters, 3) Teaching: Prepare and Connect, 4) Infrastructure: Access and Enable, and 5) Productivity: Redesign and Transform. To achieve these goals, educators must "leverage technology to provide engaging and powerful learning experiences, to deliver content, and to develop resources and assessments that measure student achievement in more complete, authentic, and meaningful ways" (U.S. Department of Education, Office of Educational Technology, 2010, p. v).

Need for this Study

Today, we find a new generation of learners in the agriculture classroom. Millennials, also called generation Y, refers to the generation born after 1980 and raised using digital technology. The millennials are commonly characterized as driven achievers who depend on technology to study and learn. Teachers must change their method of teaching to achieve academic success with this generation. Unlike their predecessors who expected teachers to deliver content, millennials desire instructors who facilitate rather than control instruction, encourage teamwork and cooperative learning, give prompt feedback, and provide clear expectations for success in their classrooms. Chalk, blackboards, and textbooks are still essential components for educating students today; however, these students want a classroom experience enhanced through technologies because they were born in the digital age (Jones, Ricketts, Ulmer, & Williams, 2008; Munro, 2012). Therefore, in order to engage this generation of learners, we must incorporate a greater level of technology into our schools.

Alston, Miller, and Williams (2003a) stated students should "use technology in learning to solve problems, improve productivity, and gain the skills necessary to become contributing members of their communities and lifelong learners" (p. 39). Marcoux and Loertscher (2009) recognized several ways to achieve teaching and learning excellence with technology including efficiency, motivation to learn, deep understanding, learning how to learn (21st century skills), creativity and content creation, inclusion of different types of learners, and organizational concerns and support. Similarly, according to the Pennsylvania Department of Education, *Classrooms for the Future* has transformed the way high school

teachers teach and how students learn by equipping classrooms with enhanced technology. This initiative is moving instruction to 21st Century learning environments with instructional practices more rigorous (higher order on Bloom's taxonomy), student centered (more constructivist), and relevant (real world) (Munro, 2012). Additionally, instructional technology allows learning to become more personalized and more learner-centered (Kolderie & McDonald, 2009).

The use of technology continues to increase at a significant rate in our society (Mueller, Wood, Willoughby, Ross, & Specht, 2008). The use of educational technology can improve student mastery of content, provide individualized instruction, improve students' attitudes toward learning, prepare students for the workforce, and increase the cost effectiveness of instruction (Boe, 1989). Due to the many benefits of using technology in education, a great deal of emphasis on incorporating technology in instruction is being exhibited at the national level. The National Educational Technology Standards raised the bar for educators to develop and use their digital skills in the classroom.

The importance of technology integration has also been recognized in agricultural education. Many states have made technology integration in the classroom a priority. Alston, Miller, and Williams (2003b) reported, "in North Carolina (NC) state educational leaders recognized the need to infuse instructional technology into the public school with a focus on technology-supported classrooms. Priority was given to integrating instructional technology into competency-based programs in career and technical education, including agricultural education" (par. 3). As computers and internet access are increasingly available

to agriculture teachers, systematic computer-assisted instruction must become a daily routine in agriculture classrooms across America.

While instructional technology offers numerous possibilities for future improvement in Agricultural Education, a number of barriers could inhibit its implementation such as the roles of leadership in integration, access to reliable technology and networks, access to instructional resources, access to human support, access to professional development, access to planning time, inadequate funding, influence of technological knowledge, influence of pedagogical knowledge, and influence of technology attitude (Alston et al., 2003a; Kolderie & McDonald, 2009; Marcoux & Loertscher, 2009; McKendrick et al., 2002; Mueller et al., 2008; Murphrey et al., 2009; Rogers, 2000; Spiess, 2001; Wood et al., 2005).

Better technological knowledge or preparedness has been correlated with and used to significantly predict or explain technology usage (Hsu, 2010; Inan & Lowther, 2010; Kanaya, Light, & McMillian-Culp, 2005). Additionally, better knowledge has been associated with greater self-efficacy or confidence that has likewise been associated with integration performance (Adamy & Boulmetis, 2005; Brinkerhoff, 2006; Cullen & Greene, 2011; Cviko, McKenney, & Voogt, 2012; Lin & Lu, 2010; Perkmen & Pamuk, 2011; Yucel, Acun, Tarman, & Mete, 2010). These studies illustrated the importance of properly preparing teachers, as teachers well-trained in technology will likely develop higher self-efficacy or confidence to integrate technology.

Although technology may be available to teachers, some may refuse to utilize it due to their mindset and attitude or some may experience technology anxiety. For example, Wood, Mueller, Willoughby, Specht, and Deyoung (2005) reported schools are increasingly

becoming well equipped with computers and internet; however, only one-half of the teachers used computers. The researchers also stated individual differences and attitudes towards technology, including computer anxiety, contributed to why teachers do not implement technology in the classroom despite the increased availability. Mueller, Wood, Willoughby, Ross, and Specht (2008) identified past experiences, beliefs, and attitudes of teachers as likely indicators of their views of using technology as an instructional tool.

There is a need for this study because there is limited recent data on the availability and frequency of use for instructional technology, specifically in Agricultural Education. Previous data does not represent new technologies or the changes in students' needs and preferences. Furthermore, there is little current research found on barriers to integrating technology in Agricultural Education in North Carolina.

Statement of the Problem

The purpose of this study was to identify and examine factors influencing the integration of technology into the instructional process in North Carolina Agricultural Education classrooms.

Research Questions

The research question was "What factors influence North Carolina agriculture teachers' ability to integrate technology in the classroom?" The research objectives for this study were to:

1. Determine the availability of educational technology in Agricultural Education classrooms.

2. Determine how frequently educational technology is utilized in the classroom by teachers and students.
3. Determine the barriers that may inhibit Agricultural Education teachers from integrating technology into the classroom.
4. Determine how Agricultural Education teachers acquire the knowledge to use educational technology for instruction effectively.
5. Determine the attitudes of Agricultural Education teachers towards integrating technology in classroom instruction.

Assumptions

It is assumed the respondents will answer the questions in the survey honestly and no errors will be made during the completion of the survey. An additional assumption is all agriculture teachers in North Carolina use email.

Limitations

Although this research instrument was carefully prepared, a limitation of the study was teachers may indicate they use the technology but may be using it incorrectly (i.e. a SMART board as a projector screen).

Definition of Terms

For the purpose of this study, the following words are defined:

Agricultural Education – Agricultural Education is based on a three circle model in which instruction is delivered through: 1) classroom/laboratory instruction (contextual learning), 2) supervised agricultural experience programs (work-based learning), and 3) student leadership organizations. The Agricultural Education mission is to "prepare students

for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems" (National FFA Organization, 2011).

Agricultural Education Teachers – Any middle school or high school teacher who teaches an agricultural related course approved by the state of North Carolina.

Educational/Instructional Technology – Information technology used for instructional purposes alongside the teacher, textbook, and chalkboard including computers, devices that can be attached to computers (e.g., LCD projector, interactive whiteboard, digital camera), computer software, and web based applications (Earle, 2002; National Center for Educational Statistics, 2010). This definition does not include agricultural technology.

Summary

With a new generation of learners in the classroom today, technology integration is being recognized at a national level. These students want a classroom experience enhanced through technologies because they were born in the digital age. The National Education Technology Plan presented recommendations for states, districts, the federal government, and other stakeholders and included goals that addressed and discussed five essential components of learning powered by technology. There are many benefits to integrating technology in the classroom. Technology motivates students to learn, provide individualized instruction, allows students to complete activities higher on Bloom's taxonomy, and is more student-centered, relevant, and personalized. Despite the many benefits of instructional technology, many external and internal barriers could inhibit its implementation.

CHAPTER 2: REVIEW OF LITERATURE

The lack of recent data on educational technology use by agricultural education teachers resulted in searching the literature for teachers' and schools' use of educational technology.

Availability and Use of Educational Technology in Public Schools

The U.S. Department of Education, National Center for Education Statistics (2010), provided the most recent data on the availability and use of educational technology in public schools. In fall 2008, this study found an estimated 100% of public schools had one or more instructional computers with internet access with a 3.1 to 1 ratio of students to instructional computers with internet access. Ninety seven percent of schools had one or more instructional computers located in classrooms. Over half of schools reported having laptop computers on carts. These laptops were shared among classrooms for student instruction. Sharing laptop carts provided maximum student access to instructional technology in schools that could not provide one to one computer access to students. In public schools, 14% of all instructional computers were laptops on carts and 51% were located in classrooms. Of these instructional computers, 98% had internet access. Whole school wireless network access was reported by 39% of schools, while 30% reported wireless access to a portion of the school. Additionally, 9% of wireless connections were from laptops to carts. Public schools also reported providing liquid crystal display (LCD) projectors and digital light processing (DLP) projectors in 97% of schools. Digital cameras were available in 93% of schools and interactive whiteboards in 73% of schools.

In addition to instructional activities, public schools used the internet and their district network for other school related functions. Eighty seven percent of schools reported using their network to provide standardized assessment results and data for teachers to individualize instruction and 85% reported using it to collect data for instructional planning. Online student assessment was used by 72% of schools and 65% used their online capabilities to provide high quality digital content (National Center for Education Statistics, 2010).

In Agricultural Education, classroom instruction continues to be enhanced through the use of educational technology which has resulted in higher quality career training. However, a Louisiana State University study revealed, "many programs still do not have access to some of the newer technologies and teachers continue to experience moderate barriers" (Kotrlik & Redmann, 2009, p. 72).

External Factors Influencing Technology Integration

Even the best technology integration program can fail if a myriad of connected internal or personal and external factors are not addressed. Some external factors known to support or detract from technology integration are leadership and policies, access to reliable technology and networks, access to instructional resources, access to human supports (technical, instructional), and access to professional development and planning time.

The Roles of Leadership in Integration

Supportive school leaders communicate a vision for technology use in their school and include teachers and other stakeholders in the process of defining that vision. Many researchers recommend school leaders employ needs assessment to understand gaps in their

technology needs related to the shared vision (e.g., School Technology Needs Assessment, STNA, instrument) (Ertmer & Ottenbreit-Leftwich, 2010; Hsu & Sharma, 2008; Larson, Miller, & Ribble, 2009-2010; Luthra & Fochtman, 2011). School technology leaders advocate for change by communicating instructional expectations or goals via technology plans and sometimes requiring technology use as a key part of instruction (Keengwe & Onchwari, 2009; Richard, 2007). When expectations are not articulated, teachers in laptop programs have shown a "dilemma of practice" in defining the role of technology. For example, technology can be used in response to some administrative rule, to meet some goal of the vision, or as a tool to improve instruction (Anthony & Clark, 2011). In comparing three elementary principals' support for integration, Staples, Pugach, and Himes (2005) found integration was influenced by how a principal aligned technology use with the school's mission and vision. Principals in this study aligned technology use differently in terms of a broad mission (e.g., support project-based learning), improving test scores, or improving instruction. The authors recommended principals align technology use to the curriculum instead of acquiring hardware and software not contextualized from a specific curricular goal (Staples, Pugach, & Himes, 2005).

Furthermore, strong technology leaders secure resources, plan for professional development, and provide time for teacher team meetings or communities of practice (Abuhmaid, 2011; Courville, 2011; Cviko, McKenney, & Voogt, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Faulder, 2011; Keengwe & Onchwari, 2009; Larson, Miller, and Ribble, 2009-2010; Richard, 2007). Technology leaders also participate in technology professional development or courses to know what is possible in the classroom, and they model

appropriate practice for teachers (Courville, 2011; Hsu & Sharma, 2008; Miners, 2009; Richard, 2007). Shinsky and Stevens (2011) recommended leaders learn to use Web 2.0 applications in support of digital collaboration (e.g., Google Docs, wikis). In one leadership training program in North Carolina, principals and district technology directors "learned about becoming change agents, facilitating collaborative planning, implementing flexible scheduling, using alternative assessments to evaluate both teacher and student work, and identifying Web 2.0 tools for administrative and instructional tasks" (McCombs, 2010, p. 11).

The policies of school leaders can affect technology integration. Some administrators do not allow teachers to use specific technologies at their schools because they consider them potential distractions to student learning (Murphrey, Miller, & Roberts, 2009). Robinson, Brown, and Green (2007) discussed information technology policies and measures taken to safeguard student accounts, privacy, and persons, as well as avoid issues with copyright and liability. Examples were given of teachers who could not teach with technology in legitimate ways, due to restrictive information technology practices. The authors conclude there was a strong need to find a proper balance between protection and open access to tools and resources.

Kotrlik, Redmann, and Douglas (2003) concluded Agricultural Education leaders must create new strategies and models that will result in faster and better integration of technology in the teaching process. The researchers stated, "It is simply not enough to make teachers "better" users of technology, but they must be convinced that technology will improve the quality of their instruction and ultimately, student learning. Certainly, university

faculties, leaders in state departments of education, and school administrators have a vital role and a definite responsibility in this effort" (Kotrlik, Redmann, & Douglas, 2003, p. 88). Leadership and support are crucial to successful technology integration in the agricultural education classroom.

Access to Reliable Technology and Networks

Access to technology resources can either promote integration under ideal circumstances or limit integration when teachers are unable to access computers, software, or the internet (Brinkerhoff, 2006; Donnelly, McGarr, & O'Reilly, 2011; Lowther, Inan, Strahl, & Ross, 2008; Richard, 2007). Inan and Lowther (2010) found computer availability was one of three variables that directly affected teacher technology integration. Petko (2012) also found computer availability was one factor explaining teacher usage of applications. Tezci (2011) identified computer ownership and access to the internet as factors elementary teachers associated with a facilitative school culture for integrating information and communications technology skills. In one survey of 126 teachers, 57% believed lack of technology was a barrier to integration (An & Reigeluth, 2012). However, this factor was highly variable and site-dependent.

Access to Human Support

Access to human supports (e.g., technical, instructional coaches) is widely held to influence technology integration (Brinkerhoff, 2006; Duran, Brunvand, & Fossum, 2009; Faulder, 2011; Hutchison, 2012; Keengwe & Onchwari, 2009; Lowther, Inan, Strahl, & Ross, 2008; Richard, 2007; Teo, 2011; Wachira & Keengwe, 2011). Technology facilitators and technical support staff are common in most states, but funding is uneven. Technology

facilitators are commonly involved in securing and providing professional development for staff, modeling appropriate technology use with ongoing background research, developing curriculum, serving on leadership visioning teams, communicating vision and goals to faculty, and evaluating progress (Coffman, 2009). Studies have shown positions like technology coordinators and facilitators can have a positive impact on student learning and technology skills (Lesisko, Wright, & O'Hearn, 2010). Technical support staff were commonly involved in setting up school help desks, configuring and maintaining school networks, overseeing network security, and troubleshooting problems and maintaining equipment inventory (Coffman, 2009). When only one of the two positions were hired, problems occurred with holes in instructional or technical support, or an instructional position became saddled with technical support with less time to work with faculty on curriculum integration. In Virginia, state lawmakers provided funding for two new positions: the instructional technology resource teacher (ITRT) and a technology support staff member. It was mandated that every school hire one of each position for every 1000 students enrolled (Coffman, 2009). Teacher librarians may also have some technology-related roles. Everhart, Mardis, and Johnston (2010) surveyed 295 teacher librarians and described some of their technology-related roles: needs assessment to understand curricular needs served by the school collection, evaluating digital resources, managing library web sites and databases and ensuring access to information both inside and outside of the school, serving on school technology committees, assisting with technology professional development, preparing proposals to secure funding for technology or digital resources, and maintaining equipment.

Teachers are more likely to integrate technology when they have access to shared instructional resources, data, and content; as well as access to instructional ideas from peers, teacher leaders, or experts in online communities (Duncan, 2011; Duran, Brunvand, & Fossum, 2009; Faulder, 2011; Hutchison, 2012; Lowther, Inan, Strahl, & Ross, 2008; Macdonald, 2008; Staples, Pugach, & Himes, 2005; Wright & Wilson, 2005-2006; Wright & Wilson, 2011).

Access to Professional Development

Access to ongoing professional development can influence technology integration (Abuhmaid, 2011; An & Reigeluth, 2012; Brinkerhoff, 2006; Faulder, 2011; Gardner, 2011; Gerard, Varma, Corliss, & Linn, 2011; Wright & Wilson, 2011). Teachers perceived technology as useful; therefore, professional development training for technology was essential (McKendrick, Straquadine, & Hubert, 2002; Murphrey, Miller, & Roberts, 2009; Spiess, 2001). However, in many cases, there is a lack of training. The need for professional development events on technology was seen in a survey of beginning agricultural teachers in Missouri. In the survey, "using computers in the classroom" was placed ninth in a list of 50 in-service needs (Garton and Chung, 1997, p. 55). Layfield and Dobbins (2002) conducted a similar study in South Carolina that supported the need for in-service education on technology integration in the classroom. The researchers found using computers in classroom teaching was the top need for veteran teachers. The studies regarding in-service needs among experienced teachers in South Carolina and among beginning teachers in Missouri may imply a possible national trend for teachers of all experience levels. These

findings support the need for additional professional development training on the use of technology.

Richard (2007) recommended beginning any professional development program with a needs assessment to inventory teacher skills. In a survey of 126 teachers by An & Reigeluth (2012), many respondents indicated professional development needs to be more targeted to specific subject areas with examples they can readily apply in their classrooms. The in-service needs to focus on a few concepts at one time with opportunities to practice these concepts before additional concepts are introduced. Lastly, professional development needs to focus on technologies or software they actually have in their schools. Gerard, Varma, Corliss, and Linn (2011) summarized 43 studies of professional development for inquiry based science, noting the most successful programs were extended beyond one year with a focus on integration and inquiry, while less successful programs were of short duration and only introduced a new tool or technology. The most successful professional development used summer institutes to give teachers opportunities to try out technologies, learn about new models, and design lessons. The best professional development also encouraged teachers to share their ideas and reflect on student products, and provided teachers with mentors and facilitators to assist in the classroom (Gerard, Varma, Corliss, & Linn, 2011).

Access to Planning Time

Providing teachers with adequate time for planning and preparation in technology-intensive learning environments has been shown to influence integration (An & Reigeluth, 2012; Brinkerhoff, 2006; Duran, Brunvand, & Fossum, 2009; Faulder, 2011; Hutchison,

2012; Keengwe & Onchwari, 2009; Wachira & Keengwe, 2011). In one survey of 126 teachers, about 57% perceived lack of time as a barrier to integration (An & Reigeluth, 2012). Vannatta and Fordham (2004) suggested, "Time is essential in becoming a technology using teacher" (p. 261). Time is needed not only to develop technology skills but also to explore what is available and develop strategies for its appropriate use in the instructional setting (Vannatta & Fordham, 2004).

Inadequate Funding

In addition, inadequate funding was identified as a barrier to technology (Alston, Miller, & Williams, 2003a; McKendrick, Straquadine, & Hubert, 2002; Rogers, 2000). Teachers may have a lack of technology or outdated technology. Rogers (2000) found the lack of availability and accessibility of technology to teachers was one reason for the lack of use. McKendrick, Straquadine, and Hubert (2002) and Alston, Miller, & Williams (2003a) both identified inadequate funding as the greatest barrier to integrating technology. Even though some administrators may encourage teachers to try new technologies, they do not provide funds for technical support or technology purchases (Rogers, 2000). If teachers do not have access to technology, they cannot utilize it in the classroom.

Internal or Personal Factors Influencing Technology Integration

Internal factors known to support or detract from integration are technological knowledge and preparedness, pedagogical knowledge, and attitudes toward technology.

Influence of Technological Knowledge

Moore-Hayes (2011) found both pre-service and in-service teachers possessed less than adequate self-efficacy in terms of knowledge of evaluating software, integrating

technology, knowing when and why to integrate technology, and using assistive technologies. The teachers reported they would be better prepared if they had practicum experiences in technology-enhanced classrooms, mentoring by expert technology-using teachers, and opportunities to take online classes.

In contrast, only 35% of 126 teachers in a survey conducted by An & Reigeluth (2012) reported lack of knowledge was a barrier to integration. Others found teacher fear and anxiety in terms of knowing less than students, losing control of classrooms, or being able to keep up with new technologies, impacted teacher willingness to integrate technology (Brinkerhoff, 2006; Faulder, 2011).

Overbaugh and Lu (2009) found younger teachers had significantly greater self-efficacy and task-based concerns in regards to technology integration, and they suggested these teachers might benefit more than others from continued professional development opportunities. Others, however, have suggested pre-service teachers just finishing school may have greater technological knowledge to help more experienced teachers understand integration (Denton et al. 2005; Sahin & Toy, 2009). Regardless, it is important for trainers to understand how their audience has been prepared and to evaluate their prior experience using technology in the classroom.

Influence of Pedagogical Knowledge

Another internal factor known to influence integration is teacher pedagogical knowledge (Ertmer & Ottenbreit-Leftwich, 2010; Faulder, 2011; Lowther, Inan, Strahl, & Ross, 2008) and teacher understanding of curricular integration (Keengwe & Onchwari, 2009; Okojie, Olinzock, & Okojie-Boulder, 2006). Petko (2012) found teachers were more

likely to employ software and web-based applications when they held constructivist beliefs and possessed the attitude that “computers improve student learning." Russell, Bebell, O'Dwyer, and O'Connor (2003) found teachers tended to use technology more for teacher-centered activities (e.g., lesson preparation, communication) than for “assigning learning activities that require the use of technology” (p. 297). Likewise, Sangra and Gonzalez-Sanmamed (2010) found teachers tended to view information and communications technology as useful for gaining attention, student response, and transmitting information, more so than for interaction and communication. In a study of Chinese teachers, Sang, Valcke, van Braak, and Zhu (2011) found teachers fell into these same two categories (teacher-centered uses, student-centered uses), and any student-centered uses of information and communications technology were directly related to teacher technology beliefs and support and indirectly related to pedagogical beliefs and attitudes. An & Reigeluth (2012) cautioned that teachers may hold a learner-centered philosophy but implement teacher-centered classrooms without more training on specific learner-centered technology related instructional strategies to overcome the dichotomy. Liu (2011) also found, in a survey of 1139 Taiwanese elementary teachers, that learner-centered beliefs in 79.3% of the sample only translated to constructivist teaching using technology by 28.2%. Teachers had concerns over student achievement and associated teacher-centered practice with higher test scores.

Influence of Technology Attitudes

Positive attitudes toward technology (Cviko, McKenney, & Voogt, 2012; Faulder, 2011; Ertmer & Ottenbreit-Leftwich, 2010) and teacher motivation and determination (Cullen & Greene, 2011; Duran, Brunvand, & Fossum, 2009; Faulder, 2005) are two related

variables commonly associated with technology integration practice. Positive technology attitudes have been found to predict "both intrinsic and extrinsic motivation to use technology" and uses of technology (Cullen & Greene, 2011; Inan & Lowther, 2010; Kanaya, Light, & McMillan-Culp, 2005; Teo, 2011).

McKendrick, Straquadine, and Hubert (2002) found Utah agricultural education teachers tended to minimize their use of computers even though the teachers had positive attitudes about computers and computer technology. With updated computers and more training, the researchers reported Utah agriculture teachers would most likely integrate computers into their curriculum at a higher frequency (McKendrick, Straquadine, & Hubert, 2002).

Russell, Bebell, O'Dwyer, and O'Connor (2003) reported, "Teacher beliefs about the importance of technology for teaching was the strongest predictor of the frequency with which technology is used for a given purpose" (p. 302). The authors also noted a relationship between exposure and improved beliefs and recommended exposing teachers to uses of technologies during training. Kenny and McDaniel (2011) studied teacher attitudes toward educational games, noting "an increase in positive attitudes towards playing games after participants actually played" (p. 208), suggesting again that exposure to technology during training can be used to improve attitudes. The researchers noted teachers "did not yet fully understand or appreciate the potential of games due to their unfamiliarity with them" (p. 2010). Abuhmaid (2011) found course-based information and communications technology training helped teachers understand the benefits of information and communications

technology, and they subsequently changed instructional strategies and made improvements in student-centered teaching.

However, Belland (2009) cautioned attitudes are typically poor predictors of behavior. He attributed poor technology integration less to attitudes and more to habits picked up through years of schooling where technology was not used and student-centered instruction was rare. Belland (2009) argued the only cure is long-duration modeling of more appropriate practice with applied practice, which has implications for pre-service teacher programs and in-service training and coaching.

Integration Training Approaches

Programs of Integration Training

A variety of approaches to technology integration training has been tested and analyzed (e.g., short workshops, long courses, ongoing coaching). Although presented separately, it is important to note some programs may overlap in practice (e.g., coaching may also involve learning communities). Longer-term, ongoing approaches are generally more effective than one-time approaches. Current trends emphasize coaching and communities, although comprehensive approaches that combine these with workshops, courses, and/or assessment, may best meet the needs of all learners.

Pre-Service Training

Often a teacher's first exposure to technology is during their teacher-training program at an institution of higher education. Gronseth et al. (2010) found most programs use standalone educational technology courses, rather than integrating technology more systematically in methods courses and field experiences. This research also found 60% of

institutions require teachers to develop technology lessons, 44% assign technology projects in methods courses, and 25% observe teacher technology uses.

Hofer (2005) analyzed seven teacher education programs that won ISTE's Distinguished Achievement Award for their work in incorporating national technology standards for teachers (NETS-T). As recommended by many, each award-winning program was praised for incorporating technology standards across a variety of courses (technology, methods, foundational, and student teaching), and the teaching of specific standards occurred in multiple course contexts. To achieve curricular integration, institutions provided a comprehensive technology infrastructure with faculty-student computers and access to new teaching tools and software for faculty testing and student use in field experiences. The institutions also provided technical support from both formal and informal-collegial arrangements, as well as instructional support and coaching to help faculty integrate technology standards. Additionally, they worked to establish an organizational culture that addressed student needs and valued innovation, offered competitive grant programs to encourage faculty development of technology-enhanced teaching materials, and offered stipends for attending workshops. Furthermore, the institutions retained strong technology leaders or committees who pushed for faculty uses of technology via strategies such as curriculum mapping or aligning courses to ISTE standards in faculty meetings (Hofer, 2005).

Moreover, Cohen, Pelligrino, Schmidt, and Schultz (2007) looked at three universities that were awarded PT3 funds to revise their technology integration efforts across teacher education and identified five common variables: 1) a focus on changing the institutional culture to achieve buy-in among faculty with efforts to support faculty through such means as

mentoring; 2) technology leaders providing program focus, training, coaching, and time to make changes; 3) technology leaders providing resources; 4) institutions establishing a vision based on some conceptual framework (e.g., supporting developmental variation, promoting simultaneous renewal between university and schools); and 5) institutions seeking comprehensive change to involve all faculty in their community.

Long-Term Course Approaches

Another approach to technology integration training is a course, which tends to be several weeks long and typically longer than a summer workshop or academy. Some courses are offered by universities, and others are offered by commercial entities. Some courses are face-to-face, and other courses are blended or fully online.

University-based courses. Jones, Fox, and Levin (2011) involved 12 middle schools in a graduate-level course to learn about integrating Web 2.0 tools (e.g., wikis, blogs), hardware solutions such as whiteboards, and other video and portfolio products. In this study, on-site coaches also worked with teachers. Data showed student technology skills and standardized math scores improved in participating schools, and teachers achieved mastery on a state portfolio assessment (Jones, Fox, & Levin, 2001). Similarly, Polly (2006) described the InterMath program of professional development with 45-hours of face-to-face classes. InterMath courses are touted as learner-centered, since teachers discuss and practice their own mathematical investigations and applications of technology after instructor modeling. A qualitative study with a few teachers indicated the course helped teachers gain knowledge of math, pedagogy, and integration strategies (Polly, 2006).

Commercial courses. Abuhmaid (2011) discussed a training program where teachers were provided with access to several training courses to improve information and communications technology proficiency and pedagogy: Intel Teach to the Future, International Computer Driving License (ICDL), World Links, iEARN, and CADER. Although more teachers developed computer skills (76.5%) than pedagogical skills (50.4%), 86.2% of teachers reported increased student centered teaching after training. On the other hand, Overbaugh and Lu (2009) described the use of six-week long, PBS Teacherline online courses to prepare teachers for technology integration. Courses involved an online community supported by discussion boards and synchronous meetings, assignments, and a final project or lesson plan. Local educators, who were a part of participant school systems and would better understand local standards and teaching environments, facilitated the courses (Overbaugh & Lu, 2009).

Use of Case Studies and Models

In course-based training approaches, a common method employed is the use of case studies and models. Greenhow, Dexter, and Hughes (2008) used the freely available, online Educational Technology Principle (eTIP) cases in an undergraduate pre-service teacher technology course and a graduate level in-service teacher technology course. Teachers were able to identify key issues, influencing factors, and make recommendations for technology use in specific contexts. In-service teachers were better able to draw on their practical experiences than pre-service teachers (Greenhow, Dexter, & Hughes, 2008).

West and Graham (2007) applied a live modeling approach to better prepare pre-service teachers for technology integration. Pre-service teachers were taught a K-12 lesson

by their university teacher and took on the role of a K-12 student learning with technology. The approach helped most students acquire technology skills and develop a better understanding of integration strategies.

Shorter-Term Workshop, Institute, or Academy Approaches

Workshop, institute, and academy training are popular models for in-service teachers. Some approaches pay stipends while some do not. The length, focus, and level of follow-up support varied widely in shorter-term approaches. Typically, extended and ongoing approaches (several weeks with follow-up) are more successful than shorter-term approaches (one afternoon or one-day). Several recommendations have been made for the length and focus of workshops and professional development.

Yost (2007) recommended a 3-year workshop model with two full days of release time for teachers every year and required technology professional development. Year one would focus on personal productivity and teaching enhancement with a laptop and projector, year two on using cart-based laptops with students on such tasks as internet research, and year three on integrating multimedia tools and software (Yost, 2007). Another shorter-term approach is 2 weeks of intensive summer training followed up with day-long workshops every other Saturday in fall and spring with topics defined by needs assessment--Webquests, United Streaming resources, integrating literature circles, concept mapping (Ireh, 2006). In Matzen and Edmunds' (2007) approach, teachers practice completing student-centered, constructivist activities for 7 days or 50 hours. Keengwe and Onchwari (2009) suggested an 8-week institute focusing on technology standards, online resources, and instructional tools. Other recommended lengths of time for workshops were 15 full days of training and five

days of in-service training, in each of two years (Brinkerhoff, 2006). Other focuses of workshops and professional development included technology skills (e.g., designing Web-based instruction, and multimedia), an understanding of integration with the curriculum (e.g., developing individual lesson plans), and leadership skills (e.g., communication, promoting change) (McPherson, Wizer, & Pierrel, 2006) and using technology in support of student thinking skills (e.g., collaboration, problem solving, creative thinking) (Miners, 2009). Researchers recommended some form of follow-up support such as sharing lessons and experiences and critiquing one another's work (Yost, 2007; Ireh, 2006; Keengwe & Onchwari, 2009; Miners, 2009; McPherson, Wizer, & Pierrel, 2006).

The recommended best practices for workshops and professional development are: focus on curriculum rather than tools (Ireh, 2006), consider stipends, CEUs, and/or graduate credits as extrinsic motivators (Ireh, 2006; Keengwe & Onchwari, 2009), use teacher input or needs assessment to define workshop topics (Ireh, 2006); use group trainees by grade levels or content areas to encourage collaboration (Erbas et al., 2006; Ireh, 2006; Matzen & Edmunds, 2007; McPherson, Wizer, & Pierrel, 2006); cover one topic at a time, and provide time for hands-on practice to apply what has been taught to one's own content (Ireh, 2006; McPherson, Wizer, & Pierrel, 2006; Yost, 2007); and require outcomes and products, peer-evaluated with standards or rubrics (Ireh, 2006; Keengwe & Onchwari, 2009).

Coaching and Mentoring Approaches

Coaching or mentoring is another type of technology integration training approach that involves well trained or experienced technology-using mentors supporting teachers less experienced with technology integration. Some coaching is informal and may simply

involve expert teachers or technology facilitators helping peers in a school, while other coaching programs formally train individuals to serve in specified coaching capacities.

Coaching roles. Technology coaching involves collaborative coaching cycles, rapport and trust, voluntary participation, prolonged engagement and immediacy, shared goals with a clear focus, communication, reflection, and deep understanding (Barron, Dawson, & Yendol-Hoppey, 2009). Kopcha (2009) noted the roles of technology coaches change over time, with an initial focus on setup and preparation, and then on curriculum and communities of practice designing together.

Programs with external coaches. Some programs emphasize hiring or bringing in external persons to serve coaching roles in schools. Examples of programs with external coaches include university mentors working with elementary teachers to integrate technology (Swan & Jennings, 2002), advanced pre-service teachers paired with in-service teachers (Denton et al., 2005; Voithofer, 2005), a full-time coach in selected schools to help locate resources, provide training, co-plan, and/or co-teach (Halter & Finch, 2011; Lowther et al., 2008).

Programs with internal coaches. In contrast, some programs emphasize training staff within the school to serve in coaching roles. Examples of programs with internal coaches include the train-the-trainer approach with 5 or 6 lead teachers receiving initial training. The trained teachers then model and re-train their peers on current technology integration (McCombs, 2010). The *Microsoft Peer Coaching* curriculum was used to train teacher leaders, who then lead teacher teams in their own districts to improve technology proficiency (Barron et al., 2009; Jones, Fox, & Levin, 2011). Another example is a four-

phase program involving needs assessment and selection of teacher mentors, training teacher mentors over the summer and ongoing meetings during year, mentor-mentee work on increasing professional productivity with technology, and finally mentor-mentee work on collaboratively developing lessons (Faulder, 2011).

Learning Community Approaches

Communities commonly address shared community interests, encourage collaborative activities and discussions, and produce resources representative of the shared interest (James, Fox, & Levin, 2011). Professional Learning Communities involve teachers working collaboratively in teams to continuously study and improve student learning. Communities of Practice involve a small group engaged in a common practice such as teaching with technology. Cifuentes, Maxwell, and Bulu (2011) provided an example of a Professional Learning Community comprised of five teachers, one administrator, one coach, and one mentor teacher from a technology using school that was not associated with the researcher's school. Participants attended meetings during the school year, two 5-day summer workshops, and targeted workshops on applying technologies to pedagogy. They also conducted classroom visits and shared resources and strategies on a website. The teachers moved up a stage of adoption scale each year with increased student-centered technology integration by year two (Cifuentes, Maxwell, & Bulu, 2011). Cowan (2012) described a different example of Communities of Practice. Cohorts of educators (i.e., teachers, administrators, professionals) enrolled in an 18-24 month blended learning graduate program at Northern Illinois University. The cohorts engaged in learning new technology

applications, discussing how the applications could be integrated into instruction, and designing curriculum and staff development (Cowan, 2012).

Product and Assessment Approaches

Another technique institutions have used to promote better technology integration is assessment of teacher technology products and competencies. Graham, Tripp, and Wentworth (2009) reported on a pre-service teacher program that assessed teacher work samples or culminating unit plans developed and implemented in field experiences. Technology unit plans improved from year 1 to year 2 after field instructors were better trained to emphasize pedagogy and rubrics were similarly re-focused (Graham, Tripp, & Wentworth, 2009). Hawley et al. (2003) described pre-service teacher e-portfolios developed at the University of San Francisco to meet a new state technology credential. Portfolio development stretched over three semesters, with a "boot camp" to introduce basic technology skills, a 2-credit hour course covering integration, a portfolio review during student teaching with feedback on missing elements and opportunities for revision, and a 1-credit hour course to finalize portfolios with examples from student teaching. California State University Bakersfield applied a framework of aligned national and state-level standards to assess faculty and pre-service teachers working on the same technology credential. School districts applied the same framework, providing for consistency in assessing technology proficiency from pre-service to in-service. With the framework, candidates and teachers could more easily articulate and work toward a similar skill set, and trainers could target proficiencies (Hawley et al., 2003).

Summary

The U.S. Department of Education, National Center for Education Statistics (2010), provides the most recent data on the availability and use of educational technology in public schools. In Agricultural Education, classroom instruction continues to be enhanced through the use of educational technology which has resulted in higher quality career training. However, many schools do not have access to newer technologies.

Even the best technology integration program can fail if a myriad of connected internal or personal and external factors are not addressed. Some external factors known to support or detract from technology integration are leadership and policies, access to reliable technology and networks, access to instructional resources, access to human supports (technical, instructional), and access to professional development and planning time. Internal factors known to support or detract from integration are technological knowledge and preparedness, pedagogical knowledge, and attitudes toward technology.

A variety of approaches to technology integration training has been tested and analyzed (e.g., short workshops, long courses, ongoing coaching). It is important to note some integration programs may overlap in practice (e.g., coaching may also involve learning communities). Longer-term, ongoing approaches are generally more effective than one-time approaches. Current trends emphasize coaching and communities, although comprehensive approaches that combine these with workshops, courses, and/or assessment, may best meet the needs of all learners.

CHAPTER 3: METHODOLOGY

The study used descriptive survey research methodology to collect information on the availability of instructional technology, the frequency of instructional technology use, barriers to technology integration, and attitudes of teachers towards technology. The survey instrument was sent to all North Carolina Agricultural Education teachers via Qualtrics, a website that produces, collects, and analyzes surveys used for research purposes.

Research Methodology

This study used descriptive research, which attempted to describe and explain conditions of the present technology availability, frequency of technology use, barriers to technology integration, and attitudes towards technology of North Carolina Agricultural Education teachers. The study provided a descriptive analysis of a given population or sample. The data source of this study was middle school and high school Agricultural Education teachers of North Carolina. A survey, a methodology that uses questionnaires as the instrument, was used to collect data. The research relied on quantitative data gathered from the survey.

Population

The population for this study consisted of all North Carolina Agricultural Education teachers teaching at the middle or high school level (N = 420). The frame used to determine the population was a list of 2012-2013 agriculture teachers provided by the North Carolina Agricultural Education Regional Coordinators.

Due to the use of an online survey, there was no need to take a sample and a census of all North Carolina Agricultural Education teachers was determined to be the most effective

method to represent the population. All accessible Agricultural Education teachers were contacted to participate in the study. Seven teachers opted out of the survey and one teacher had an undeliverable email address so the accessible population was N = 412.

To protect the rights and welfare of the human subjects in the research, the protocol, consent form, and example letters and emails were submitted to the Institutional Review Board (IRB) on August 3, 2012. The IRB approval letter for the study was received on August 16, 2012. The IRB approval letter is reproduced in Appendix A.

Instrumentation

Participants responded to the survey and agreed to the informed consent through an online survey program called Qualtrics. The consent form and instrument are reproduced in Appendices B and C. The instrument consisted of five sections with a total of 23 questions. The questions were formatted based on a Likert scale, multiple-choice format, or a listing of responses.

Section one of the instrument was an introduction to the survey. This section included one multiple-choice question regarding which computer operating system teachers used most at school and one 5-point Likert scale question regarding the extent various sources had prepared them to make effective use of educational technology.

In section two, teachers were asked to identify the availability of teacher-based technology and the frequency of use for the available technology. This section listed various types of technology including devices, software programs, and web services. The availability of devices question included *not available*, *available as needed*, and *always in classroom*. The frequency of device use utilized a 5-point Likert scale ranging from 1

(*never*) to 5 (*daily*) with a 3 meaning *2-4 times a month*. The software programs and web services questions used a 6-point Likert scale ranging from 1 (*not available*) to 6 (*daily*) with a 4 meaning *2-4 times a month*. The higher the score, the more the teacher used technology in the classroom.

Section three asked teachers to identify the availability and frequency of use of instructional technologies by students. The first question was an open-ended question that asked teachers to provide the number of student computers and tablet computers located in the classroom every day and that could be brought into the classroom. Similar to section one, this section listed various types of technology and utilized a 6-point Likert scale ranging from 1 (*not available*) to 6 (*daily*) with a 4 meaning *2-4 times a month*. The higher the score, the more the students used technology in the classroom. Additionally, a *yes* or *no* question asked teachers if their district had written policies restricting the use of various technologies by students.

Section four of the instrument asked teachers to identify barriers to integrating technology in the classroom. Statements related to using educational technology in the instructional program such as "Technology is a priority for the district administration" and statements describing teachers' attitudes towards instructional technology such as "Technology allows students to be creative" utilized a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) with a 3 meaning *neither agree nor disagree*. The higher the score, the less of a barrier and the more likely the teacher will integrate technology in the classroom. Furthermore, a 4-point Likert scale ranging from 1 (*not a barrier*) to 4 (*major barrier*) was used to evaluate the extent of barriers such as "Technology is

expensive." The higher the score, the less likely the teacher was to integrate technology in the classroom.

Section five of the instrument was made up of eight background and demographic questions. The demographic questions included age, gender, years of teaching experience, number of agriculture teachers at the school, and teaching region. The background questions consisted of one short answer question concerning the number of hours teachers spend in professional development activities for educational technology and one 4-point Likert scale question on how teachers perceived the professional development activities. The final question of the instrument was an open-ended question regarding any other information that should be considered in the study as it related to technology integration for agriculture teachers in North Carolina.

The questionnaire was developed to meet the objectives of the study. Barriers found in the review of literature were considered for the instrument. Additionally, questionnaires that had already been developed were used as guides. Questions for the instrument were adapted from the *Educational Technology in U.S. Public Schools: Fall 2008* and *Teachers' Use of Educational Technology in U.S. Public Schools: 2009* questionnaires published by the National Center for Education Statistics in the U.S. Department of Education (2010) and an instrument developed by Coley (2012). The instrument was developed based on these ideas along with the researcher's original ideas. The instrument was reviewed for content validity by Agricultural Education professors at North Carolina State University.

A pilot study was conducted using 22 Career and Technical Education teachers in North Carolina. Reliability was determined using the test-re-test approach. Fifty-seven

North Carolina Career and Technical Education teachers were emailed the original instrument; twenty-four completed the instrument the first time, after receiving one reminder email. Of the twenty-four who completed the first instrument, twenty-two completed the re-test, also after one reminder email. The instrument was evaluated for significant differences between the first and second responses of the twenty-two teachers. No significant differences were found. Therefore, the instrument was determined to be stable over time. Minor modifications were made to the survey instrument at the conclusion of the pilot study. For example, in the sources of teacher preparedness to use educational technology, "From your students" was changed to "From the students you teach." Additional statements were also added such as "Publication software (e.g., Publisher)" as a software program and "YouTube" as technology school districts have written policies restricting its use.

Data Collection

The survey implementation followed the procedure recommended by Dillman (2009). A pre-notice letter was sent to subjects 3-5 days prior to the receipt of the instrument. Qualtrics was used to send an email message to all teachers describing the research process, informed consent, and containing a link to the instrument. One week later, each teacher received another email message containing a link to the informed consent and survey instrument. Two additional reminder email messages were sent out over the course of 12 days. Qualtrics ensured only individuals who had not completed the survey were sent reminder email messages. A thank you email message was sent to all participants 5 days after the deadline. The pre-notice letter, invitation email message, three reminder email messages, and thank you email message are reproduced in Appendices D, E, F, G, H, and I.

Data were collected and recorded through Qualtrics during fall 2012. Three hundred and four teachers completed the survey instrument for a population response rate of 72.4%.

In order to improve the response rate, the survey was kept short and the completion time was expected to be less than 15 minutes. All respondents received a $1 bill with the pre-notice letter and were entered into a drawing for two $50 gift cards as an incentive (Dillman, 2009). Miller and Smith (1983) stated, "Research has shown that late respondents are often similar to nonrespondents. Thus one way to estimate the nature of the replies of nonrespondents is through late respondents" (p. 48). To address non-response errors, the researcher compared early to late respondents, and no significant differences were found.

Through Qualtrics, the researcher was able to identify participants who completed the questionnaire and the participants who had not responded. No identifiable information was connected to the participants' responses. Participants were assured any data collected from or about them would be held in confidence. All participants in the study had the right to withdraw from the study or to request that data collected about them not be used.

Data Analysis

The data were analyzed using reports produced by the Qualtrics Survey Software. Descriptive parameters were run for each objective based on the participants' responses to compare percentages, mean, and standard deviation (SD) scores. SPSS was used to analyze the reliability of the survey instrument in the pilot study and to address non-response errors by comparing early respondents to late respondents.

CHAPTER 4: RESULTS

The population for this study consisted of all Agricultural Education teachers at the middle or high school level in North Carolina (N=420). The frame used to determine this population was a list of 2012-2013 North Carolina Agricultural Education teachers provided by the North Carolina Agricultural Education Regional Coordinators. A census was conducted via Qualtrics with a final N=412 as the accessible population. A response rate of 72.4% was achieved. Non-response error was controlled by comparing early to late respondents to determine if there were any differences. No major differences were found; therefore, responses were considered representative of the entire population.

Demographics of Participants

The population of North Carolina agriculture teachers was comprised of 57% male teachers (n = 173) and 43% female teachers (n = 131). The average agriculture teacher was approximately 37 years old and had been teaching for 11 years. Teachers were representative of all eight regions in North Carolina. There were 50 from the Southeast Region (16%), 49 teachers from the East Central Region (16%), 45 from the South Central Region (15%), 41 from the West Central Region (13%), 40 from the Southwest Region (13%), 33 from the Northwest Region (11%), 27 from the West Region (9%), and 19 from the Northeast Region (6%). There was considerable variation in the number of agriculture teachers per program. One hundred twenty-seven of the teachers taught in a one-teacher program (42%), 121 taught in a two-teacher program (40%), 41 taught in a three-teacher program (13%), 9 taught in a four-teacher program (3%), and 6 taught in a program with five or more teachers (2%).

Availability of Educational Technology

The first objective of this study was to determine the availability of educational technology in North Carolina Agricultural Education classrooms including computer operating systems, teacher-based devices, student computers, and tablet computers.

Over half (57.23%) of the teachers are using older Microsoft Windows operating systems (Windows XP and Windows Vista) most often at school. Eighty of the teachers used Microsoft Windows 7 (26.32%), 22 teachers weren't sure but thought it was Windows (7.24%), 21 teachers used Apple/Mac OS X (6.91%), 17 teachers used Microsoft Windows Vista (5.59%), 1 teacher used Linux (0.33%), and 1 teacher wasn't sure but thought it was Mac (0.33%). Other operating systems teachers reported included Microsoft 2007, Microsoft Windows 3, and using multiple operating systems such as Windows 7 and XP. Table 1 displays the operating systems teachers used at school.

Table 1

Computer Operating System

Operating System	N	%
Microsoft Windows XP	157	51.64
Microsoft Windows 7	80	26.32
Not sure, but I think it's Windows	22	7.24
Apple/Mac OS X	21	6.91
Microsoft Windows Vista	17	5.59
Other	5	1.64
Linux	1	0.33
Not sure, but I think it's Mac	1	0.33

The most available technological device to teachers in their classrooms was projectors. Other devices teachers had in their classrooms included teacher desktop

computers, DVD players, teacher laptop computers, older technologies (e.g., VHS, overhead projector), digital cameras, interactive whiteboards (e.g., SMART Board, Activboard), and video camera/camcorders. Most teachers did not have access to video conference units (61.51%), iPads or tablet computers (59.54%), and MP3 players or iPods (55.92%). Teachers also reported having access to a 3-D projector, ELMO document camera, Mobi Mobile Interactive Whiteboard, a printer/copier/fax, web cam, and wireless internet. Table 2 shows the availability of various teacher-based devices for instructional purposes.

Table 2

Availability of Teacher-based Devices

	Not Available		Available as Needed		Always in Classroom	
Technology Type	N	%	N	%	N	%
Projector	6	1.97	25	8.22	273	89.80
Teacher desktop computer	31	10.20	23	7.57	250	82.24
Teacher laptop computer	31	10.20	50	16.45	223	73.36
DVD player	18	5.92	70	23.03	216	71.05
Older technologies (e.g., VHS, Overhead Projector)	23	7.57	91	29.93	190	62.50
Interactive whiteboard (e.g., SMART Board, Activboard)	116	38.16	49	16.12	139	45.72
Digital camera	35	11.51	155	50.99	114	37.50
Document camera	112	36.84	99	32.57	93	30.59
Video camera/camcorder	60	19.74	185	60.86	59	19.41
Classroom response system (e.g., clickers)	124	40.79	129	42.43	51	16.78
iPad or tablet computer	181	59.54	81	26.64	42	13.82
Video conference unit	187	61.51	93	30.59	24	7.89
Other	262	86.18	18	5.92	24	7.89
MP3 player/iPod	170	55.92	113	37.17	21	6.91

Frequency of Instructional Technology Use

The second objective was to determine how frequently instructional technology (i.e., computers, devices that can be attached to computers, computer software, and web based applications) were utilized in North Carolina Agricultural Education classrooms by teachers and students.

The most frequently used technological device for instruction was the projector. Other technologies commonly used included teacher desktop computers and teacher laptop computers. Technologies used mostly more than several times a year, but less than daily, included interactive whiteboards, older technologies (e.g., VHS, overhead projector), document cameras, and MP3 players/iPods. The majority of teachers never used DVD players, digital cameras, video cameras/camcorders, iPad or tablet computers, classroom response systems (e.g., clickers), and video conference units. Teachers also reported ELMO document camera, Mobi Mobile Interactive Whiteboard, and power point via TV as devices they used for instruction. Table 3 shows the frequency of use of various devices for instructional purposes.

Table 3

Use of Devices for Instruction

	Never		Several times a year		2-4 times a month		2-3 times a week		Daily	
Technology Type	N	%	N	%	N	%	N	%	N	%
Projector	47	15.46	5	1.64	7	2.30	17	5.59	228	75.00
Teacher desktop computer	44	14.47	19	6.25	15	4.93	27	8.88	199	65.46
Teacher laptop computer	17	5.59	12	3.95	8	2.63	58	19.08	209	68.75
DVD player	260	85.53	32	10.53	9	2.96	2	0.66	1	0.33
Interactive whiteboard	138	45.39	24	7.89	16	5.26	34	11.18	92	30.26
Digital camera	200	65.79	61	20.07	27	8.88	10	3.29	6	1.97
Older technologies	73	24.01	87	28.62	94	30.92	44	14.47	6	1.97
Document camera	143	47.04	115	37.83	35	11.51	7	2.30	4	1.32
Video camera / camcorder	239	78.62	44	14.47	14	4.61	5	1.64	2	0.66
iPad or tablet computer	228	75.00	28	9.21	14	4.61	18	5.92	16	5.26
Classroom response system	174	57.24	47	15.46	40	13.16	29	9.54	14	4.61
MP3 player/iPod	34	11.18	63	20.72	147	48.36	50	16.45	10	3.29
Other	74	24.34	98	32.24	103	33.88	18	5.92	11	3.62
Video conference unit	273	89.80	10	3.29	7	2.30	6	1.97	8	2.63

The most frequently used software program for planning and instruction was an internet browser (e.g., Internet Explorer, Mozilla Firefox, Apple Safari, Google Chrome). Other software programs commonly used included software for managing student records (attendance, grades, reporting), word processing software (e.g., Word, Pages), software for making presentations (e.g., PowerPoint, Keynote), spreadsheets and graphing programs (e.g., Excel, Numbers), and software for administering tests (e.g., Elements). Software programs used only a several times a year included video or audio player software (e.g., Windows Media Player, iTunes), publication software (e.g., Publisher), and database management software (e.g., Access). Photo creation and editing software (e.g., Photoshop, Picasa), drill/practice programs/tutorials software, subject-specific programs (e.g., iCEV, My

CAERT), simulation and visualization programs, video creation and editing software (e.g., Windows Movie Maker, iMovie), and website composer software (e.g., Dreamweaver, Seamonkey) were the least frequently used software by teachers. Only one teacher did not have access to spreadsheets and graphing programs and software for making presentations. Word processing software was the only software accessible to all teachers. Other software programs used for planning and instruction included Agriculture Experience Tracker (AET), power points from internet, and Pix writer, and Notebook. Table 4 shows the frequency of use of various software programs for planning and instructional purposes.

Table 4

Use of Software Programs for Planning and Instruction

	Not available		Never		Several times a year		2-4 times a month		2-3 times a week		Daily	
Technology Type	N	%	N	%	N	%	N	%	N	%	N	%
Word processing software (e.g., Word, Pages)	0	0.00	3	0.99	10	3.29	20	6.58	91	29.93	180	59.21
Spreadsheets and graphing programs (e.g., Excel, Numbers)	1	0.33	12	3.95	54	17.76	83	27.30	90	29.61	64	21.05
Software for making presentations (e.g., PowerPoint, Keynote)	1	0.33	5	1.64	21	6.91	41	13.49	96	31.58	140	46.05
Database management software (e.g., Access)	32	10.53	114	37.50	54	17.76	48	15.79	37	12.17	19	6.25
Publication software (e.g., Publisher)	25	8.22	58	19.08	116	38.16	68	22.37	30	9.87	7	2.30
Internet browser (e.g., Internet Explorer, Mozilla Firefox, Apple Safari, Google Chrome)	4	1.32	3	0.99	2	0.66	10	3.29	32	10.53	253	83.22
Photo creation and editing software (e.g., Photoshop, Picasa)	37	12.17	86	28.29	106	34.87	44	14.47	27	8.88	4	1.32
Video creation and editing software (e.g., Windows Movie Maker, iMovie)	40	13.16	123	40.46	111	36.51	20	6.58	9	2.96	1	0.33
Video or Audio player (e.g., Windows Media Player, iTunes)	23	7.57	88	28.95	76	25.00	63	20.72	45	14.80	9	2.96
Website composer (e.g., Dreamweaver, Seamonkey)	67	22.04	159	52.30	49	16.12	17	5.59	9	2.96	3	0.99
Software for managing student records (attendance, grades, reporting)	4	1.32	16	5.26	10	3.29	11	3.62	26	8.55	237	77.96
Software for administering tests (e.g., Elements)	6	1.97	21	6.91	30	9.87	98	32.24	104	34.21	45	14.80
Simulation and visualization programs	74	24.34	101	33.22	67	22.04	36	11.84	21	6.91	5	1.64
Drill/practice programs/tutorials	53	17.43	86	28.29	71	23.36	53	17.43	32	10.53	9	2.96
Subject-specific programs (e.g., iCEV, My CAERT)	70	23.03	86	28.29	58	19.08	40	13.16	38	12.50	12	3.95
Other	253	83.22	30	9.87	4	1.32	8	2.63	5	1.64	4	1.32

The most frequently used web service for planning and instruction was for curriculum planning (e.g., Moodle for blueprints & instructional outlines). Another web service commonly used was data sharing services (e.g., Google Documents, Dropbox). Web services used 2-4 times a month by at least 30% of teachers included learning management

systems (e.g., Blackboard, Moodle), video sharing (e.g., YouTube, School Tube), personal website, blog, or wiki, chapter website, blog, or wiki. Online presentation websites (e.g., Prezi, Animoto, Glogster) and social networking websites (e.g., Facebook, Twitter, Google Plus, FFA Nation) were used at least several times a year by almost half the teachers. Social bookmarking (e.g., Diigo, Delicious, Pinterest) and photo sharing (e.g., Flickr, Picasa) were the least frequently used web services by teachers. Almost 75% of teachers used all the web services at least several times a year. Other web services used by teachers for planning and instruction included Edmodo, Gaggle, AET, and games. Table 5 shows the frequency of use of various web services for planning and instructional purposes.

Table 5

Use of Web Services for Planning and Instruction

	Not available		Never		Several times a year		2-4 times a month		2-3 times a week		Daily	
Technology Type	N	%	N	%	N	%	N	%	N	%	N	%
Curriculum planning (e.g., Moodle for blueprints & instructional outlines)	4	1.32	15	4.93	54	17.76	95	31.25	93	30.59	43	14.14
Data sharing services (e.g., Google Documents, Dropbox)	12	3.95	75	24.67	48	15.79	65	21.38	67	22.04	37	12.17
Learning Management System (e.g., Blackboard, Moodle)	22	7.24	84	27.63	61	20.07	60	19.74	48	15.79	29	9.54
Social networking websites (e.g., Facebook, Twitter, Google Plus, FFA Nation)	31	10.20	125	41.12	43	14.14	41	13.49	41	13.49	23	7.57
Personal website, blog, or wiki	25	8.22	101	33.22	68	22.37	44	14.47	45	14.80	21	6.91
Chapter website, blog, or wiki	30	9.87	99	32.57	60	19.74	52	17.11	48	15.79	15	4.93
Video sharing (e.g., YouTube, School Tube)	24	7.89	90	29.61	55	18.09	66	21.71	55	18.09	14	4.61
Social bookmarking (e.g., Diigo, Delicious, Pinterest)	46	15.13	185	60.86	22	7.24	27	8.88	15	4.93	9	2.96
Photo sharing (e.g., Flickr, Picasa)	37	12.17	188	61.84	40	13.16	25	8.22	9	2.96	5	1.64
Online presentation websites (e.g., Prezi, Animoto, Glogster)	29	9.54	125	41.12	74	24.34	44	14.47	29	9.54	3	0.99
Other	246	80.92	41	13.49	6	1.97	7	2.30	1	0.33	3	0.99

Computers were more available and used more frequently than tablet computers by students. Students used computers more frequently in the classroom than in other settings during instructional time. Computers at another location in the school were used a few times a month. Almost half of the teachers did not have tablet computers available in their classroom (48.36%) or in another location in the school (45.72%). Table 6 displays the frequency of computer and tablet computer use during instructional time by students.

Table 6

Student Use of Computers and Tablet Computers

	Not available		Never		Several times a year		2-4 times a month		2-3 times a week		Daily	
Technology Type	N	%	N	%	N	%	N	%	N	%	N	%
Computers - In your classroom	37	12.17	26	8.55	62	20.39	63	20.72	66	21.71	50	16.45
Computers - Other location in your school	9	2.96	36	11.84	107	35.20	87	28.62	33	10.86	32	10.53
Tablet computers - In your classroom	147	48.36	91	29.93	27	8.88	15	4.93	13	4.28	11	3.62
Tablet computers - Other location in your school	139	45.72	101	33.22	32	10.53	15	4.93	9	2.96	8	2.63

The most frequently performed activity using educational technology by students in the classroom was conducting research (e.g., internet searching, using reference materials on CD-ROM). Other activities commonly performed were preparing written text (e.g., word processing, desktop publishing), corresponding with others (e.g., students, teachers, experts) via email, network, or internet, developing and presenting multimedia presentations (e.g., PowerPoint), creating or using graphics or visual displays (e.g., graphs, diagrams, pictures, maps), solving problems, analyzing data, or performing calculations, and conducting experiments or performing measurements. Using social networking websites, creating art, music, movies, or webcasts, and contributing to blogs or wikis were the least frequently used

by most teachers. Teachers also reported students play games, use Google Docs/Drive, use online simulations, and take online-computerized tests during their classes. Table 7 lists activities performed by students using education technology.

Table 7

Student Use of Educational Technology

	Not applicable		Never		Several times a year		2-4 times a month		2-3 times a week		Daily	
Activity	N	%	N	%	N	%	N	%	N	%	N	%
Correspond with others (e.g., students, teachers, experts) via email, network, or Internet	20	6.58	72	25.35	72	25.35	68	23.94	40	14.08	32	11.27
Prepare written text (e.g., word processing, desktop publishing)	7	2.30	33	11.11	111	37.37	84	28.28	51	17.17	18	6.06
Conduct research (e.g., Internet searching, using reference materials on CD-ROM)	5	1.64	12	4.01	114	38.13	91	30.43	65	21.74	17	5.69
Use social networking websites	34	11.18	174	64.44	39	14.44	31	11.48	12	4.44	14	5.19
Other	242	79.61	44	70.97	7	11.29	4	6.45	4	6.45	3	4.84
Develop and present multimedia presentations (e.g., PowerPoint)	11	3.62	31	10.58	137	46.76	92	31.40	19	6.48	14	4.78
Solve problems, analyze data, or perform calculations	16	5.26	67	23.26	106	36.81	67	23.26	36	12.50	12	4.17
Create or use graphics or visual displays (e.g., graphs, diagrams, pictures, maps)	8	2.63	59	19.93	118	39.86	74	25.00	36	12.16	9	3.04
Contribute to blogs or wikis	37	12.17	199	74.53	33	12.36	17	6.37	13	4.87	5	1.87
Conduct experiments or perform measurements	18	5.92	80	27.97	103	36.01	69	24.13	29	10.14	5	1.75
Create art, music, movies, or webcasts	28	9.21	138	50.00	94	34.06	32	11.59	10	3.62	2	0.72

Barriers

The third objective was to identify barriers that may inhibit North Carolina agricultural education teachers from integrating technology into the classroom including sources of teachers' technological knowledge/preparedness, school districts with policies restricting specific technology use, integration of educational technology in school districts,

various barriers identified from the literature review, and effectiveness of professional development activities in educational technology.

Over 80% of the teachers' school districts had written policies restricting student use of social networking sites (N = 269), cell phones (N = 263), and MP3 players/iPods (N = 252) by students. Over 50% of the teachers' school districts had written policies restricting the use of YouTube (N = 237) and Wikis and/or blogs (N = 163). Email had the fewest written policies restricting use by students (47.70%). Teachers reported districts also having written policies restricting the use of games, music sites such as Pandora, and photo sharing sites such as Pinterest and Instagram. One teacher reported, "they block everything, even teachers can not connect their devices to the internet." Table 8 lists technologies school districts have written policies restricting their use by students.

Table 8

School Districts with Policies Restricting Technology Use

Technology Type	N	%
Social networking websites	269	88.49%
Cell phones	263	86.51%
MP3 players/iPods	252	82.89%
YouTube	237	77.96%
Wikis and/or blogs	163	53.62%
Email	145	47.70%
Other	108	35.53%

Teachers agreed most strongly with the statement that technology is a priority for the district administration. Therefore, teachers did not identify district administration as a barrier to technology integration. Other statements teachers strongly agreed with included teachers are interested in using technology in classroom instruction. While the mean score is in the

neutral range, 24% of teachers disagreed or strongly disagreed with the statement, "Teachers are sufficiently trained to integrate technology into classroom instruction." Teachers disagreed the most with funding for educational technology is being spent in the most appropriate ways and funding for educational technology is adequate. Table 9 shows how teachers perceive integration of educational technology in the school districts.

Table 9

Integration of Educational Technology in School Districts

Statement	N	M	SD
Technology is a priority for the district administration	304	4.08	0.84
Teachers are interested in using technology in classroom instruction	304	4.02	0.71
Use of educational technology is adversely affected by competing priorities in the classroom	304	3.48	0.89
Teachers are sufficiently trained to integrate technology into classroom instruction	304	3.32	0.97
Technology infrastructure is adequate (e.g., adequate Internet speeds)	304	3.28	1.14
Technical support for educational technology is adequate	304	3.26	1.12
Funding for educational technology is being spent in the most appropriate ways	304	2.93	1.05
Funding for educational technology is adequate	304	2.79	1.19

Note. 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree.

The expense of technology was identified as the greatest barrier to technology integration. Other factors that served as moderate to major barriers included cost of implementing new technologies, time to develop lessons that use technology, availability of technology for the number of students, availability of effective instructional software for the courses taught, availability of technical support to effectively use instructional technology in the teacher/learning process, shared technology throughout the school, and the teacher's

ability to integrate technology in the teaching/learning process. Student interest in technology, administrative support for integration of technology in the teaching/learning process, and student knowledge of existing technology were identified as minimal barriers to technology integration in the classroom. Other barriers identified by teachers included technology is a distraction to students instead of an encouragement to learn and reliability of technology. Table 10 lists barriers to technology integration.

Table 10

Barriers to Technology Integration

	Not a barrier		Minor barrier		Moderate barrier		Major barrier	
Barrier	N	%	N	%	N	%	N	%
Technology is expensive	24	7.89	56	18.42	93	30.59	131	43.09
Cost of implementing new technologies	21	6.91	67	22.04	109	35.86	107	35.20
Enough time to develop lessons that use technology	27	8.88	69	22.70	109	35.86	99	32.57
Availability of technology for the number of students in my classes	61	20.07	72	23.68	90	29.61	81	26.64
Availability of effective instructional software for the courses I teach	41	13.49	104	34.21	108	35.53	51	16.78
Shared technology throughout my school	73	24.01	73	24.01	107	35.20	51	16.78
Availability of technical support to effectively use instructional technology in the teacher/learning process	40	13.16	124	40.79	96	31.58	44	14.47
My ability to integrate technology in the teaching/learning process	61	20.07	123	40.46	85	27.96	35	11.51
Administrative support for integration of technology in the teaching/learning process	126	41.45	106	34.87	53	17.43	19	6.25
Student knowledge of existing technology	109	35.86	130	42.76	51	16.78	14	4.61
Student interest in technology	149	49.01	104	34.21	43	14.14	8	2.63

Teachers' Knowledge/Preparedness

Objective four was to determine how Agricultural Education teachers acquire the knowledge to use educational technology for instruction effectively.

Teachers acquired technology skills to a moderate extent from personal trial and error and interaction with other faculty/staff. Approximately 47% of the teachers (n = 143) reported personal trial and error was the source they acquired technology skills to a major extent. For all of the teachers, personal trial and error contributed at least a minor extent to the acquisition of technology skills. For the majority of teachers, at least a moderate extent of knowledge was obtained from training provided by staff, independent learning, and professional development activities. Undergraduate teacher education programs contributed at least a moderate extent for over 45% of teachers. Teachers gained knowledge most minimally from the students they teach. Another source of technology training identified by teachers was past work experience. Table 11 lists the sources of teachers' technology acquisition.

Table 11

Sources of Teachers' Technological Knowledge/Preparedness

	Not applicable		Not at all		Minor extent		Moderate extent		Major extent	
Source	N	%	N	%	N	%	N	%	N	%
Personal trial and error	2	0.66	0	0.00	44	14.47	115	37.83	143	47.04
Interaction with other faculty/staff	4	1.32	9	2.96	61	20.07	125	41.12	105	34.54
Training provided by staff responsible for technology support and/or integration at your school	6	1.97	18	5.92	85	27.96	118	38.82	77	25.33
Independent learning (e.g., online tutorials or books, help menus)	13	4.28	26	8.55	90	29.61	108	35.53	67	22.04
Professional development activities (in-service courses/workshops)	9	2.96	9	2.96	82	26.97	140	46.05	64	21.05
Undergraduate teacher education program	58	19.08	35	11.51	71	23.36	97	31.91	43	14.14
Graduate teacher education program	125	41.12	18	5.92	60	19.74	61	20.07	40	13.16
From the students you teach	4	1.32	35	11.51	116	38.16	109	35.86	40	13.16
Other	275	90.46	7	2.30	7	2.30	6	1.97	9	2.96

Agriculture teachers spent approximately 16 hours on average in professional development activities for educational technology with a range of 0 to 150 hours during the last 12 months. Teachers agreed these professional development activities in educational technology supported the goals and standards of the state, district, and school. Another statement teachers agreed with was the professional development activities applied to technology available at the school. Teachers somewhat disagreed that professional development activities met teachers' goals and needs and were available at convenient times and places. Over half of the teachers answered somewhat agree for all four statements. Table 12 shows how teachers perceive professional development activities in educational technology.

Table 12

Professional Development in Educational Technology

Statement	N	M	SD
It supported the goals and standards of my state, district, and school	270	3.03	0.63
It applied to technology available in my school	270	3.01	0.76
It met my goals and needs	270	2.81	0.68
It was available at convenient times and places	267	2.76	0.79

Note. 1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = strongly agree.

Teachers' Attitudes

Objective five was to determine the attitudes of North Carolina Agricultural Education teachers towards integrating technology in classroom instruction.

The statement teachers most strongly agreed with was technology allows students to be creative. Other statements teachers agreed with included technology allows students to access course materials easily, appeals to the learning styles of students, provides opportunities for individualized instruction, and enhances student learning. None of the teachers strongly disagreed that technology allows students to be creative, appeals to the learning styles of students, and provides opportunities for individualized instruction. Table 13 shows the attitudes of teachers towards instructional technology.

Table 13

Teachers' Attitudes Towards Instructional Technology

Statement	N	M	SD
Technology allows students to be creative	304	4.01	0.70
Technology allows students to access course materials easily	304	3.92	0.73
Technology appeals to the learning styles of students	304	3.92	0.69
Technology provides opportunities for individualized instruction	304	3.92	0.67
Technology enhances student learning	304	3.84	0.73
Technology improves students' attitudes toward learning	304	3.76	0.84
Technology implementation in the classroom is time consuming	304	3.71	0.92
Technology makes teaching easier	304	3.65	1.02
Technology increases student motivation to learn	304	3.65	0.89
Technology promotes the development of personalized learning plans	304	3.61	0.89
Technology improves student mastery of content	304	3.55	0.84
Technology closes learning gaps between students	304	3.52	0.86
Technology is easy to use	304	3.44	0.89
Technology increases VoCATS exam scores	304	3.39	0.93

Note. 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree.

When asked at the end of the instrument if there were any additional comments they felt were applicable to general technology in education or instructional technology use in agriculture, 122 teachers chose to respond. More than half of those who responded to the question reflected on their personal struggles, failures, and successes when it came to technology integration. Several teachers commented on the lack of up-to-date technologies, the lack of time to learn how to use technology, and the difficulty to manage student behavior when utilizing technology. Teachers expressed, "students, educators, and administrators need to realize that technology is one of many teaching/learning tools" and "Computers are not the fix all for education." Several teachers viewed instructional technology to include agricultural technology instead of only devices that can be attached to computers, computer

software, and web based applications. "Expand your view of instructional technology, beyond the traditional use of computers to teach. Include machine and equipment operation, service, maintenace, and etc. that you would find in modern industry today," reported one teacher. Another teacher commented on the leadership by stating, "Our state is lacking in leadership in development of curriculum course content that could be used through the technology. We are still a pencil and paper organization." All teacher comments are listed in Appendix J.

CHAPTER 5: CONCLUSIONS, DISCUSSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary of Purpose and Objectives

The purpose of this study was to identify and examine factors influencing the integration of technology into the instructional process in North Carolina Agricultural Education classrooms. The research question was "What factors influence North Carolina agriculture teachers' ability to integrate technology in the classroom?" The research objectives for this study were to:

1. Determine the availability of educational technology in Agricultural Education classrooms.
2. Determine how frequently educational technology is utilized in the classroom.
3. Determine the barriers that may inhibit Agricultural Education teachers from integrating technology into the classroom.
4. Determine how Agricultural Education teachers acquire the knowledge to use educational technology for instruction effectively.
5. Determine the attitudes of Agricultural Education teachers towards integrating technology in classroom instruction.

Summary of Methodology

The study used survey research methodology to collect information on the availability of instructional technology, the frequency of instructional technology use, barriers to technology integration, and attitudes of teachers towards technology.

The population for this study consisted of all North Carolina Agricultural Education teachers teaching at the middle or high school level (N = 420). The frame used to determine the population was a list of 2012-2013 agriculture teachers provided by the North Carolina Agricultural Education Regional Coordinators. Seven teachers opted out of the survey and one teacher had an undeliverable email address so the accessible population was N = 412.

Participants responded to the survey through an online survey program called Qualtrics, a website that produces, collects, and analyzes surveys used for research purposes. The survey consisted of five sections with a total of 23 questions. Barriers identified in the review of literature were considered for the instrument. Additionally, questionnaires that had already been developed were used as guides. The instrument was developed based on these ideas along with the researcher's original ideas. The instrument was reviewed for content validity by Agricultural Education professors at North Carolina State University.

Reliability was determined using the test/re-test approach. Twenty-two North Carolina Career and Technical Education teachers completed the test and re-test. The instrument was then evaluated for significant differences between the first and second responses of the eleven teachers. No significant differences were found. Therefore, the instrument was determined to be stable over time.

A pre-notice letter was sent to North Carolina agriculture teachers 3-5 days prior to the receipt of the instrument. Qualtrics was used to send an email to all teachers describing the research process, informed consent, and containing a link to the instrument. Three follow-up emails containing a link to the informed consent and survey instrument were sent over the course of 19 days. Three hundred and four teachers completed the survey

instrument for a response rate of 72.4%. To address non-response errors, the researcher compared early to late respondents, and no significant differences were found. The data were analyzed using reports produced by the Qualtrics Survey Software. Descriptive parameters were run on data to compare percentages, mean, and standard deviation (SD) scores.

Conclusions/Discussion/Implications

Agricultural Education teachers have access to some technology, but often it is not state-of-the-art. Agricultural Education teachers are using educational technology on a regular basis, but not always newer technology. Additionally, teachers are only using basic level skills like internet searches and writing papers. Technology expense, school district restrictions on the use of specific technologies, and lack of time to adequately prepare lessons are barriers to agricultural education teachers integrating technology into their daily lessons. Most agricultural education teachers acquired the majority of their technological knowledge from personal trial and error and from interaction with other faculty and staff. Professional development should better meet the needs and goals of teachers and be provided at more convenient times and places. Agricultural Education teachers believe the integration of educational technology allows students to be creative, appeals to individual learning styles of students, allows easy access to course materials, and provides opportunities for individualized instruction.

Teacher-Based Technology Availability and Frequency of Use

Based on the results of this study, over half (51.64%) of the North Carolina teachers use Microsoft Windows XP, the most often at school. Released in 2001, Microsoft Windows XP is over 10 years old (Microsoft, 2001). Only 26.32% (n = 88) of the teachers used

Microsoft Windows 7, the newest Windows operating system. Most agriculture teachers do not have access to the most up-to-date Windows operating system.

Almost all teachers (98.03%) had access to projectors. These results are consistent with the U.S. Department of Education's *Educational Technology in U.S. Public Schools: Fall 2008* (2010) which reported 97% of schools had projectors. Most teachers also had access to digital cameras (88.49%) and interactive whiteboards (61.84%). These results are somewhat low compared to the U.S. Department of Education's findings that digital cameras were available in 93% of schools and interactive whiteboards in 73% of schools. Less than 12% of teachers did not have access to a teacher desktop or laptop computer, a DVD player, and older technologies such as VHS or an overhead projector. Over half of the teachers did not have access to new educational technologies such as video conference units, iPads or tablet computers, and MP3 players or iPods. Overall, teachers had access to a variety of teacher-based devices.

Over 65% of teachers used a projector, a teacher desktop computer, and a teacher laptop computer on a daily basis. These technologies were also the most available and always in the classroom. Teachers are using the technologies that are easy to access. On the other hand, most teachers had DVD players (94.08%) and older technologies such as VHS or an overhead projector (92.43%) always in the classroom, but 85.53% and 24.01% of teachers, respectively, never use these technologies. Teachers are using newer technologies instead of older technologies.

Additionally, over 75% of teachers had access to all the software programs listed on the survey instrument and used an internet browser and software for managing student

records on a daily basis. The majority of teachers used publication software several times a year. However, this rate of frequency is appropriate for this type of technology. Teachers also had limited access to simulation and visualization software programs and website composer software such as Dreamweaver or Seamonkey.

Over 60% of the teachers that had access to social bookmarking and photo sharing never used them. A higher percentage of teachers reported never using these web services than the percentage of teachers that did not have these technologies available. These web services are relatively new; therefore, teachers may be unaware of their existence or do not know how to use them.

Student-Based Technology Frequency of Use

Although teachers have a positive attitude towards technology, student use is less frequent than teacher use. Most teachers had access to computers either in their classroom or at another location in the school for student use. Students used these computers several times a year or 2-4 times a month. On the other hand, almost half of the teachers did not have access to tablet computers. Of the teachers that did have access to tablet computers, most of the students never used the tablet computers or only used them several times year. The most frequently performed activity using educational technology by students in the classroom was conducting research such as internet searching or using reference materials on CD-ROM. Using social networking websites, creating art, music, movies, or webcasts, and contributing to blogs or wikis were rarely used student activities. Based on the survey results, when agriculture students used technology in the classroom, they were typically using basic technology skills, and when compared to teacher use of technology, the students' use is

considerably less frequent. Other research suggested the lack of student technology use might be the result of the lack of pedagogical knowledge. Russell, Bebell, O'Dwyer, and O'Connor (2003) and Sangra and Gonzalez-Sanmamed (2010) found teachers tended to use technology more for teacher-centered activities such as gaining attention, student response, and transmitting information than student-centered activities such as interaction and communication.

Barriers to Technology Integration

Over half of the teachers' school districts had written policies restricting the use of social networking sites, cell phones, MP3 players/iPods by students, YouTube, and Wikis and/or blogs. Based on these results, leadership and policies are major external barriers. Robinson, Brown, and Green (2007) also identified a barrier indicating teachers could not teach with technology in legitimate ways due to restrictive technology practices. If districts restrict the use of technology, teachers cannot integrate that technology in the classroom. However, teachers agreed most strongly with the statement that technology is a priority for the district administration and did not identify administrative support for integration of technology in the teaching/learning process as a barrier. The research suggests district administration encourages teachers to use technology but restricts students' use of the technology. Due to the large number of school districts with written policies restricting technology use, there is a strong need to find a proper balance between protection and open access to tools and resources.

The expense of technology was identified as the greatest barrier to technology integration. Almost half (43.09%) of teachers identified this factor as a major barrier.

Similarly, 71.06% of teachers reported the cost of implementing new technologies as a major barrier or moderate barrier. Additionally, teachers disagreed with the statement, "Funding for educational technology is adequate." These findings are similar to the findings of other research. Rogers (2000) found the lack of availability and accessibility of technology to teachers was one reason for the lack of use. McKendrick, Straquadine, and Hubert (2002) and Alston, Miller, & Williams (2003a) both identified inadequate funding as the greatest barrier to integrating technology. Another moderate to major barrier to technology integration identified by 68.43% of teachers was time to develop lessons that use technology. These results are somewhat higher than the findings of An & Reigeluth's (2012) survey of 126 teachers in which about 57% perceived lack of time as a barrier to integration. Even teachers who have the technological skills necessary to effectively utilize technology in their classrooms may lack the time to develop courseware or create new teaching materials. Additionally, if teachers do not have technological skills, they may not have time to develop new skills in order to integrate technology.

Sources of Technological Knowledge

Over 75% of teachers acquired much of their technological knowledge from personal trial and error or interaction with other faculty and staff. The interaction with other faculty and staff can be considered a learning community that commonly addresses shared community interests, encourages collaborative activities and discussions, and produces resources representative of shared interest (James, Fox, & Levin, 2011). Most teachers reported training provided by technology staff at the school, independent learning, professional development, and an undergraduate teacher education program only helped

them acquire minimal technological knowledge. Most undergraduate teacher education programs use standalone educational technology courses, rather than integrating technology more systematically in methods courses and field experiences (Gronseth et al., 2010).

Additionally, teachers attended a high number of professional development events in educational technology but rated the quality of professional development somewhat low. To better meet teachers' goals and needs, professional development should be provided to assist with the integration of technology with the curriculum, implementation of new technology tools, and basic skills with technology. Additionally, administrators should be encouraged to improve technology skills, and online learning resources should be provided for staff. All professional development should be evaluated through short surveys to determine the value of each professional development session. A question on the survey should also ask if the session was held at a convenient time and place. Staff should then review survey results for technology based offerings and use that feedback to enhance future offerings. Documentation of teaching strategies using technology could also increase the implementation and use of technology in the classroom. When teachers know how to use technology, they are more likely to utilize it in the classroom. Therefore, professional development plays a crucial role in the technology implementation process. If teachers do not have the understanding or the skills to use technology, then technology integration will have little impact. Professional development activities can help overcome the technological knowledge/preparedness internal barrier by improving teachers' technological knowledge.

Attitudes towards Technology Integration

Teachers in this study were interested in using technology in classroom instruction and believed technology allows students to be creative. None of the teachers strongly disagreed that technology allows students to be creative, appeals to the learning styles of students, and provides opportunities for individualized instruction. Student knowledge of existing technology was viewed as not a barrier or as a minimal barrier by almost 80% of teachers. Although teachers seemed to recognize technology as a valuable instructional tool, teachers disagreed with the statement, "technology increases VoCATS exam scores." An and Reigeluth (2012) and Liu (2011) reported teachers may hold a learner-centered philosophy but implement teacher-centered classrooms. Liu (2011) also found teachers had concerns over student achievement and associated teacher-centered practice with higher test scores. To overcome this barrier, teachers need more training on specific learner-centered technology related instructional strategies. If teachers do not allow students to use technology in the classroom, Agricultural Education students may not gain the technological skills needed in the 21st century.

Recommendations for Future Practice and Research

Practice

To increase student use of technology, social expectations need to be changed to what constitutes good technology use for learner-centered instruction. Teacher recognition awards or sharing best practices could promote changes from teacher-centered to learner-centered integration. Additionally, teachers recognized to be technology savvy could serve as mentors to other teachers.

Most teachers have access to several technologies they rarely use such as photo and video creation and editing software. In addition, web services only require a computer which most teachers have available; therefore, technology expense is not a barrier and should be incorporated in professional development. As well, professional development facilitators need to examine the written polices of school districts to avoid potential restrictions of technology usage. Professional development should reflect the technologies teachers have available, and pre-service teachers should be trained to use these technologies. Pre-service teachers should also be trained to use newer technologies to ensure they are prepared to use the most up-to-date technologies. Furthermore, universities should offer technology integration courses rather than a standalone technology course and a standalone methods course.

Research

Further studies might test the generalization of these results by examining teachers' access to and use of educational technology in different states or countries. Additional inquiry could examine the issues related to technology integration in greater depth using observation and interviews in addition to an online survey. This research could uncover the level of expertise of the teachers in technology integration and also identify teachers who have achieved successful technology integration. A comparative study could be conducted between teachers who have achieved successful technology integration and teachers who could not achieve successful technology integration. This study might reveal further connections among teachers' barriers and how these barriers influence their technology integration efforts. Another study could examine teachers who teach the same agriculture

course. This study may uncover pedagogical practices of teachers who teach the same agriculture courses and use technology. Document analysis could be used to analyze school policies to examine specifically how they restrict access to technology and how this might hinder technology usage. While this study examined the availability and use of various technologies, it is also important to understand how confident teachers feel about using technology. Additional research on teachers' perceived self-efficacy specific to technology integration is recommended. Similarly, future research could examine how pre-service teachers are trained and their perceived self-efficacy at technology integration. With limited student use of technology found in this study, it would be appropriate to examine how students are using technology for learning in other classrooms and independently. Findings could be used to provide recommendations for technology integration in Agricultural Education. Finally, future research is needed to explore various ways to design and implement professional development programs for educational technology that are subject-specific and provide hands-on learning experiences.

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APPENDICES

Appendix A

From: Deb Paxton, IRB Administrator
North Carolina State University
Institutional Review Board

Date: August 16, 2012

Title: Factors that influence agricultural education teachers in North Carolina to integrate technology in the classroom

IRB#: 2759

Dear Maegan Williams

The research proposal named above has received administrative review and has been approved as exempt from the policy as outlined in the Code of Federal Regulations (Exemption: 46.101. b.2). Provided that the only participation of the subjects is as described in the proposal narrative, this project is exempt from further review.

NOTE:

1. This committee complies with requirements found in Title 45 part 46 of The Code of Federal Regulations. For NCSU projects, the Assurance Number is: FWA00003429.

2. Any changes to the research must be submitted and approved by the IRB prior to implementation.

3. If any unanticipated problems occur, they must be reported to the IRB office within 5 business days.

Please forward a copy of this letter to your faculty sponsor, if applicable.
Thank you.

Sincerely,

Deb Paxton
NC State IRB

Appendix B

North Carolina State University
INFORMED CONSENT FORM for RESEARCH

Title of Study: Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom

Principal Investigator: Maegen Williams Faculty Sponsor: Wendy Warner

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What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researchers named above.

What is the purpose of this study?
The purpose of this study is to identify the factors that influence the integration of technology into the instructional process in Agricultural Education classrooms.

What will happen if you take part in the study?
If you agree to participate in this study, you will be asked to:
Complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey* (10-15 minutes). If you choose, you may discontinue participation at any time by closing your browser window.

Risks
As an online participant in this research, there is always a risk of intrusion, loss of data, identification, or other misuse of data by outside agents. Though these risks are minimal, they do exist.

Benefits
There may or may not be a direct benefit to you for completing this survey. However, the results of this research will assist Agricultural Education professionals in the development and delivery of future professional development offerings on technology integration for the 21st century classroom as well as contributing to the Agricultural Education base of knowledge.

Confidentiality

The information in the study records will be kept confidential. Data will be stored securely on a university-sponsored, online survey program called Qualtrics that only the principal investigator and faculty sponsors will be able to access. No reference will be made in oral or written reports, which could link you to the study. You will NOT be asked to write your name on any study materials; therefore, no one can match your identity to the answers that you provide. All data obtained from participants will only be reported in a aggregate format (by reporting only combined results and never reporting individual ones).

Compensation

For participating in this study, you will be entered into a drawing for one of two $50 gift cards. If you withdraw from the study prior to its completion, you will not receive any compensation.

What if you have questions about this study?

If you have questions at any time about the study or the procedures, you may contact the researcher, Maegen Williams, at mrwilli3@ncsu.edu or (910-585-3180). You may also contact Maegen's faculty sponsor, Wendy Warner at wjwarner@ncsu.edu.

What if you have questions about your rights as a research participant?

If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent To Participate

"I have read and understand the above information. I understand I can print a copy of this form for my records. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled. My submission of the survey to the researcher confirms that I agree to participate in this study."

Please select your choice for participation in this study. If you agree to participate, you will automatically be taken to the survey. We appreciate your consideration and time to participate. By clicking an option below, you are electronically signing the consent form.

1. I have read the above consent form, and I agree to participate in this study.
2. I have read the above consent form, and I decline participation in this study.

Appendix C

Q1 – Consent Form

Q2 Instructions: This survey is designed to identify factors that influence instructional technology use in secondary Agricultural Education classrooms in North Carolina.

Please answer the following questions as they pertain to your day-to-day teaching. Please consider all areas of Agricultural Education when answering (classroom, FFA, and SAE).

If you teach at more than one school, consider the technology that you have and use at all schools.

Survey responses will be identified ONLY for the purpose of identifying non-respondents. Identified responses will not be published or shared with any third parties.

Please make sure you answer all the questions in the survey. On questions with the "Other (please specify)" statement, you must select an answer choice to continue the survey even if you do not enter any text.

Q3 What computer operating system do you use most often at SCHOOL?

- ❍ Microsoft Windows XP
- ❍ Microsoft Windows Vista
- ❍ Microsoft Windows 7
- ❍ Apple/Mac OS X
- ❍ Linux
- ❍ Not sure, but I think it's Windows
- ❍ Not sure, but I think it's Mac
- ❍ Other (please specify) _____

Q4 To what extent has each of the following prepared you to make effective use of educational technology for instruction? If you did not participate in an activity, select "not applicable."

	Not applicable	Not at all	Minor extent	Moderate extent	Major extent
Undergraduate teacher education program	❍	❍	❍	❍	❍
Graduate teacher education program	❍	❍	❍	❍	❍
Professional development activities (in-service courses/workshops)	❍	❍	❍	❍	❍
Training provided by staff responsible for technology support and/or integration at your school	❍	❍	❍	❍	❍
Interaction with other faculty/staff	❍	❍	❍	❍	❍
From the students you teach	❍	❍	❍	❍	❍
Independent learning (e.g., online tutorials or books, help menus)	❍	❍	❍	❍	❍
Personal trial and error	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍

Q5 For each of the devices below, indicate its availability to you. Include only devices provided by the school or district.

	Not available	Available as needed	Always in classroom
Teacher desktop computer	❍	❍	❍
Teacher laptop computer	❍	❍	❍
Projector	❍	❍	❍
Video conference unit	❍	❍	❍
Interactive whiteboard (e.g., SMART Board, Activboard)	❍	❍	❍
Classroom response system (e.g., clickers)	❍	❍	❍
Digital camera	❍	❍	❍
Video camera/camcorder	❍	❍	❍
MP3 player/iPod	❍	❍	❍
iPad or tablet computer	❍	❍	❍
Document camera	❍	❍	❍
DVD player	❍	❍	❍
Older technologies (e.g., VHS, Overhead Projector)	❍	❍	❍
Other (please specify)	❍	❍	❍

Q6 For devices that are available to you (as needed or in classroom), indicate how frequently they are used for instruction during your classes.

	Never	Several times a year	2-4 times a month	2-3 times a week	Daily
Teacher desktop computer	❍	❍	❍	❍	❍
Teacher laptop computer	❍	❍	❍	❍	❍
Projector	❍	❍	❍	❍	❍
Video conference unit	❍	❍	❍	❍	❍
Interactive whiteboard (e.g., SMART Board, Activboard)	❍	❍	❍	❍	❍
Classroom response system (e.g., clickers)	❍	❍	❍	❍	❍
Digital camera	❍	❍	❍	❍	❍
Video camera/camcorder	❍	❍	❍	❍	❍
MP3 player/iPod	❍	❍	❍	❍	❍
iPad or tablet computer	❍	❍	❍	❍	❍
Document camera	❍	❍	❍	❍	❍
DVD player	❍	❍	❍	❍	❍
Older technologies (e.g., VHS, Overhead Projector)	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍

Q7 How frequently do you use the following software programs for planning and instruction (including classroom, FFA, and SAE)?

	Not available	Never	Several times a year	2-4 times a month	2-3 times a week	Daily
Word processing software (e.g., Word, Pages)	❍	❍	❍	❍	❍	❍
Spreadsheets and graphing programs (e.g., Excel, Numbers)	❍	❍	❍	❍	❍	❍
Software for making presentations (e.g., PowerPoint, Keynote)	❍	❍	❍	❍	❍	❍
Database management software (e.g., Access)	❍	❍	❍	❍	❍	❍
Publication software (e.g., Publisher)	❍	❍	❍	❍	❍	❍
Internet browser (e.g., Internet Explorer, Mozilla Firefox, Apple Safari, Google Chrome)	❍	❍	❍	❍	❍	❍
Photo creation and editing software (e.g., Photoshop, Picasa)	❍	❍	❍	❍	❍	❍
Video creation and editing software (e.g., Windows Movie Maker, iMovie)	❍	❍	❍	❍	❍	❍
Video or Audio player (e.g., Windows Media Player, iTunes)	❍	❍	❍	❍	❍	❍
Website composer (e.g., Dreamweaver, Seamonkey)	❍	❍	❍	❍	❍	❍
Software for managing student records (attendance, grades, reporting)	❍	❍	❍	❍	❍	❍
Software for administering tests (e.g., Elements)	❍	❍	❍	❍	❍	❍
Simulation and visualization	❍	❍	❍	❍	❍	❍

programs						
Drill/practice programs/tutorials	❍	❍	❍	❍	❍	❍
Subject-specific programs (e.g., iCEV, My CAERT)	❍	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍	❍

Q8 How frequently do you use the following web services for planning and instruction (including classroom, FFA, and SAE)?

	Not available	Never	Several times a year	2-4 times a month	2-3 times a week	Daily
Personal website, blog, or wiki	❍	❍	❍	❍	❍	❍
Chapter website, blog, or wiki	❍	❍	❍	❍	❍	❍
Social networking websites (e.g., Facebook, Twitter, Google Plus, FFA Nation)	❍	❍	❍	❍	❍	❍
Photo sharing (e.g., Flickr, Picasa)	❍	❍	❍	❍	❍	❍
Video sharing (e.g., YouTube, School Tube)	❍	❍	❍	❍	❍	❍
Social bookmarking (e.g., Diigo, Delicious, Pinterest)	❍	❍	❍	❍	❍	❍
Learning Management System (e.g., Blackboard, Moodle)	❍	❍	❍	❍	❍	❍
Curriculum planning (e.g., Moodle for blueprints & instructional outlines)	❍	❍	❍	❍	❍	❍
Data sharing services (e.g., Google Documents, Dropbox)	❍	❍	❍	❍	❍	❍
Online presentation websites (e.g., Prezi, Animoto, Glogster)	❍	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍	❍

Q9 List any other instructional technologies that you use in your classroom. Also, list how frequently you use each technology.

Q10 Please report the number of each device available in your classroom. For devices that can be brought into your classroom, only indicate the number that is generally brought in at one time. (If none, enter 0.)

	Located in your classroom every day	Can be brought into your classroom (e.g., laptops on carts)
Student computers (e.g., desktops, laptops)		
Tablet computers (e.g., iPads)		

Q11 How frequently do your students use each technology during instructional time in the following locations? Only select "not available" if you have no computers in your classroom and cannot bring in computers.

	Not available	Never	Several times a year	2-4 times a month	2-3 times a week	Daily
Computers - In your classroom	❍	❍	❍	❍	❍	❍
Computers - Other location in your school	❍	❍	❍	❍	❍	❍
Tablet computers - In your classroom	❍	❍	❍	❍	❍	❍
Tablet computers - Other location in your school	❍	❍	❍	❍	❍	❍

Q12 How frequently do your students perform the following activities using educational technology during your classes?

	Not applicable	Never	Several times a year	2-4 times a month	2-3 times a week	Daily
Prepare written text (e.g., word processing, desktop publishing)	❍	❍	❍	❍	❍	❍
Create or use graphics or visual displays (e.g., graphs, diagrams, pictures, maps)	❍	❍	❍	❍	❍	❍
Conduct research (e.g., Internet searching, using reference materials on CD-ROM)	❍	❍	❍	❍	❍	❍
Correspond with others (e.g., students, teachers, experts) via email, network, or Internet	❍	❍	❍	❍	❍	❍
Contribute to blogs or wikis	❍	❍	❍	❍	❍	❍
Use social networking websites	❍	❍	❍	❍	❍	❍
Solve problems, analyze data, or perform calculations	❍	❍	❍	❍	❍	❍
Conduct experiments or perform measurements	❍	❍	❍	❍	❍	❍
Develop and present multimedia presentations (e.g., PowerPoint)	❍	❍	❍	❍	❍	❍
Create art, music, movies, or webcasts	❍	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍	❍

Q13 Please indicate whether your district has written policies restricting use (e.g., blocking access) by students that specifically address each of the following:

	Yes	No
Cell phones	❍	❍
MP3 players/iPods	❍	❍
Wikis and/or blogs	❍	❍
Social networking websites	❍	❍
Email	❍	❍
YouTube	❍	❍
Other (please specify)	❍	❍

Q14 Please indicate the extent to which you agree or disagree with each of the following statements as it relates to using educational technology in the instructional program in your district.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Technology is a priority for the district administration	❍	❍	❍	❍	❍
Teachers are sufficiently trained to integrate technology into classroom instruction	❍	❍	❍	❍	❍
Teachers are interested in using technology in classroom instruction	❍	❍	❍	❍	❍
Technology infrastructure is adequate (e.g., adequate Internet speeds)	❍	❍	❍	❍	❍
Technical support for educational technology is adequate	❍	❍	❍	❍	❍
Funding for educational technology is adequate	❍	❍	❍	❍	❍
Funding for educational technology is being spent in the most appropriate ways	❍	❍	❍	❍	❍
Use of educational technology is adversely affected by competing priorities in the classroom	❍	❍	❍	❍	❍

Q15 Mark the response that best describes your attitude towards instructional technology.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Technology closes learning gaps between students	❍	❍	❍	❍	❍
Technology is easy to use	❍	❍	❍	❍	❍
Technology improves student mastery of content	❍	❍	❍	❍	❍
Technology increases VoCATS exam scores	❍	❍	❍	❍	❍
Technology allows students to access course materials easily	❍	❍	❍	❍	❍
Technology allows students to be creative	❍	❍	❍	❍	❍
Technology improves students' attitudes toward learning	❍	❍	❍	❍	❍
Technology promotes the development of personalized learning plans	❍	❍	❍	❍	❍
Technology makes teaching easier	❍	❍	❍	❍	❍
Technology implementation in the classroom is time consuming	❍	❍	❍	❍	❍
Technology appeals to the learning styles of students	❍	❍	❍	❍	❍
Technology provides opportunities for individualized instruction	❍	❍	❍	❍	❍
Technology enhances student learning	❍	❍	❍	❍	❍
Technology increases student motivation to learn	❍	❍	❍	❍	❍

Q16 Mark how severe you perceive each barrier to be for technology integration in your classroom.

	Not a barrier	Minor barrier	Moderate barrier	Major barrier
Availability of technology for the number of students in my classes	❍	❍	❍	❍
Shared technology throughout my school	❍	❍	❍	❍
Technology is expensive	❍	❍	❍	❍
Enough time to develop lessons that use technology	❍	❍	❍	❍
Availability of technical support to effectively use instructional technology in the teacher/learning process	❍	❍	❍	❍
Availability of effective instructional software for the courses I teach	❍	❍	❍	❍
My ability to integrate technology in the teaching/learning process	❍	❍	❍	❍
Administrative support for integration of technology in the teaching/learning process	❍	❍	❍	❍
Cost of implementing new technologies	❍	❍	❍	❍
Student interest in technology	❍	❍	❍	❍
Student knowledge of existing technology	❍	❍	❍	❍

Q17 List any other barriers to technology integration that you have experienced.

Q18 Your Age:

Q19 Your Gender:

- ❍ Male
- ❍ Female

Q20 Including the 2012-2013 school year, how many years have you been teaching agricultural education? If this is your first year teaching, your answer should be 1.

Q21 How many agriculture teachers teach at your school?

- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 or more

Q22 In which region do you teach?

- ❍ East Central
- ❍ Northeast
- ❍ Northwest
- ❍ South Central
- ❍ Southeast
- ❍ Southwest
- ❍ West
- ❍ West Central

Q23 During the last 12 months, how many hours did you spend in professional development activities for educational technology (e.g., workshops, courses, coordinated workgroups)?

Q24 Please indicate the extent to which you agree or disagree with the following statements as they relate to the professional development in educational technology that you took participated in over the last 12 months.

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
It met my goals and needs	❍	❍	❍	❍
It supported the goals and standards of my state, district, and school	❍	❍	❍	❍
It applied to technology available in my school	❍	❍	❍	❍
It was available at convenient times and places	❍	❍	❍	❍

Q25 Thank you for taking the time to complete this survey. If there is anything you would like to tell the researcher about general technology in education, instructional technology use in agriculture, or any item in the survey, please do so in the space below.

Appendix D

October 8, 2012

Dear [FirstName LastName],

I am a Master's degree student in Agricultural Education at North Carolina State University. To earn my degree, I am conducting a research study entitled, *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom*. You will soon receive an email request at **[email]** to voluntarily participate in this research study. If the email address above is **not** correct, please contact me immediately to ensure you receive the request.

As technology continues to increase at a significant rate in our society, it is important that agricultural education students gain technological skills needed in the 21st century. However, there is limited recent data on the availability and frequency of use for instructional technology, and previous data does not represent new technologies. The purpose of this study is to identify the factors that influence the integration of technology into the instructional process in Agricultural Education classrooms. The data collected will assist in the development and delivery of future professional development offerings on technology integration.

If you agree to participate in the study, you will be asked to complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey*. The consent form is the first thing you will see when you access the website. Once you agree to participate, you will be taken to the survey. The survey will take 15-20 minutes to complete.

Please complete the survey as soon as possible, but no later than **Friday, October 26, 2012**. I cannot place a value on how grateful I am for your support by completing the survey. Enclosed is a one-dollar bill. I realize your time is much more valuable than one dollar; however, it is just a small token of my appreciation. In addition, you will have the chance to win one of two $50 gifts cards if you participate in the study.

If you have any questions, feel free to contact me at mrwilli3@ncsu.edu or (910) 585-3180 or my faculty sponsor, Wendy Warner, at wjwarner@ncsu.edu.

Sincerely,

Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Appendix E

Delivery completed on October 11, 2012 6:00 AM.

To: [Email]
From: Maegen Williams, mrwilli3@ncsu.edu
Subject: Technology Integration Survey - Help NCSU Ag Ed Student
Body: Dear ${m://FirstName} ${m://LastName},

You should have recently received a letter with a one dollar bill enclosed describing a research study I am conducting to earn my Master's degree. I am asking you to complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey* to help me with my research.

The consent form is the first thing you will see when you access the website. Once you agree to participate, you will be taken to the survey. The survey will take 10-15 minutes to complete.

Please complete the survey as soon as possible, but no later than **Friday, October 26, 2012**. For this study, individual responses will not be reported and will be kept confidential.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

Again, I cannot place a value on how grateful I am for your support by completing the survey. As an incentive, you will have the chance to win one of two $50 gifts cards if you participate in the study.

If you have any questions, feel free to contact me at mrwilli3@ncsu.edu or (910) 585-3180 or my faculty sponsor, Wendy Warner, at wjwarner@ncsu.edu.

Sincerely,
Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Dr. Wendy Warner

Department of Agricultural and Extension Education
North Carolina State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix F

Delivery completed on October 18, 2012 6:00 AM.

To: [Email]
From: Maegen Williams, mrwilli3@ncsu.edu
Subject: Reminder: Help NCSU Ag Ed Student - Technology Integration Survey
Body: Dear ${m://FirstName} ${m://LastName},

This is a reminder to please complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey* by **October 26, 2012.** I sincerely appreciate you helping me earn my Master's degree by completing the survey.

The consent form is the first thing you will see when you access the website. Once you agree to participate, you will be taken to the survey. The survey will take 10-15 minutes to complete.

Note: On questions with the "Other (please specify)" statement, you must select an answer choice to continue the survey even if you do not enter any text.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

As an incentive, you will have the chance to win one of two $50 gifts cards if you participate in the study.

If you have any questions, feel free to contact me at mrwilli3@ncsu.edu or (910) 585-3180 or my faculty sponsor, Wendy Warner, at wjwarner@ncsu.edu.

Sincerely,

Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Dr. Wendy Warner
Department of Agricultural and Extension Education
North Carolina State University

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Appendix G

Delivery completed on October 25, 2012 5:30 AM.

To: [Email]
From: Maegen Williams, mrwilli3@ncsu.edu
Subject: NCSU Ag Ed Student Requests Your Help
Body: Dear ${m://FirstName} ${m://LastName},

This **Friday, October 26, 2012** is the deadline to complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey*. I know you are very busy, but please try to find **10-15 minutes** to click on the link below and complete the survey by this Friday. Completing the survey will help me earn my Master's degree.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

As an incentive, you will have the chance to win one of two $50 gifts cards if you participate in the study.

If you have any questions, feel free to contact me at mrwilli3@ncsu.edu or (910) 585-3180 or my faculty sponsor, Wendy Warner, at wjwarner@ncsu.edu.

Sincerely,

Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Dr. Wendy Warner
Department of Agricultural and Extension Education
North Carolina State University

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Appendix H

Delivery completed on October 30, 2012 6:00 AM.

To: [Email]
From: Maegen Williams, mrwilli3@ncsu.edu
Subject: Final Reminder: Help NCSU Ag Ed Student - Technology Integration Survey
Body: Dear ${m://FirstName} ${m://LastName},

I just realized that my original deadline to complete the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey* was during the National FFA Convention. Therefore, I have extended my deadline to **Thursday, November 1, 2012.**

Although I have had a tremendous response rate, I still need 117 more responses to earn my Master's degree. Please try to find **10-15 minutes** to click on the link below and complete the survey by this Thursday.

Follow this link to the Survey:
${l://SurveyLink?d=Take the Survey}

Or copy and paste the URL below into your internet browser:
${l://SurveyURL}

As an incentive, you will have the chance to win one of two $50 gifts cards if you participate in the study.

If you have any questions, feel free to contact me at mrwilli3@ncsu.edu or (910) 585-3180 or my faculty sponsor, Wendy Warner, at wjwarner@ncsu.edu.

Sincerely,

Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Dr. Wendy Warner
Department of Agricultural and Extension Education
North Carolina State University

Follow the link to opt out of future emails:
${l://OptOutLink?d=Click here to unsubscribe}

Appendix I

Delivery completed on November 6, 2012 6:00 AM.

To: [Email]
From: Maegen Williams, mrwilli3@ncsu.edu
Subject: Thank You!
Body: Dear ${m://FirstName} ${m://LastName},

Thank you for being one of 300 North Carolina agriculture teachers that completed the *Factors that Influence Agricultural Education Teachers in North Carolina to Integrate Technology in the Classroom Survey*! I am now on track to complete my thesis this semester and earn my Master's degree in Agricultural Education from NC State. Words cannot express my sincere gratitude for your participation and support!

Winners of the $50 gift cards drawing will be notified by the end of the week.

Have a fantastic day!

Respectfully Yours,
Maegen Williams
Graduate Student
Department of Agricultural and Extension Education
North Carolina State University

Dr. Wendy Warner
Department of Agricultural and Extension Education
North Carolina State University

Appendix J

Note: Each bullet point represents one comment.

- Amount of computers available in classrooms are often a problem. Also. the classrooms assigned to agriculture classes are not conducive for computers and technology. For instance, the classrom that I teach in is very humid ant has a tendance to have insect infestations.
- Being a teacher of a homeschool ag ed program, my responses reflect a very unusual teaching environment. I do not receive compensation as a teacher. Student fees are minimal and used for consumable supplies and very basic resources. Technology resources and training are limited to personal expenditures therefore they are limited.
- Counties with limited funding really struggle to meet technology needs. It is unfortunate that if you teach in a poor county your students do not receive the same "opportunities" to be successful as more affluent counties.
- At my age it is difficult to find the time to learn the newer technologies and to prepare CDE teams for competition.
- Having time to create ways to use technology is difficult, when we do some much on our land lab and are very involved in FFA/SAE activities after-school and in the summer (ex...finding time to make activities on the promethean board). It is also difficult to find the time to utilize certain technologies in the classroom because of how long it takes to use or the availability of shared resources. The students like technology, but have to be closely monitored on school computers, etc because they want to use technology for their own purpose (twitter, music, google, etc) instead of their assignment.

- Computers are not the fix all for education. Students need to have problem solving skills and be able to use computers and technology as a tool. Schools in our county that are not yet 1 to 1 with laptops have better scores at the end of the year. We as educators are expected to teach and monitor student use of computers. That is hard to do when I may have as many as 38 students in an Ag Mechanics 1 class. I don't mind the laptops one bit, It makes my job easier in a way. I can tell exactly when a student has turned in an assignment and when they are lying, that is the part they dislike.
- Concerning using The AET, some students really like it and some don't because of the technology. It's a big change which they don't necessarily like either and they don't want to take the time to learn. I think it's mainly because the program isn't very user friendly. I constantly have to go back through the steps of using the program even with written directions for each student. / / My school is moving to a One-to-One initiative soon with Google Chromebooks. It is taking a very long time to move in this direction. I feel as if they have taken the "cheap" route with choosing the chromebooks. There are a lot of potential problems that could occur with the chromebooks and I feel as if it hasn't been thoroughly thought out. / / With this initiative, there are a lot of teachers that have strongly expressed noncompliance with technology and almost refused to learn how to use any form of technology that is new when we are in technology training. Because they have that mindset, I feel as if they completely shut down and even if something is easy to use, they are unwilling to learn because of that mental set. It is frustrating to me as a young teacher that is pretty tech savvy sitting through training with not so tech savvy teachers who are uncooperative in learning about the technology. / / If I had the adequate

resources and support, I could see myself using technology even more than I try to now, but until that point, I try to make due with what I have.

- Expand your view of instructional technology, beyond the traditional use of computers to teach. Include machine and equipment operation, service, maintenace, and etc. that you would find in modern industry today. For example. the first thing a mechanic does is plug a computer into the car, tractor, bulldozer or etc. to run diagnostics on a machine. A machinist, must program a CNC macine to cut out a part. Welders have programable presets on them to set them to frequently welded materials in the fabrication shop.
- I place technology at a broader sense to include technological advances in the tools we use. For example, gps and soil mapping, gmo's, use of simulator, learning about automation in horticulture that plant plugs or automation of watering systems.
- Here at [school] I was able to have some computers (58 of them) donated to the Ag Department. Our IT Department will not support them nor want anything to do with them.
- I enjoy intergrating technology into the classroom and feel comfortable doing so. The major limitation is access to cutting edge technology beyond just having a classroom computer. It would be neat to have iPads or computers for each of my students in the classroom but for me that is not possible. / / Thank you for your work in this research.
- I really like ICEV, and utilize power point a lot. The students also enjoy getting to do class participation study/ review using jeopardy and other games online. / / For the most part, Power Point,Word, Youtube, and ICEV are what I use for lectures when we aren't doing something outside/ hands on.

- I teach Technology, Design and Innovation to 6,7,8 grades. We use computers, hands-on technical equipment to enhance the learning and make topics tangible. We use Pitsco Synergy STEM Centers to incorporate math, science, technology, engineering, and language arts skills in to student learning.
- I teach the home school students so much of this does not apply to me. I use what I personally have available. The students do enjoy technology and I feel they do excel somewhat. Those that have moved on to college are using IT and there has been no hinderance in their ability to pick up the knowledge. Living in a large, rural and economically depressed area, it is hard for some families. A few of my families are struggling to eat and stay warm, therefore technology is not a concern.
- I think the students, educators, and administrators need to realize that technology is one of many teaching/learning tools.
- I try to use technology everyday, my biggest hurdle is not having up-to-date technology. I currently have 3 laptops that are from the mid 2000's and between the 3 I may get through a days instruction without too much headache. Every teacher in the county other than our Agriculture teachers this year were given new laptops, guess Ag isn't a priority, yet we are evaluated on our use of technology. I asked for a SMART board from CTE, never got one, yet I would use it almost everyday and have lessons already planned. Two teachers in CTE have a SMART board at my school, one doesn't even use it, priorties again are not in the right place with where we put our technology money. We have new student computers in labs, with the newest version of Microsoft Office however all of our teacher desktops are still running Office 2003, makes so much sense! If I had the updated

version of Office, I would be able to create and share better lessons, I have the knowledge of all the newest technolgy but I am given no opportunities to fully express my knowledge through my lessons.

- I want clickers and I want someone to show me how to use them properly =)
- If all we do is incorporate technology in the classroom, how will we have time to teach students "HANDS-ON" skills that they need to be successful out there in a world called reality...
- In our district CTE teachers do not have the same OS has regular teachers, and even between CTE classes some have Microsoft 2011, while I still have have 2003. Technology is a touchy subject in our county and can be quite hard to overcome.
- Integrating technology into the classroom effectively takes time and planning but no more so than planning any other effective and engaging lesson.
- It is great if you have access to it.
- less money should be spent on computers and more on technology like greenhouse, welding etc...
- Managing student behavior is considerabley more difficult as they utilize technology in class!
- Most teachers in our district have mimeo projectors in their rooms but I don't. I have student computers for other courses in business I teach. I use them mostly for research, projects, tests, and activities in the agriculture classes.
- My school has a 1:1 program for student MacBooks. Students can pay a $25 fee to be 24/7 users meaning they can take the laptops home with them at night and weekends. If a

student does not pay the fee, they are required to check out their laptops every day from a specified cart. This may be an unusual scenario that may skew your data slightly.

- Not enough funds to provide computer technogy in my classes. All funds are spent in the area of technology for career development in the shop or hands on part of the instruction. Students take other classes where they are exposed to computer technology. Most of my students will use computers and programs in employment however it is most important that they have access to use up- to- date welding equippment and tools they need to become employed.
- Once again I would like to state my opinion that technology is not the answer to our education problems. I love having a computer I can type out assignments on or using the computer in conjuction with the projector to show video clips and even occasionally do an assignment in the computer lab. But the use of smart phones and tablets and students having computers is something that I do not support. Even some educational software such as the CEV software that is supposed to "replace" textbooks is very lacking. The power points are poor, the lesson plans are lacking, and in my opinion it's garbage. Technology is a way for companies to make money maybe, I don't know. I do know that cell phones are already enough of a problem and even teachers with computers in their classrooms have trouble keeping students off of mindless gaming sites. Most teachers will tell you that technology is not the answer.
- Once again we are a bring your own device school, so students are allowed to use phones in the classroom as well as tablets, and laptops. However we hare a title one school with

an almost 50% free and reduced lunch so money is limited for the students to purchase these items themselves.

- One of the biggest drawbacks is that some students don't have technology at home and that puts them at a big disadvantage.
- Our school has 1:1 MacBooks for our students. This is our second full year with this program. Our major obstacles include online distractions such as facebook, Twitter, Skype, Youtube, and online gaming like Call of Duty or Angry Birds. The students have more freedom online, but many students cannot handle balancing and prioritizing their coursework with their social media.
- Our school is a one to one school. All student have laptops. Also, every classroom has a smart board system.
- Our state is lacking in leadership in development of curriculum course content that could be used through the technology. We are still a pencil and paper organization.
- Probably need you to come and help me out on some of this technology
- Provide enough funding for technology aparatus.
- Schools seem to lag behind tech advancements (iPads etc.) - students are personally better equipped than classrooms.
- sometimes i worry we concentrate too much on technology and using it that we miss the point. It is impossible to use all the different types of technology that are now available and still conduct hands-on experiences in the shop/lab.
- Students need technology to keep up with the fast pace agriculture is headed.
- Summer workshops in technology one teacher to another would be welcomed.

- Technology can be a great tool to have in the classroom. We are a middle school where EVERY student has a mini laptop that travels with them from class to class. This would be great is network would be consistant. Internet goes up and down, the student's home folders are accessible sometimes and not others. Inconsistent.
- Technology can be a positive tool for instruction if implemented in the correct way.
- Technology can be a wonderful thing if you have time to learn about it and implement it.
- Technology has decreased my time that I have for preparing for the class because of recordkeeping, e-mail, data requirements at my school. Teaching was much easier when I followed the curriculum and taught it as I saw what the student needed to learn. Vocats has made me dumb down my instruction and made me a less effective teacher.
- Technology integration in the classroom is key to successful education from the teacher perspective and the student perspective. On the one hand, teachers need the resources provided by technology in order to keep up with the standards of today's society. When teachers receive the proper training and approach technology integration with an open and willing mind, it is a tool that makes teaching overall more convenient and increases teacher performance. On the other hand, students must be introduced to technology in the classroom so they will be prepared to use it when they enter the work force. Not only will they have the skills to operate specific technological devices, but they will also develop responsible behaviors that are necessary for technology use. Students need to learn in school how to multi-task in a technology-flooded environment so they are able to focus and function in the work force.

- Technology is a great thing in the classroom. We need to bring all teachers to the same level of instruction!
- Technology is a major distraction for a lot of my students. Our district does not block anything, so students are constantly on websites that they should not be on (facebook, twitter, youtube). Technology is causing some to fail because they are not disciplined enough to do what they are supposed to do.
- Technology is a tool to be used in the classroom. However, it needs to recognized that it is not a cure all for the problems that take place in the classroom. My experience has been that while some student adapt very well to technology others abuse the equipment. Not all students buy in to the value of having individual laptop computers, but rather take it for granted or simply don't care. I do believe that technology can help the close the achievement gap, and can be used to facilitate learning. It is a great way to share curriculum materials with students, and to conduct presentations with. It should also be noted that while "technology" in this instance is being used to describe digital computation devices, and so forth it is also advantageous to have technology upgrades to the lab/shop enviroment. i.e. digital MIG welder VS. older plug type MIG welder; Soil pH meter, etc...
- Technology is a valuable tool in instruction...but only one of many tools that we must use.
- Technology is everywhere in agriculture. Students need to take advantage of the opportunities they have to capitalize on this.
- Technology is great if you have the tools that you need.

- Technology is great, but we have to have the available resources to use - including hardware, software, support, and time to get it set up.
- Technology is more than just the use of a computer , and when was the last time you saw someone milk a computer or weld a plate with it. I know I do alot of old school ways and I am slow to change but my students did not sign up for an agriculuture welding class to only virtually weld they want and need the real thing. Can you get real milk from the cyber cow? How real hands on training is needed because , most students I teach can do very little with thier hands other than i phones, ipads, gmail, moddle ,tweet, gaming,networking,etc..... This makes the stuff we do in ag; new and fun and educational. We have every student at our school with a lap top but google welding does not make you a welder. Sorry for moaning. old school teacher.
- technology is not the total answer
- Technology is now a requirement to be used in the classroom. I believe it restricts children from learning the basics and fundamentals it takes for a child to succeed at the basics in life. Yes, technology can be used as a learning tool but kids still need to learn to read, write, and spell before technology is required for teachers to use.
- Technology sounds good and is very popular among administrators from the school level on up to the state superintendent, but teachers have so many other responsibilities that finding time to effectively incorporate technology into lessons is very difficult. All of our work days are consumed by "Professional Development" meetings which largely prove to be a waste of time. Until the state and local administration learns to trust teachers to do their jobs and manage their time on workdays and other times that we

could use to work on things such as planning lessons that incorporate technology, not many teachers will be able to use technology to its fullest potential. / / Funding is always an issue, but I believe there is money there, but that it is not always spent in the wisest ways. Buying smartboards but not teaching teachers how to use them is a huge waste of money. Laptop carts seem like a good alternative to having computers in every room, but teachers get tired of competing with each other for their use and they seem to get damaged easily by the students who use them. Another barrier not listed could be teacher liability for students looking at sites they shouldn't. It seems like it is always the teacher's fault in situations like these, so some teachers stay away from technology to avoid that risk. / / Hope this helps.

- The big push for technology is not always a great thing. Remember, relying too heavily on any technology can handicap our society. We have children who have failed to learn factors, division, multiplication, etc. because it can be found on the calculator. Do we need technology, absolutely, but we need to make sure we are using it effectively and helping our students improve.
- The county I teach in is nationally recognized for its implementation of 1:1 student laptop intitiative.
- The integration of technology and learning how to use it is not the problem. We are a 1-to-1 school and every student has a school provided laptop. It is HOW students are using the technology. It is NOT being used as an instuctional tool. It is their personal social / gaming / entertainment device. Students spend 10 X more time on social media and entertainment than on instruction. We have "Rules" on paper about proper use, but

nothing is enforced. It is a HUGE distraction and a time waster. Learning is slower due to students trying to multi-task instuction and social together. There has not been adequate monitoring of students, and there is not sufficient consequences for mis-use. To punish a student, you have to take the technology away, and that is exactly opposite of the county's vision. It is a "catch-22". Until the use of the technology is restricted to educational purposes, student learning and scores will continue to decline. Like everything else, it can be a wonderful tool if used properly. Right now it is nothing short of the most destructive educational tool introduced in recent educational history.

- The major barrier for technology use in the classroom is funding and training on current technologies that can be used in the classroom.
- The students are far more advanced in technology then this teacher is.
- The tecnology needs to be availabel for the student use and for the teacher. Need up dating. / theAET program is great!
- The us of technology has benefitted many students; however most students use the internet as an entertainment tool. When they use the internet information it is generally cut and paste. They lack the ability to research, interpret, and understand what has been read. Technology makes for more interesting presentations, but it does not make for better understanding.
- The use of technology is wonderful and can provide students with cutting edge knowledge of their chosen fields of study. it is difficult sometimes for older teachers to "get the hang" of utilizing new technology and finding funding to do so. I support the use of technology in the classroom wholeheartedly. Beyond making powerpoints, using the

boxlight for presentations, and using DVD's, I am behind. Summer conference for ag. teachers does a great job in trying to help keep us up to date.

- There is training out there to help those whou would like training on using technology
- Update all curriculum material to reflect the use of technology
- We are a one on one school. Classroom management has been a huge problem. Keeping students on task is a challenge. Also, students don't know how to use the technology. They don't know how to type. They also don't know how to use programs such as Keynote or Pages so a great deal of time has to be spent just teaching students these basic skills.
- We are going to have to learn how to better use our technology, and more importantly how to keep up with the changes within our budgets or expand the budgets effectively for GOOD technology.
- We are moving away from the hands on approach to learning and encouraging "virtual" experiences so that safety is not a liability in shop education. Computers are not the total answer to skilled vocational people.
- We don't use technology as much as other teachers in our school for two reasons. One, we don't have a laptop for each student to use in the classroom. Two, our teaching philosophy is more geared to providing students with a practical application for concepts taught in class, meaning that we do more hands on demonstrations and project work in the shop and in the greenhouses. We haven't found a great use for wikis, blogs or moodles because our clientel is more kinesthetically inclined. The work other teachers are doing with technology is outstanding and we certainly learn a great deal from them

but have not found real applications for them. / / I will say, however, that we do maintain a website for our department, we use different presentation methods, are currently utilizing google docs and communicate with FFA officers through google mail. Our philosophy on technology is that it is supposed to make life and teaching easier and we are open to technology that can meet those needs. / / I really hope my input helps you in your research and look forward to reading your findings and conclusions. Thanks and have a great day.

- We need more technology before we continue having all of these workshops promoting it.