



**TECHNICAL READINESS OF PRE-SERVICE TEACHERS TO NAVIGATE
AND USE TECHNOLOGY IN THE MODERN DAY CLASSROOM: A LOOK AT
A SMALL, LIBERAL ARTS STATE INSTITUTION OF HIGHER LEARNING**

By

Meghan Greiner

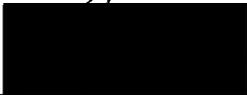
A Master's Thesis/Project Capstone
Submitted in Partial Fulfillment
Of the Requirements for the Degree of
Master of Science in Education
Curriculum and Instruction in Inclusive Settings
Department of Curriculum and Instruction
State University of New York at Fredonia
Fredonia, New York

May 2016

State University of New York at Fredonia
Department of Curriculum and Instruction

CERTIFICATION OF THESIS/PROJECT CAPSTONE WORK

We, the undersigned, certify that this project entitled Technical Readiness of Pre-Service Teachers to Navigate and Use Technology in the Modern Day Classroom: A Look at a Small, Liberal Arts State Institution of Higher Education, Meghan Greiner, Candidate for the Degree of Master of Science in Education, Curriculum and Instruction in Inclusive Education is acceptable in form and content and demonstrates a satisfactory knowledge of the field covered by this project.



Dr. Robert L. Dahlgren
Master's Capstone Advisor
EDU691 Course Instructor
Department of Curriculum and Instruction

5/17/2016

Date



Dr. Robert L. Dahlgren
Department Chair
Department of Curriculum and Instruction

5/17/2016

Date



Dean Christine Givner, PhD.
College of Education
State University of New York at Fredonia

5/18/16

Date

Abstract

The proposed study was based on college students, specifically pre-service teachers, planning to enter the educational field within five years. The study examined technical readiness of these pre-service teachers attending a rural, public university in Western New York and their attitudes toward information and communication technologies (ICT) in the classroom. The investigation sought to answer the question: do small, liberal arts state institutions of higher learning produce pre-service teachers with an adequate amount of exposure and training to navigate and use technology in the modern day classroom? The result of the study revealed a greater need for higher learning programs to implement technology tools and resources that reflect what technologies are in the field.

Keywords: pre-service teachers, ICT, technology, readiness, computer

TABLE OF CONTENTS

Chapter 1 – Introduction.....	1
Chapter 2 – Literature Review.....	8
Chapter 3 – Methodology.....	21
Chapter 4 – Results.....	31
Chapter 5 – Discussion.....	54
References.....	64
Appendices.....	69

Chapter 1 – Introduction

We live in a technologically advanced world, and with such growing innovations there comes a similar growth in the population's attitude towards these shifts. In recent years there has been a pivotal thrust in public opinion towards using interactive technology, such as iPads and SMARTBoards in the classroom (Couse & Chen, 2010). To ground the context of our current society: between an elderly woman and modern-day toddler, the toddler has a significantly higher likelihood and capability to unlock an iPhone to find a specific application than the elderly woman. In countless videos such as this, you can witness a small child, unable to read, yet able to navigate through his iPad to a drawing application (Wilson, 2010). He has learned how to touch-click and swipe to move through the various screens and to pick out his favorite images. As these generations move toward the public school system, the amount of technology they will be exposed to and utilize is exponential. In fact, the Institute of Education Sciences noted that in 2009, 97% of public schools had at least one computer in their classroom, with 93% having Internet capabilities (Gray, Thomas & Lewis, 2010). The research went on to describe that teachers reported they or their students used computers in the classroom during instructional time more often (40%) than not. It is inevitable that as each year passes, more children will be exposed to technology. Based on current trends, research has concluded that these percentages of computer time in classrooms will continue to rise throughout each school year (Gray, Thomas & Lewis). This growing frequency of screen time then stresses the importance of effective technology facilitation in the classroom (Couse & Chen). In the following chapter, I will introduce the issues related technology

integration and will provide a rationale for a research study that I conducted on the efficacy of technology use in public school classrooms.

This general shift as a culture will play a major role in a child's cognitive, social, and computer literacy. Cognitively, a child that is being put in front of a computer for learning purposes is in-taking information differently from that of past generations learning from concrete, tangible tools. The toddler in the video mentioned earlier had a variety of animals to stamp on his iPad and could chose from various paintbrushes, colors, and stroke sizes to individualize his drawing (Wilson, 2010). The possibilities for creativity and individualism are exponentially higher when concrete tools are exchanged for a computer screen. If the child from the video were using concrete materials, such as stickers or magazines, there would be a limited number of options for the child to choose from. Instead, the use of applications gives way for countless more options and the technological ability to upload and hold many more virtual images than can fit on a traditional page. In this sense, the child has many more options when deciding how to arrange and create on his iPad (Wilson). Cognitively, this implies that the child's exposure to new images broadens and their understanding of the world around them.

Before this technological surge, interacting with parents or caregivers socialized children. Children today avoid this contact through the use of applications and computer programs. This would subsequently result in taking away the need of a facilitator around to guide direct instruction. Again to support this idea, from the video you see that the child needs little assistance in creating his artwork (Wilson, 2010). In a comical video, we see how this technological age can affect relationships. During dinner, two teenage boys are connected to their phones and when asked to pass the salt by his father, the one

child distractedly passes over the pepper instead (Abeler, 2013). A play on technology and relationships, the father then pulls out an old typewriter and noisily begins typing away as his sons do. Throughout the video you see the growing tension between the two generations at the table, one era wanting to talk traditionally, while the other communicates primarily using technology (Abeler). The video depicts social discrepancies growing with the advent of this new era.

Finally, with children being exposed to these technologies at younger ages, their computer literacy skills will much surpass those of the generations before them. As these children grow up, they will have a much larger understanding of the potential this technology has. That is, the ability to intake more information from technology and get exposure to educational materials that far outreach traditional means. For example, through the use of virtual field trips, a classroom is able to take a virtual tour of the ancient pyramids of Egypt or even to the moon without having to leave the room. Zanetis (2010) stated that, “Interactive VRTs are synchronous, real-time experiences in which students in one location learn from informal educators in another location, such as a museum, historic castle, or organization such as NASA” (p. 21). Due to this, students must learn computer literacy skills through navigating different screens, various websites, and fulfilling multiple tasks. It is important that pre-service educators understand and have the knowledge of this and other tools able to support this growth.

Over the past 10 years, many new research endeavors have been inspired by the inevitability of technology in the classroom (Couse & Chen, 2010; Howard, Miles & Rees-Davies, 2012; O’Hara, 2011; Robert-Holmes, 2014; Sackes, Trundle, & Bell, 2011). Couse and Chen pointed out that it is no longer whether to bring technology into

the classroom; it is a question of how the technology should be used. The researchers noted that, “technology that encourages student’s thinking affords them opportunities for active control and problem solving while providing teachers with a window to children’s development” (p. 76). Through their research they noted that 72% of elementary students have online access at home. This supports that idea that a majority of students will be coming to school with a familiarity with computer technologies. In turn, it reflects a need for educators to as they said, see through the window, to further what knowledge they are trying to instill. With high demands coming down from states and curriculum, technology is evolving into the main avenue with which to reach goals that traditional teaching could not reach.

It isn’t enough to place a computer in a classroom without effective guidance (Mangen, 2010; Masoumi, 2015; Muhammad & Muhammad 2012). Teachers need to feel confident in computer integration through training as well as to have computers available for children to explore. As funding continues to grow for additional laptop and iPad sets for classrooms, the availability for technology will become more prevalent in the coming years. Asing-Cashman, Gurung, Limbu, & Rutledge (2014) suggest that, “teachers’ existing beliefs and attitudes influence the development of technology and beliefs about both potential technology integration and related practices” (p. 66). The researchers went on to suggest that the teachers’ technology beliefs and attitudes “determine their pedagogic intention, including the likelihood of using technology in their future classrooms” (p. 66). To improve instruction, well-trained teachers use multimedia presentations and tools to develop skills in ways that traditionally would be impractical. Masoumi warns that, “On their own, ICTs- information and computer

technologies- cannot enhance preschool educational practices” (p. 6). Yet by investing time and practice with teacher readiness in computers, tablets, interactive whiteboards, and ongoing professional development, a school can elevate the rigor and richness of their educational practices (Masoumi). Technology in this day and age opens a door to seemingly limitless possibilities for a child’s imagination. Before ICTs became such a predominant aspect of people’s lives, computer technology was not seen as help to teachers (Mangen). Technology 10 years ago was not at a point where user-friendly tablets, easy to navigate computers, and well-trained teachers were common in classrooms integrating technology. As a result, in the years before 2007, there was a predominantly negative teacher perspective on the use of ICTs in the classroom (Mangen). The lack of equipment and abundance of untrained teachers resulted in ICT showing little to no benefits to children. However, the post-graduate students of the class of 2006 did show confidence in technology integration and displayed the beginnings of change in teacher perspective (Mitchell & Dunbar). As year’s progress, and pre-service teachers begin to be people who are more comfortable with technology, it is suggested that there is likelihood they will be more confident integrating technology into their own classrooms (Asing-Cashman, Gurung, Limbu, & Rutledge, 2014; Masoumi, 2015; Muhammad & Muhammad 2012).

Throughout the research teachers reported that, when proper training was distributed, teacher confidence in technology integration was much higher (Campbell & Scotellaro, 2009; Garcia & Rose, 2007; Mitchell & Dunbar, 2006). Now that our availability with classroom technology has been met to an extent, how does one find confident educators? This begs the question, are current universities meeting these high

technology demands in the modern day classroom? Campbell & Scotellaro (2009) proposed that, “One difficulty is providing funding for the hardware and software needed to support the introduction of ICT in early childhood education, but an even more urgent need is the professional development of early childhood teachers” (p. 12). By investigating the training pre-service teachers receive through getting their degrees, connections can be made between readiness and intentions.

Throughout my experiences with P-12 public schools in Western New York State, I’ve noted that schools are becoming much more progressive. Accompanying this shift, administrators are expecting pre-service teachers to have experience with new technologies such as SMARTBoards, iPads, tablets, and other software. Although my fellow pre-service teachers and I may consider us technologically competent, it stems from our upbringing in this modern age. This self-exploration has limited our generation to a small window of the broad technology being used. Many collegiate classrooms do not have the ICT tools that can be found in our public schools and this may form a perspective trend from current pre-service teachers about how prepared they feel in getting their own classroom. My research will hope to reveal pre-service teachers’ perspectives on technological readiness by conducting surveys and interviews.

My research will attempt to look at current pre service teachers attending a rural institute of higher education in order to analyze teacher preparedness in terms of technology use in the classroom. The research question that drives this project is thus: do modern rural institutions of higher education produce pre-service teachers with an adequate amount of exposure to and training with ICTs to navigate and use technology in the modern day classroom? In addition, through my survey responses and interviews, I

hope to understand pre-service perspectives on SMARTBoard lesson creation as well as pinpoint where pre-service teachers feel that they are learning the most about technology in the classroom. In the following chapter, I will review the literature related to strategies for integrating technology use in the elementary classroom.

Chapter 2 – Review of the Literature

Chapter 1 discussed the current trends of technology in the classroom. It is clear that technology has a major impact on our students and will continue to have a larger impact each year that passes. Children are learners by nature. They possess a sense of curiosity that will develop and flourish throughout their formative years. During this time, more and more children are being exposed to technology. These children are experiencing computer application that aim to teach topics such as ELA and mathematics in ways that provide continuous, enhanced, and focused practice. Educators should act as the facilitator in the classroom when exposing children to new technologies. To be successful, these educators should have proper training and experience with these various forms for technology. In the following review of the literature, I will attempt to summarize the current scholarship related to student achievement and teacher perspectives on their abilities to implement these technologies.

It is notable that children who begin to master computer technology will have a lifelong advantage over those who have not. Young children need to be introduced early to technology as a form of literacy, but due to the lack of teacher confidence and training in early childhood settings, it was found that teachers did not see much improvement in their children's computer literacy. Chen and Chang (2006) suggested that more studies and training are needed for teachers to integrate computer programs into their classroom effectively. Researchers have determined that teacher attitudes toward technology correlate to their effectiveness in the classroom (Mohammad & Mohammad, 2012, O'Hara, 2011, Howard, Miles, & Rees-Davies, 2012). Couse and Chen (2010), used their findings to point out that there is no longer an argument whether or not to bring

technology into the classroom. Instead, it is a question of how the technology should be used. Through their research, they noted that 72% of elementary students have online access at home. That number reflects a need for us as educators to use that to our advantage and give children tools they can use to further that knowledge we are trying to instill in them. With the high demands coming down from states and curriculum, technology is becoming a high demand to meet those needs traditional teaching can't reach. In the author's study, they gave 41 young children, three- to six- year olds, tablets and found that motivation toward handwriting increased with the use of tablet computers and the children being able to pick their own colors and style writing. Another notable finding was that the younger 3-year-old children spent significantly less time on the tablets, implying the researchers wrote, "that cognitive maturity increased engagement with technology" (p.93).

Technology is prevalent in early childhood settings. A similar study reviewed the current research being done on the effects of computer integration into the early childhood curriculum (Mohammad & Mohammad, 2012). Mohammad and Mohammad found a consensus that computer use with young children has been proven to show positive impacts on social, emotional, language, and cognitive development. To describe this, "the computer is seen as a material with many potential benefits and many potential problems. If it is used wisely, with the principles of early childhood development in mind, it can be a valuable addition to a development-based classroom" (p. 99). With open-ended computer programming, computers for young children facilitate creative thinking while developing improved problem solving skills. The authors remarked the children are not logging onto a computer, playing, and then signing off. Instead, they are

creating end products that they then print out and discuss with peers. Children are being observed taking computer experience and developing dramatic play scenarios with other peers. Mohammad and Mohammad conclude however, that for computers to be successfully integrated, teachers must be caring and well knowledgeable. It is a teacher's role to provide developmentally appropriate software, place computers on low-rise tables, and encourage peer interaction.

To reinforce the positive effects of ICT in the classroom, teachers must have equally positive attitudes toward the integration. Chen and Chang (2006) sought to assess the status of early childhood teachers' attitudes, skills, and practices when it comes to integrating computers in the classroom. The goal was to determine relationships between these teachers' attitudes and the "implications for the design of technology training for early childhood teachers" (p. 77). To do this, the researchers surveyed a large pool of teacher participants from the state pre-kindergarten program in a metropolitan public school system. The teachers surveyed included 98% females and a majority (65%) of teachers who had worked in school for over 10 years. The results found that only half of the teachers felt confident with using computers in the classroom, as well as teaching computer use to children. In addition, through classroom practices and in-service training questions showed distinct hesitance to using computers to the full potential. Statistically, a teacher would be more likely to use pre-made programming as opposed to generating his or her own computer materials. Chen and Chang suggested, "teacher proficiency in technology integration is a critical determinant of the educational benefits children gain from using computers" (p.178). In conclusion, teachers must feel confident in their ICT abilities in order for their student's to find equal success.

Before experience in the classroom itself, pre-service teachers are taught at universities how to effectively instruct students. This target population yields answers on progressive attitudes toward ICT. In 2006, Mitchell and Dunbar noticed a rise in teachers using ICT in nursery school settings across Europe. Their investigation sought to understand teacher perspectives on ICT and if it was being successfully integrated. The target population was postgraduate students at Stranmillis University College who graduated with an early childhood degree. Respondents showed confidence in using technology in the classroom, as well as enthusiasm. Results from the following teacher interviews and nursery observations showed a contradictory divide. In most classrooms, only one or two computers were available to use. Other modes of technology such as scanners and webcams were not found in any classrooms. This meant that not a lot of technology was available for children to interact with. However, teachers felt in their interviews that there were ample benefits to using computers. Two most notable reasons given were that ICT provided opportunities for making choices as well as promoting independence and autonomy. The results of the observations concluded with positive effects in areas of physical development (fine motor skills), cognitive development, language, and the role of the teacher (proactive in fostering peer interaction and cooperation). In conclusion, in 2006 we see teacher confidence in implementing ICT yet a lack of resources in the modern day classroom.

A connection can be made between the amount of technology that is used at home and ability to explore technology in school. O'Hara (2011) performed a study to determine parental perspectives when it came to the use of ICT in home settings. The parents were either from Stafford School or Hill School, two average economic

communities in England. O'Hara wanted to determine if there was a relationship between the computer technology children used at home, and the amount they used in nursery school. The researcher found, "parents reported that young children were using a wide range of ICT equipment, with greater levels of autonomy and at earlier ages than was the case in school and perhaps therefore the largest digital divide was that between the children's ICT experiences in nursery/school compared to those at home" (p. 229). Throughout the interviews, data were collected that suggested a natural pattern children received at home: first children get acquainted to televisions, then on to video, CD, and DVD players, and then finally by the age of four, PCs and game consoles of various kinds. Even those parents that avoided introducing their children to technology noted that they are naturally technologically savvy. In conclusion to the study, many parents noted their hesitance with regard to the use of technology in the classroom, but did not note that ICT had a positive impact on siblings, family, and friends in relation to social and collaborative learning. The author found that there was a correlation between children's confidence in technology in the classroom that were familiar with technology at home, but it is to be noted that even those children whom did not have much ICT experience at home were still interested in ICT in the classroom.

It is important to note student perspectives on ICT in the classroom. While lesson reinforcement activities are being shifted to computer-based programming- do students notice? Howard, Miles, and Rees-Davies (2012) set out to research the ways that computers are used within a play-based curriculum. Twelve schools in South Wales from varying socio-economic backgrounds were observed. Contrary to previous findings, teachers felt confident in their ability to integrate computers into the classroom. Children

on the computer were both supervised and unsupervised; the study found that the activities they performed were designed to enable children to practice and master skills previously covered in class. In short the authors suggest, “teachers are managing their interactions with children using computers effectively, supporting the learning process whilst also facilitating children’s autonomy, choice and control” (p. 187). The teachers discussed with researchers that the computers provided children continuous, enhanced, and focused practice. The study noted that, contrary to the idea that play cannot happen with teacher presence, teacher involvement during computer activity led to no difference in children’s ratings of the degree to which the activity resembled play. Most poignantly, the authors found that, “children’s experience with this diverse classroom provision [using computers as a play tool] has prevented them from developing a dichotomous perception of their activities” (p. 187). This suggests that integrating computer in a play-based curriculum can be done in a teacher guided way successfully that also promotes social and cognitive development in children.

As technology demands increase, computer literacy in student achievement can be seen to grow alongside the trend. A recent study by Sackes, Trundle, and Bell (2011) used a large children sample pool to analyze computer skills development (using LISREL software version 8.80) in children aged kindergarten to third grade. In addition, questionnaires were distributed to construct teacher perspectives on new ICT strategies in the classroom. The researchers wanted to specifically look at socio-economic status, gender, and availability of computers at home to predict a child’s development of computer skills. Most pointed, the study found that, “results demonstrated a positive influence of the availability of computers in kindergarten classrooms on the long-term

development of children's computer skills and provided empirical evidence for the rationale for inclusion of computers in kindergarten classrooms" (p. 6). This research supports the integration of computers and technology in early childhood settings, stating that it gives children a jump-start in computer literacy development. This correlated with the results of questionnaires from teachers feeling confident in their abilities to use ICT tools in the classroom for assessment purposes.

In addition to computer literacy, student social interactions are effected by the integration of ICT in the classroom. Researchers Plowman and Stephan (2005) sought to observe the ICT development in preschool years of education. Evidence was collected through observations at 7 Scottish preschool settings as well as child and practitioner interviews. Due to the public schools in Scotland starting at age five, these preschool settings had practitioners with a diverse range of qualifications and generally not a high level of ICT resources. Child-centered, play-based curriculum is the staple of early childhood education in Scotland, so integrating technology came as a contradiction to those ideals, many practitioners noted. Each setting was observed during two half-day sessions and audio recording was taken at each site. Children's interactions fell into these three categories: negotiating assesses and taking turns, managing operations, or sharing enjoying of action onscreen. As mostly observed by the researchers, there were negative social effects of the computer on children. Children were either asking for a turn, or instructing the child where to click. In addition, the researchers observed little to no adult involvement in computer play. The adult did not play an active role in computer exploration, merely as a "reactive supervisor" (p. 151). As the authors concluded, a low level of practitioner confidence in ICT and observations that suggested that computer

play does not always support active learning. These observations point out the need for a more developed pedagogy for the use of computers in the classroom, as well as further practitioner training on how to integrate computers successfully into the classroom.

Conclusions

In the past 10 years, research and ICT has changed and evolved dramatically overtime. The majority of articles (Chen & Chang, 2006; Couse & Chen, 2010; Howard, Miles, & Rees-Davies, 2012; Mitchell & Dunbar, 2006; O'Hara, 2011; Plowman & Stephen, 2005; Robert-Holmes, 2014) on this topic were qualitative. However, practitioner-oriented articles (Mohammad & Mohammad, 2012; Wilber, 2012) and mixed-method approaches (Sackes, Trundle, & Bell, 2011) were also used. It should be stated that a majority of the articles used questionnaires and surveys to collect data (Chen & Chang; Couse & Chen; Howard, Miles, Rees-Davies; Mitchell & Dunbar; O'Hara; Plowman & Stephen; Robert-Holmes). Teacher perspectives were used to discuss teacher confidence and ability to use new technologies in the classroom (Chen & Chang; Howard, Miles, & Rees-Davies; Mitchell & Dunbar; O'Hara; Plowman & Stephen; Roberts-Holmes; Sackes, Trundle, & Bell) as well as child interviews (Couse & Chen; Howard, Miles, & Rees-Davies; Mitchell & Dunbar; Plowman & Stephen; Robert-Holmes). There were distinct patterns that formed throughout the research that discussed the relationship between child success and teacher confidence when it came to technology integrations.

The time frame of research played a large role in the results gathered. Research noted the negative effects of child integration of ICT in articles published 2005-2006 (Chen & Chang, 2006, & Plowman and Stephen, 2005). Both teams of researchers found

there was a consensus that teachers did not feel confident with integrating computers into early childhood settings. As a result of this lack of confidence, children were either sat in front of a computer with the teacher as a 'reactive supervisor' (Plowman & Stephen), or not put in front of a computer at all (Chen & Chang). Without appropriate teacher guidance, children had little to no effect of ICT in the classroom. Chen and Chang noted that a lack of teacher confidence leads to a negative effect on ICT integration.

Mohammad and Mohammad (2012) and O'Hara (2011) agreed. Both made distinct points that confidence and training for early childhood teachers create educators who know how to correctly integrate ICT into the classroom. O'Hara brought up parental perspectives of the hesitance of computer safety, but noted that even children who didn't use computers at home, had an inept ability to "know what to click" (p. 224). In agreement, another set of researchers came to the conclusion that when computers are integrated early, for example kindergarten, there are distinct levels of growth and development that happen (Sackes, Trundle, & Bell, 2011).

There was a noted difference between the perspectives of teachers based on their age. Teachers that were interviewed whom had been in the field over ten years generally spoke more negatively and were hesitant adding computers to a classroom (Chen & Chang, 2006). While, post-graduate teachers just getting into the field felt confident in computers, yet did not have the supplies to successfully integrate them into the classroom (Mitchell & Dunbar, 2006). This divide in the same year of study demonstrates a generational difference happening in the research. However, once studies began after 2010, all teachers reported to have better computer training and a higher confidence in computers in the classroom (Mohammad & Mohammad, 2012, O'Hara, 2011, Howard,

Miles, & Rees-Davies, 2012). This competency to be active in children's exploration of computers is what leads to the positive effects these computers have on children. The role of the teacher in a successful ICT classroom is to be an active facilitator, not a bystander (Mohammad & Mohammad; O'Hara, Howard, Miles, & Rees-Davies). Teachers needed to be knowledgeable of the technologies being used in the classroom to successfully teach and guide student instruction.

When computers are successfully integrated into the classroom with trained teachers that understand how to use them, children see large amounts of development in social, cognitive, and literate ways. Giving a child a tablet in nursery school will inevitably lead to conversation with peers (Couse & Chen, 2010). Through observations in a case study, confidence, self-esteem, and social skills were all results of integrating computers into a nursery school class. These social interactions from making multimedia movies and avatars developed into opportunities of cooperation with peers and sustained shared thinking (SST) (Roberts-Holmes, 2014). The same is true when two children were observed making a picture on a computer, printed it out, and then showed two other students. As a result, the four students created a dramatic play scenario based on the multi-media (Mohammad & Mohammad, 2012). Children appreciate ICT because they are able to work on development quickly. For example, to make a picture, children were quoted saying that they prefer coloring on tablets because they don't have to clean off a brush and there are hundreds more options available for them (Couse & Chen). In addition, tablets provide even younger children the ability to navigate options more independently without having to read (Wilber, 2012). With these options open, and the

more creativity that is happening for the child, meaningful conversation can be fostered between children (Couse & Chen; Mohammad & Mohammad; Robert-Holmes, 2014).

Researchers have concluded that without a doubt, computers and ICT are going to be assessable to abundant numbers of students in years to come. There is a trend that shows that beyond the year 2010, computers are seen in every classroom setting (Couse & Chen, 2010; Howard, Miles, & Rees-Davies, 2012; O'Hara, 2011; Robert-Holmes, 2014, Sackes, Trundle, & Bell, 2011). It isn't enough to just place a computer in a classroom without any guidance. Teachers need to feel confident in computer integration through training as well as to have computers available for children to explore. To improve instruction, well-trained teachers use multimedia to develop children's skills in ways that traditionally would be impossible. Technology opens a door for limitless possibilities for children's imaginations, and that can lead to young children developing skills, especially social and cognitive, in ways not seen before.

Data from the articles were mostly collected through interviews, surveys, and observations (Chen & Chang, 2006; Couse & Chen, 2006; Howard, Miles, & Rees-Davies, 2012; Mitchell & Dunbar, 2006; Mohammad & Mohammad, 2012; O'Hara, 2011; Plowman & Stephen, 2005; Roberts-Holmes, 2014; Sackes, Trundle, & Bell, 2011). This lack of empirical, quantitative research leads to researchers examining teacher perspectives more than actual statistics. This is why the range of data collected throughout the articles in ten years varied immensely. Before ICT and home computers became such a predominant aspect of people's lives, computer technology in early childhood settings was not seen as helpful to teachers. The technology was not at a point that tablets, easy to navigate computers, and well-trained teachers were in classrooms

integrating technology. As a result, before 2007, there was predominately a negative teacher perspective on ICT and due to teachers being untrained, children saw little to no benefits from computers in the classroom. However, the post-graduate students in 2006 did show confidence and the beginnings of change in teacher perspective (Mitchell & Dunbar, 2006). Now that computers are part of everyday life for most children, more is being done to train teachers in the potential this technology has. Using this technology successfully has proven through observations and interviews to promote development in children, specifically social, cognitive, and computer literacy development. The importance of pre service teachers being able to understand these technologies before they get into the classroom will prove to be vital in creating a successful ICT classroom for the students.

In the following chapter, I will discuss my methods in a study that looks at pre-service teachers at a rural, state university in New York. As many studies dealt with teacher perspectives in European settings, analyzing the technology shift in the United States will provide a unique perspective not yet seen in research. Through the use of a mixed-methods approach, I will be using interviews and questionnaires to generalize pre-service readiness to meet the ICT demands in a typical New York State classroom. As past studies has shown, there is an evolving need to research teacher perspectives in ICT, I plan on showcasing that need by presenting indicators of technological utilization in U.S. classrooms.

Chapter 3 – Methods

Technology-enhanced learning is creating a shift in early childhood and childhood classrooms. In the previous chapter, I reviewed literature concerning teacher attitudes of technology integration and the general shift that has occurred over the past ten years. Researchers point out a “digital divide” between the learning experiences a child has at home and that in an educational setting (Campbell & Scotellaro, 2009, p. 11). This insight seeks to explain the shift in perspective that is currently happening in education. As we begin analyzing the modern classroom, there is a greater effort being put forth to integrate technology into the classes of school-age children.

The research prior to 2010 noted negative attitudes and low student achievement in classrooms that utilized computer technologies (Chen & Chang, 2006; Plowman & Stephen, 2005). Research after 2010 showed improved teacher competence in blending technology with traditional teaching methods and saw an overall growth in student achievement (Howard, Miles, & Rees-Davies, 2012; Mohammad & Mohammad, 2012; O’Hara, 2011). Due to this, educators and researchers have concluded that, in the future, a push for more information and communication technology instruction will not lose momentum (Yilmaz & Alici, 2011). To summarize, technology integration that is being used to aid in teaching a concept by competent teachers has proven to be an effective means to promote higher student achievement (Howard, Miles, & Rees-Davies, 2012; Mohammad & Mohammad, 2012; O’Hara, 2011; and Yilmaz & Alici, 2011). In the following chapter, I will detail the methods used in my study that compiled evidence that generalized pre-service attitudes toward ICT integration by evaluating the framework of my study as well as data collection processes used.

Research Frameworks

My proposed study was based on college students, specifically pre-service teachers, planning to enter the education field within five years. My study examined the technological preparedness of various pre-service teachers attending a rural, public university in Western New York and their attitudes toward information and communication technologies, ICT, in the classroom. Through the use of a mixed methods approach I guided my research with rating scales and interviews to gain an understanding of pre-service teachers' attitudes toward computer focused education and their readiness to implement these tools in their future classroom.

My study followed a mixed-methods paradigm. I wanted to receive back large amounts of data through the distribution of a questionnaire and support that information with rich responses in interview forums. In this way, using a mixed-methods approach provided me, “words, pictures, and narrative [that could] be used to add meaning to numbers” (Johnson & Christensen, 2012, p. 433). In addition, with my goal being to generalize pre-service attitudes, I found this paradigm enabled me to answer this broad topic easier because, “the researcher [was] not confined to a single method or research approach” (p. 433). My rationale for the decisions from this study, therefore, follows a mixed methods paradigm.

Research Setting

The setting for my research study took place at a rural, public liberal arts state college. This particular four-year comprehensive public, Liberal Arts College is best known for Bachelor's degree programs in music and education – thus was ideal for my research topic.

Analyzing the population make-up of the school is as follows. As of the Fall 2014 semester, there were a total of 5,214 enrolled students (Fast Facts, 2014). The breakdown of that number included 4,941 undergraduate students and 273 total graduate students. The gender percentage was divided with female students accounting for 54.4% undergraduate and 75.8% graduate, and male students accounting for 45.6% undergraduate and 24.2% graduate. The reported ethnicity of undergraduates are as followed: White: 78.9%, Hispanic: 5.9%, African-American: 5.6%, multiple races: 2.2%, Asian: 3.9%, American Indian: 0.4%, and Native Hawaiian, Pacific Islander: 0.1% (Fast Facts).

Sampling Procedures

To qualify for my study, the participants had to be enrolled as students at the particular university where I set my study for three or more years. These students also had to be enrolled or have an undergraduate degree in a field of education at the same institution. My participants ranged from undergraduate juniors to graduate students that were not full time teachers in the field. The age range from my participants ranged from 20-26. In terms of both my interview and survey procedures, I used purposeful sampling because “individuals or cases are selected that provide the information needed to address the purpose of the research” (Johnson & Christensen, 2012, p. 235).

The participant pool provided me with a focused source of students that would have distinct attitudes toward the degree of exposure they received through their education program with ample amount of years taking various education classes. Furthermore, the pool enabled me to develop an understanding of the current education program at the university and the degree to which pre-service teachers are exposed to

technology training through their undergraduate and graduate class work. Participation was completely voluntary and could have been revoked at any time during the research process (see Informed Consent in Appendix A).

Data Collection Procedures

I wanted to determine trends that could be supported by quantitative numbers and would allow me to explore the effectiveness of the education program at a particular university. From reviewing literature that studied pre-service teachers in other capacities, I determined that the most effective way to compile data was through the use of a brief survey (Campbell & Scotellaro, 2009; Yilmaz & Alici, 2011). To then generalize these results, in a qualitative and open-ended interview I hoped to collect details views from participants that helped give meaning to survey data (Creswell, 2014).

Surveys

To perceive teacher attitudes, I used quantitative measures in the form of a survey. I provided an adapted Likert Scale that presented statements or prompted questions to the participant that they then rated from one to five on personal confidence level (see survey instrument in Appendix B). Overall, there were 61 prompts for participants to answer.

To distribute the survey, I went to three education methods courses and one graduate education course that had the participants that met all the criteria for my study. I introduced my topic of study to all the students and distributed consent forms. The survey itself took around 10 minutes to complete. When the survey was collected, I then passed out a voluntary sheet for names and emails of students who would be interested in participating in the second interview portion of my study.

The survey was broken up into two main topics. The first topic asked participants to rate their confidence levels with using various technology tools typically employed by teachers in the classroom, for example interactive white boards, various educational websites, and iPads. I adopted the list using the “50 Education Technology Tools Every Teacher Should Know About” from the Global Digital Citizen Foundation (GDC Team, 2014). The 50 resources were broken up into five major components: social learning tools, learning tools, lesson planning and tools, useful tools, and miscellaneous tools. The participants rated their confidence level with using the resource or circled the last column (a question mark), which indicated that they had never heard of the resource at all. This provided me insight to whether or not the participants had heard of the resource yet didn’t know how to use it, or had never heard of the resource at all.

The second portion of my survey identified confidence levels of pre-service teachers toward using technology in each of the major subject areas: ELA, math, science, and social studies. When the surveys were collected, I cross-referenced based on the number of years the participants had been enrolled at the university as well as participants’ majors in order to ensure the participant fit in my pool. I then added up their scores and input them in an Excel spreadsheet. I then matched the scores with the confidence levels that students had identified in the first part of the survey (if the student circled a question mark, I input that response as a “zero”). By using these measures to collect data, I allowed myself the ability to calculate and report an average for the group of respondents. My study quantitatively displayed overall attitude percentages for each item on the survey. Quantitative measures helped me illustrate

trends in teacher reflections and provide the numerical representations I needed to infer overall attitudes

Interviews

To be able to conclude and make inferences based on these survey results, in my study, I wanted to then dig deeper and obtain rich, thick data that could use to justify my findings. At that point, I knew I wanted to continue my study through the use of one on one interviews with participants. Johnson and Christensen (2012) explain that, “qualitative interviewing allows a researcher to enter into the inner world of another person to gain an understanding of that person’s perspective (p. 202). I sought to include qualitative interviews with willing participants that completed the survey.

Once my survey was distributed in participating undergraduate and graduate classes, I passed around a signup sheet for a follow up interview process. From there, I sent out 30 emails to the participants that clearly met the criteria of my study, that is: been enrolled in the college for three or more years, enrolled in an education program, and current pre-service teacher without a full-time teaching position. I crossed off every fifth person on my signup sheet until 30 emails remained and then distributed an email requesting to sit and perform the interview. I heard back from 5 participants, however due to scheduling conflicts, I was only able to meet with two participants and perform the interview. To formulate interview questions, I spent time developing connections between the survey and furthering the understanding as to why the participant would feel a certain way. In this way, I followed the interview guide approach; meaning, “the interviewer enters the interview session with a plan to explore specific topics and to ask specific open-ended questions of the interviewee” (Johnson & Christensen, 2012; p. 202).

Interview questions were also formulated based on what technologies are seen in a modern classroom (see interview protocol in Appendix C).

The two participants that completed the interview with myself were women in the College of Education. Participant A is currently a 24-year-old graduate student, who completed her bachelor's degree in Childhood Inclusive Education. She does not currently have a full-time teaching job and limited experience substituting in nearby school districts. Her interview took place March 15, 2016 in an empty classroom in the educational building of the college. Participant B is an undergraduate 21-year-old woman in the College of Education as well. She is currently a senior in the Early Childhood Education program who is finishing her student teaching placement this semester with no substituting experience. Her interview session took place April 18, 2016 at a close by coffee place on the college campus. Both participants have had similar core education classes with varying placement scenarios in diverse schools around the area.

Professional Learning Network

At the end of the interview, pre-service teachers were asked to map out their Professional Learning Network, or PLN, on what technologies they used in the classroom. This last activity gave me insights about the ways in which pre-service teachers are most likely gaining an understanding of certain technologies in the classroom. It also helped guide me to understand the elements that pre-service teachers at a particular university find a priority in respects to ICT in the classroom, and the manner in which they are fulfilling the needs to utilize these technologies.

Data Analysis Procedures

Quantitative analysis

Data from both the survey and interviews strategies were analyzed using frequency, mean, and percentage values as descriptors. The survey was analyzed using the pre-developed groupings and the rating scale acted as a means to develop a percentage that represented the confidence of the 50 participants. For example, in the social learning tools category, the total score available was 55, meaning if all pre-service teachers felt highly confident in all tools the sum of all 50 scores would be 2,750. To get a percentage that inferred pre-service perception, I added up all 50 participant scores individually on an Excel spreadsheet and took that number and divided by the total available points. This yielded a percentage in each category that described the confidence level of the pool of participants in each category.

Qualitative analysis

The interviews were qualitatively analyzed using frequency of certain words and overarching trends in the participant answers. My purpose was to examine the reflections that pre-service teachers generated about personal experience and attitudes toward technology. Thus, to analyze these trends, I designed a semi-structured interview guide that highlighted keywords in answers to determine frequency in participant answers and common themes that emerged. To explain the theory, Johnson and Christensen (2012) explain, “data collection in grounded theory is called the constant comparative method, and it involves constant interplay among the researcher, the data, and the developing theory” (p. 403). This was the approach I took to create the generalizations explained in my discussion. After each interview, I transcribed the encounter and began pinpointing

important words that arose. For example, if the participants answered an interview question about the technology classes to which they had been exposed, and all shared the same class name, that class name was highlighted and was put to the side as a talking point for the results section. The PLN exercise at the end of the interview was also used to pinpoint ideas. For this portion, I collected all PLNs at the end of the interviews and found common trends among the participant answers. This guided me for my discussion portion to talk about where current pre-service teachers are getting most of their technology understanding and how they are being exposed to new ICT teacher tools. I highlighted all overlapping words, tools, and resources and set aside for the discussion section.

Conclusions

Originally, I had planned for my study to be purely qualitative with a set of ten formulated interview questions. However, I determined that the information I would yield could be easily biased by personal experience in the university and narrow in my inability to interview a large pool of participants. Therefore, the addition of a survey gave me the accessibility to reach more pre-service teachers in a broader sense. The survey was also able to rate confidence levels in fifty different tools and resources, which would be too large for an interview setting. Finally, I think a unique piece of my study in mapping the participants PLN gave me insight on what my participants find most important and relevant to their professional lives.

A similar study that sought to determine pre-service teachers' attitudes toward using Computer Based Education (CBE) stressed the importance of survey research to examine trends (Yilamz & LICI, 2011). This complements my own goal of examining

pre-service teacher attitudes on technological readiness in the classroom. Instead of a small participant pool, reaching large quantities of pre-service teachers help support the trends that developed through my study. In addition to this, another study provided some predetermined focus through collecting data obtained through semi-structured interviews on teacher perspectives because, “massive surveys with pre-coded slots to be ticked and computer analyzed will not tap into this information” (Campbell & Scotellaro, 2009). In this sense, using interviews creates data that not only supports the surveys, but also gives substantial meaning to the results. The overall goal of my study was to gain an understanding of how well pre-service teachers are prepared by an educational university program to handle the technology demands of the modern classroom. I successfully met this goal through the use of my methodological mixed-methods approach to my study. In the end, the mixed-method research approach provided authentic insights from the field of education, while illustrating concrete trends and variations of opinions on pre-service perceptions of technology readiness at the university.

In the following chapter, I will report the findings from my qualitative study. I will analyze my distributed survey as well as the two one on one interviews I performed with Participant A and Participant B. Showcasing these findings will begin to explain how pre-service teachers feel about their technology readiness through their higher education courses, and bring light to where the educational program at this particular college excels and lacks in ICT preparations.

Chapter 4 – Results

In the previous chapter, I described the method outline to my study. This chapter will provide a synopsis of my findings. Results will be displayed for both the survey that was distributed to 50 participants, one on one interview that was conducted with two willing participants, Participant A and Participant B, and the interviewees PLNs.

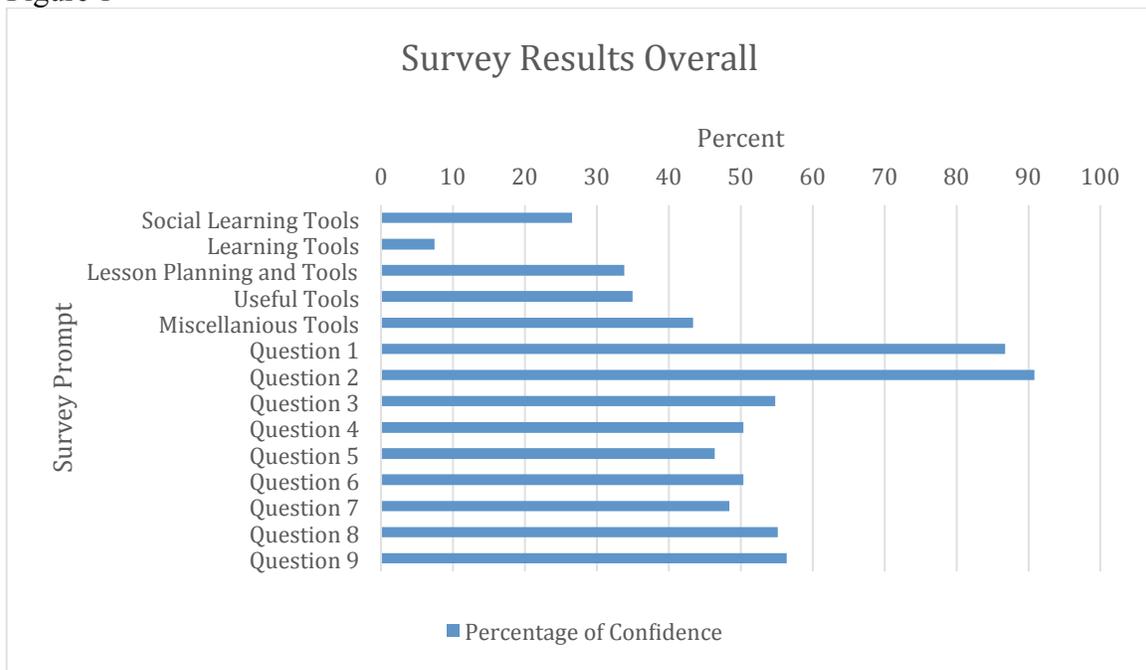
Survey Results

Surveys were distributed to a total of five classes in the education department. Two of the five classes were math concentrated undergraduate methods courses divided into two class sections. Another class was an undergraduate education class that dealt with current education issues. The final two classes were graduate level courses dealing with inclusive education settings. All participants were given a form to determine their eligibility to take part in my study. Throughout the data collection process, I noted overall confidence scores, percentages, means, and modes of all categories of my survey.

Below, I noted the results of the 14 categories of my survey as well as a results graph that summarized the overall findings. Each figure depicts the individual participants' responses on a 1-5 Likert-style rating scale based on pre-service teacher confidence. Each participant's survey response was given a specific number, which follows throughout all the graphs. For example, Participant 15 is listed as the 15th dot on every graph shown below.

Figure 1 displays the overall survey results received from the participants in my study. These results show the percentage rates of all 14 categories of my survey. As the graph illustrates, participants felt most confident about the Question 2 prompt that read, “I believe my future employers will expect me to be knowledgeable on how to use technology in my classroom,” with a 90.8% rating of importance on the Likert Scale. This is followed closely by the Question 1 prompt that read, “I believe that integrating technology into the classroom is important,” with an 86.8% rating score. Participants felt the least confident in the Learning Tools category of the survey with only 7.48% overall confidence score. Most other categories held at an average of a 40% confidence score overall. These results are displayed below in Figure 1:

Figure 1



The Figure 2 graph shows the participant confidence score in the “Social Learning Tools” category of the survey. These tools included website resources such as Edmodo, Grockit, EduBlogs, Skype, Wikispaces, Pinterest, Schoology, Quora, Ning, OpenStudy, and ePals. The total raw score in this category was 730/2,750 translating into a 26.55% confidence score. The mean score that participants received for this category was 14.6 out of a possible 55. From the chart, it is notable that no participant scored higher than 32 (Participant 49). The lowest confidence score among the participants (Participant 41) was a 5. These results are displayed below in Figure 2:

Figure 2

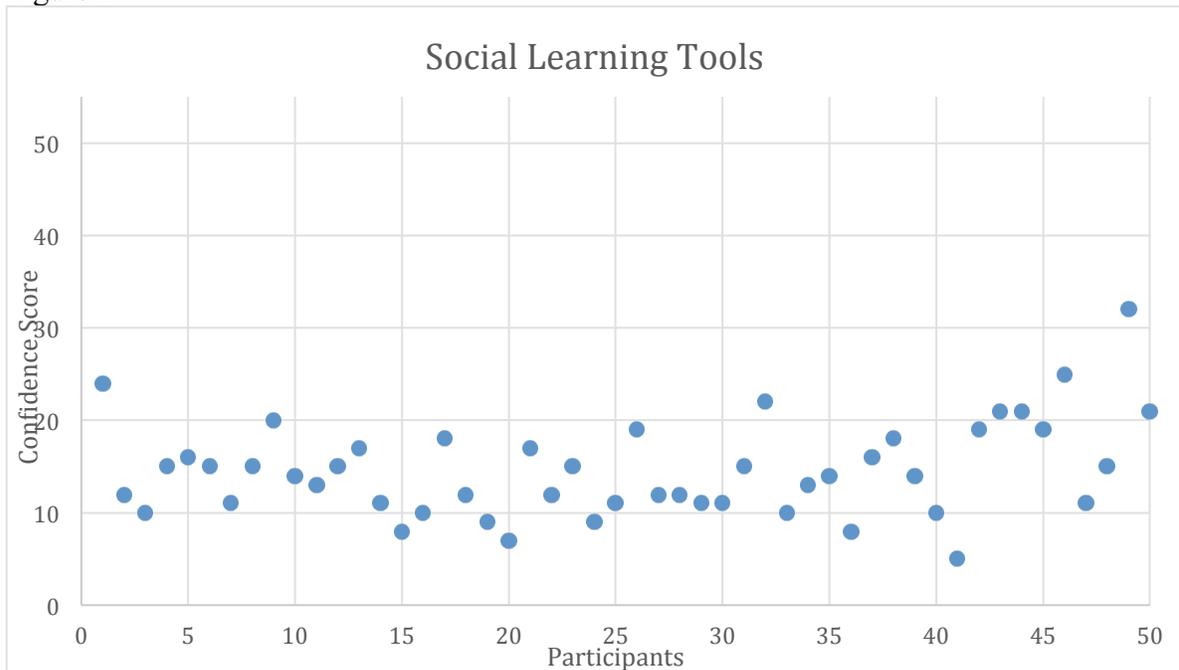
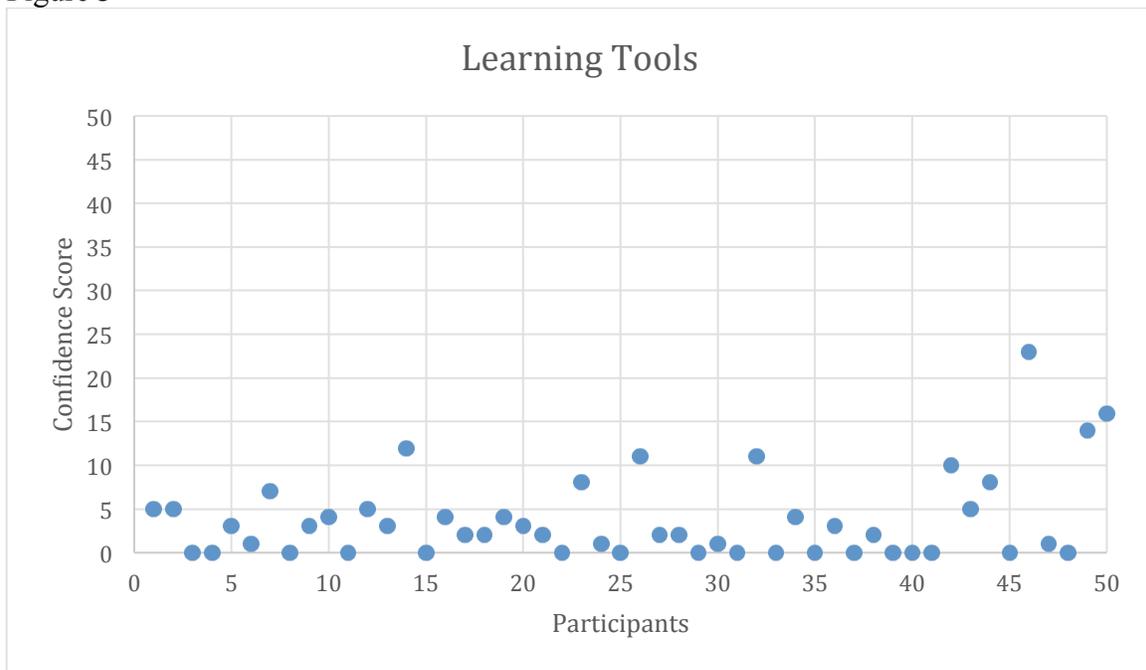


Figure 3 illustrates participant confidence scores in the “Learning Tools” category of my survey. This was the lowest scoring category including the learning tools: Khan Academy, MangaHigh, FunBrain, Educreations, Animoto, Socractive, Knewton, Kerpoof, StudySync, and CarrotStick. The total raw score was 187 out of a possible 2,500, which translated into an overall 7.48% confidence score in the section. The mean score from all participants was a 3.74/50. The most confident participant (Participant 46) scored a 23 while a total of 17 participants (Participants 3, 4, 8, 11, 15, 22, 25, 29, 31, 33, 35, 39, 40, 41, 45, and 48) all scored a 0 confidence rating, which meant they were completely unfamiliar with and have never heard of any of the resources in that category. These results are displayed below in Figure 3:

Figure 3



The next chart, Figure 4, displays the confidence scores in the “Lesson Planning and Tools” category of my survey. This category included the resources Teachers Pay Teachers, Planboard, Timetoast, Capzles, Prezi, Wordle, QR Codes, MasteryConnect, GoogleDocs, Youtube, TED-Ed, Glogster, Creaza, and Mentor Mob. The total raw score was 1,185/3,500, which translated into 33.86% confidence in using these tools. The mean score of this category was a 23.7 out of a possible 70. Participant 50 felt most confident in this category, exhibiting a confidence score of 55, while Participant 22 reported the lowest confidence score of a 3. These reports are displayed below in Figure 4:

Figure 4

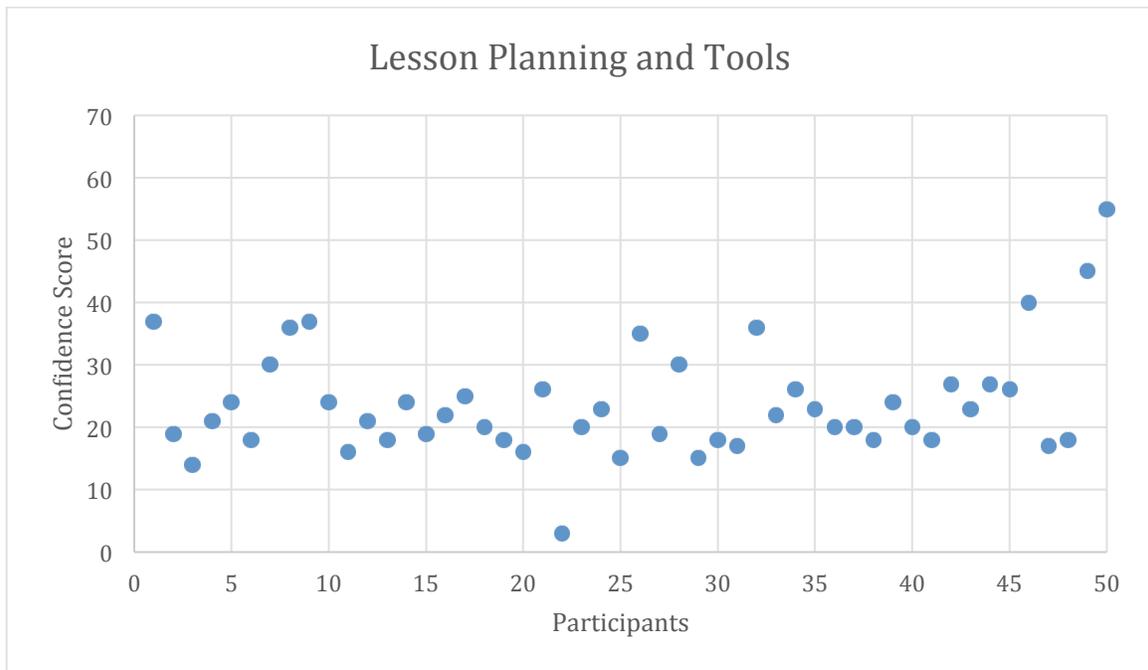
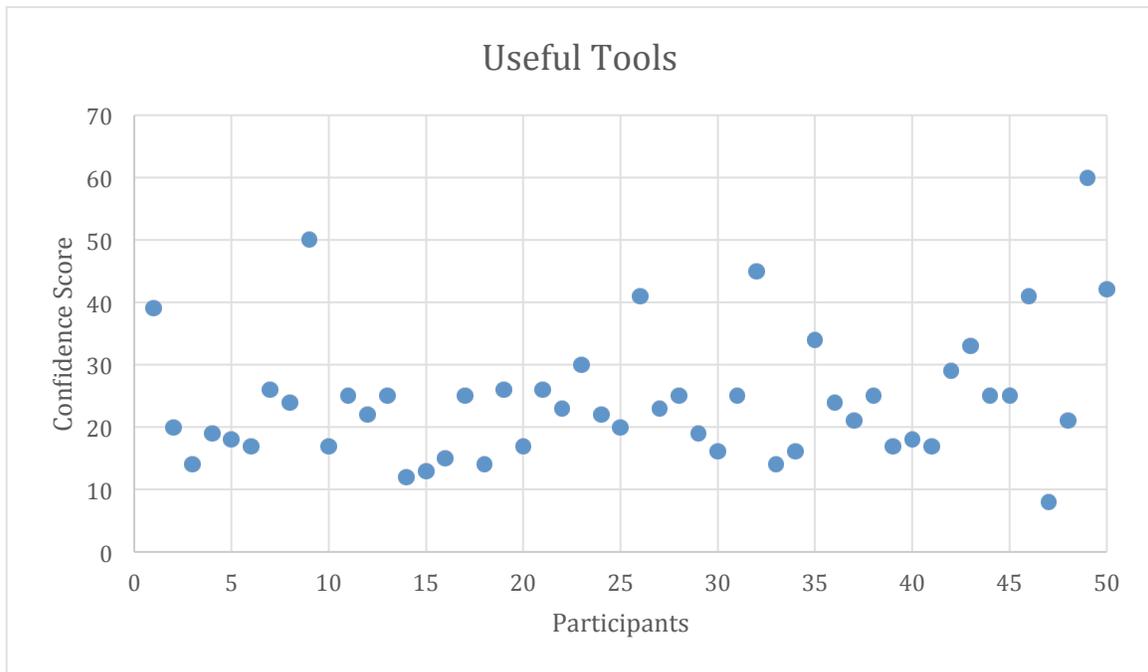


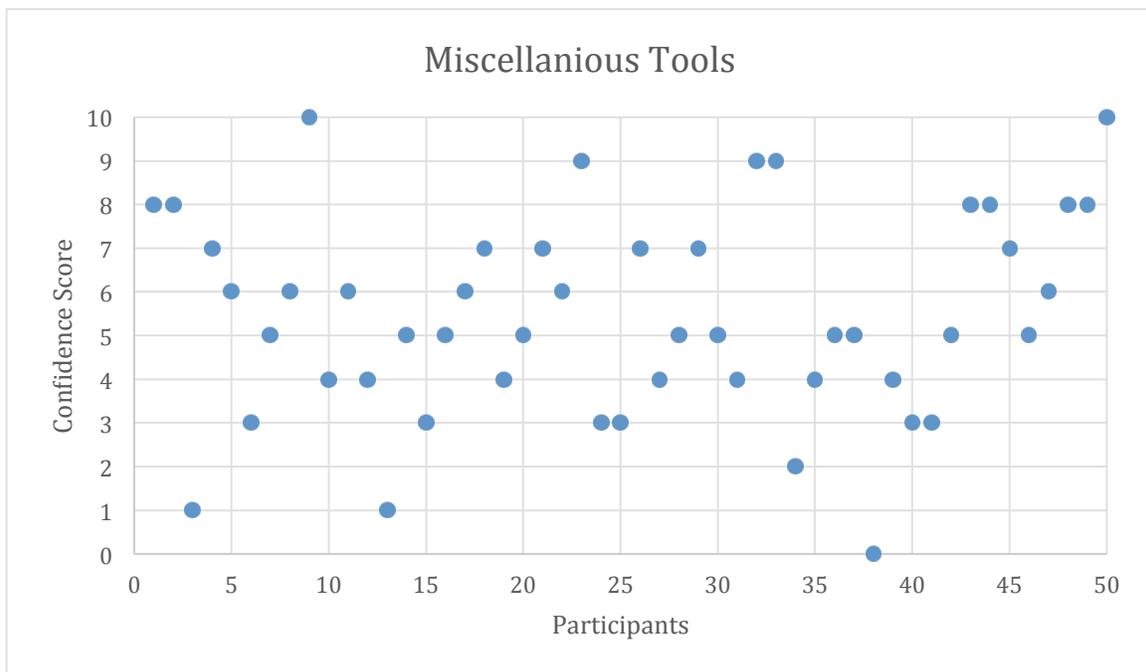
Figure 5 displays the confidence ratings in the “Useful Tools” category. This section included the resources Evernote, Twitter, Google Education, Dropbox, Diigo, Apple iPad, Aviary, Jing, Popplet, Google Earth, DonorChoose, SlideShare, LiveBinders, and AudioBook. In this category, the total raw score was 1,223/3,500 translating to 34.94% confidence. The mean score was 22.46 out of a possible 70 confidence points. Participants 9 and 49 stood out most with the highest confidence ratings of 50 and 60, respectively. The lowest rating of 8 came from Participant 47. These results are displayed below in Figure 5:

Figure 5



The following chart, Figure 6, displays the confidence ratings of the “Miscellaneous Tools” category, which included SMARTBoards and assessment programs such as STAR and ARtests. This section had a total raw score of 217/500, which translated into 43.4% confidence. The mean of this category was 4.34 out of a possible 10 points. Participant 9 and 50, again, felt most confident in this category scoring a perfect 10 points in terms of their confidence levels with these resources. Participant 38 was the lowest score with a 0 rating. The results from this category are displayed below in Figure 6:

Figure 6



The succeeding charts all rate statements by participant confidence levels 1 through 5. The first statement, demonstrated in Figure 7 reads, “I believe that integrating technology into the classroom is important.” The total raw score was 217/250; this was an 86.8% confidence scoring of the statement. This was the second highest scoring category in my study with a mean of 4.34 out of 5 from participants. A total of 26 participants (Participant 2, 3, 4, 5, 7, 11, 14, 23, 28, 29, 31, 32, 33, 34, 36, 37, 38, 39, 40, 44, 46, 47, 48, 49, and 50) all gave this category a 5/5 rating, meaning that they were extremely confident in that statement. The lowest confidence score was a 2 by Participant 15. The results from this statement category are displayed below in Figure 7:

Figure 7

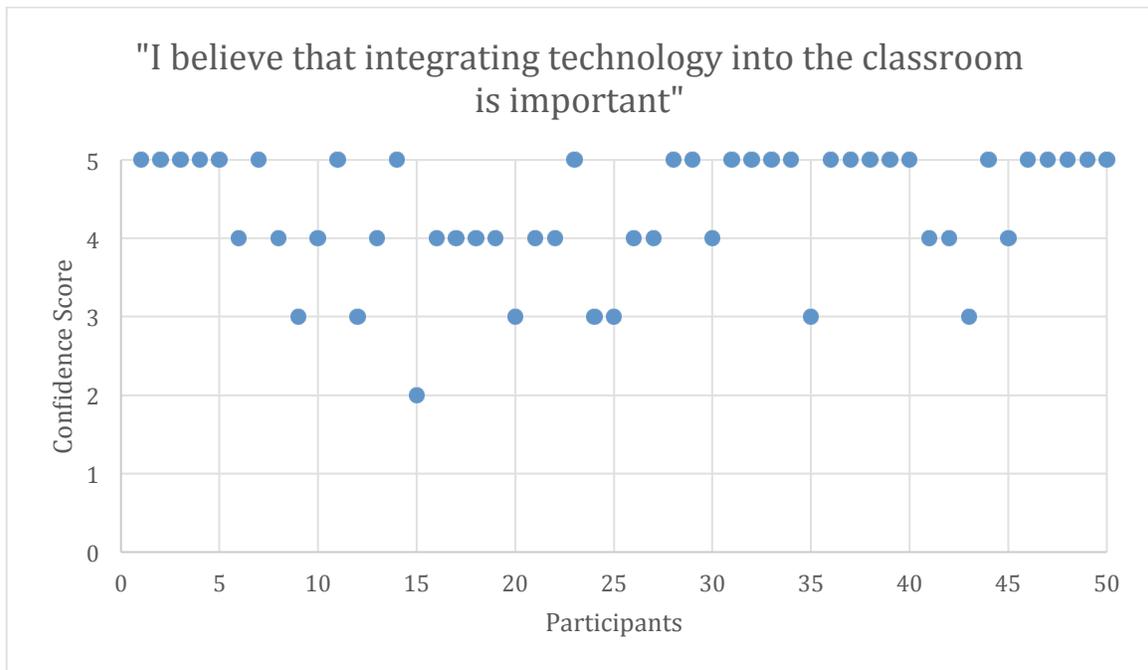


Figure 8 shows the highest confidence rating score from my survey. The statement read, “I believe that my future employer will expect me to be knowledgeable on how to use technology in my classroom.” The total raw score was 227/250, translating into a 90.8% confidence/agreement score. The mean score given by participants was a 4.54 out of 5 points. A staggering 29 participants all gave a 5/5 rating (Participant 2, 3, 4, 5, 7, 11, 12, 13, 14, 18, 21, 24, 25, 26, 28, 29, 30, 31, 32, 33, 35, 36, 37, 38, 40, 44, 47, 49, and 50). The lowest confidence scoring in this category was a 3/5 given by Participant 9 and 45. The results from this statement category are displayed below in Figure 8:

Figure 8

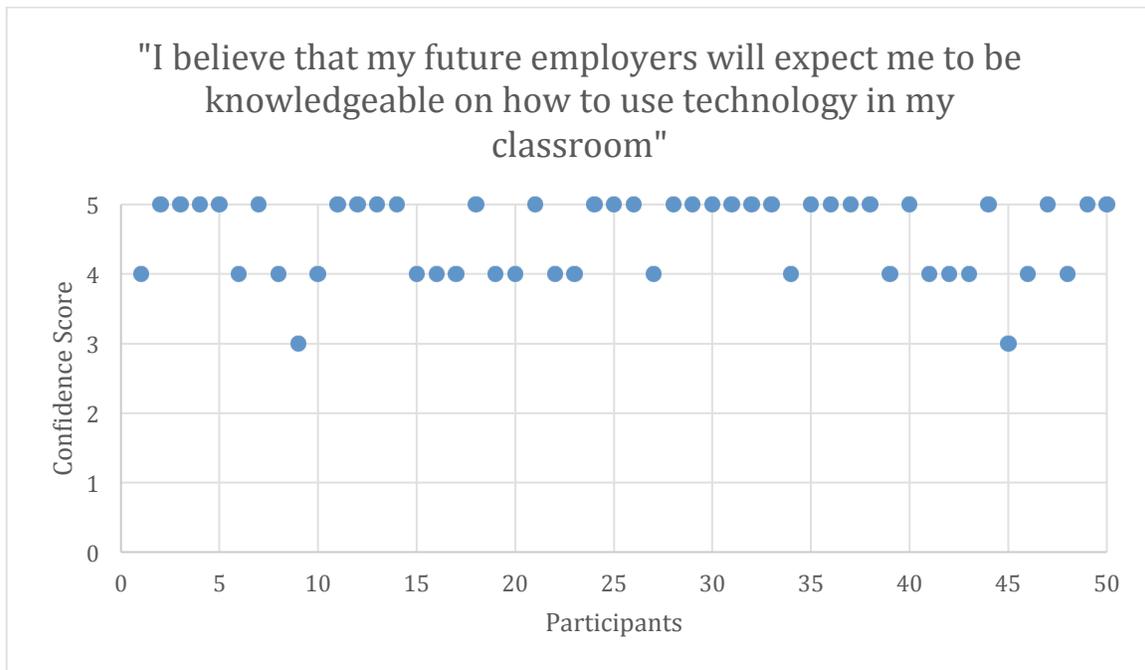
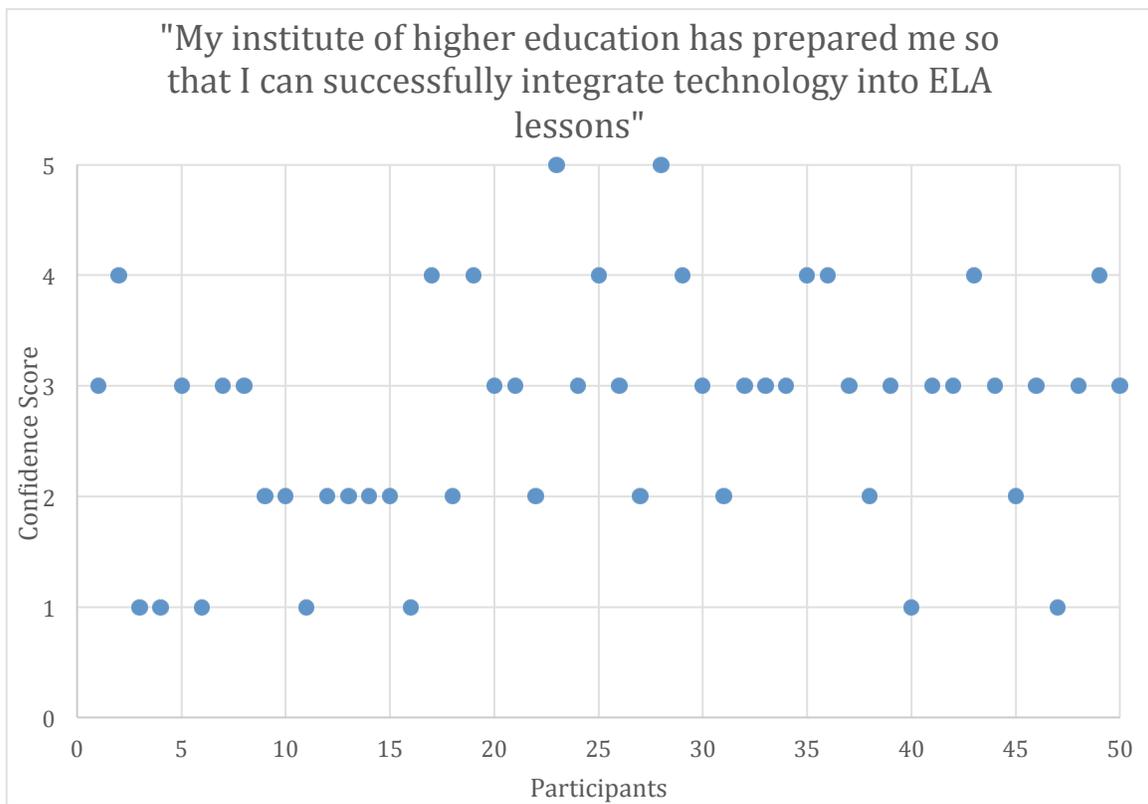


Figure 9 illustrates the results prompted by the statement, “My institute of higher education has prepared me so that I can successfully integrate technology into ELA lessons.” The results were much more scattered and varied in this category, with a total raw score of 137/250 equating to a 54.8% confidence score. The mean score of this statement was 2.74/5. Again, individual participant scores varied greatly in this category with two participants rating a 5/5 (Participant 23 and 28) and 7 rating a low 1/5 (Participant 3, 4, 6, 11, 16, 40, and 47). The results from this statement category are displayed below in Figure 9:

Figure 9



In the next chart, Figure 10, I prompted participants to respond to the statement, “My institute of higher education has prepared me so that I can successfully integrate technology into math lessons.” The total raw score in this category yielded a 126/250 possible confidence score. This raw score translated into 50.40% and a mean of 2.52/5. This question was one of two that produced an almost perfect half and half result. Participants 23 and 28 rated a confidence score of 5 again, while 10 other participants rated a 1/5 score (Participant 1, 3, 4, 11, 15, 23, 40, 41, 42, and 43). The results from this statement category are displayed below in Figure 10:

Figure 10

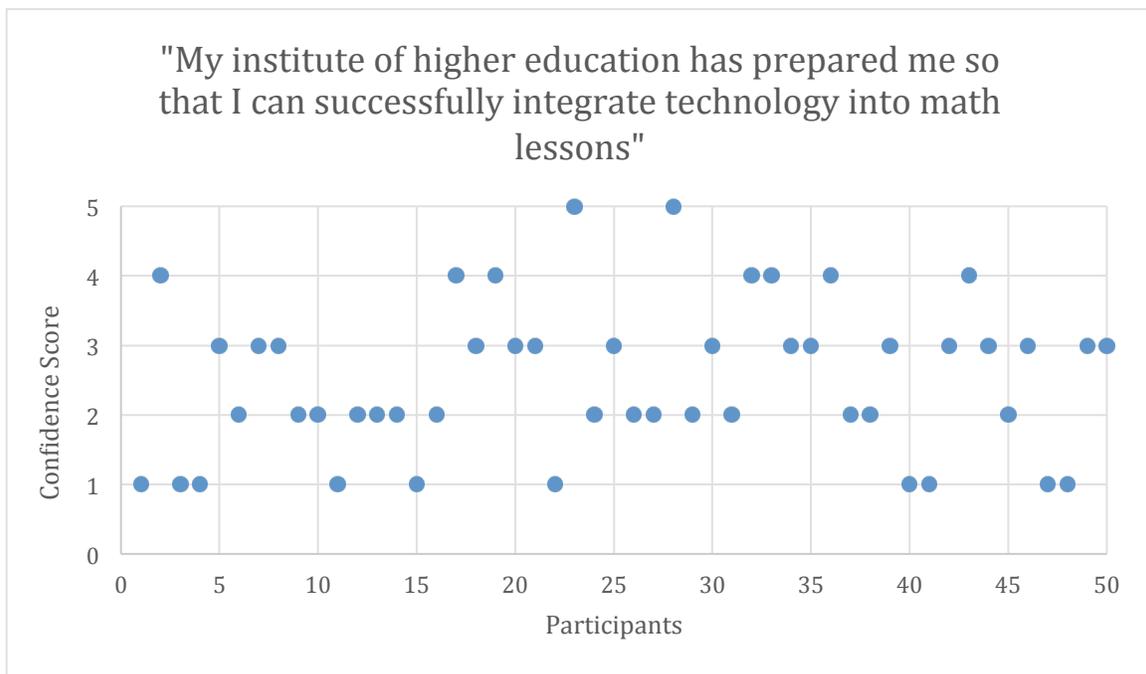
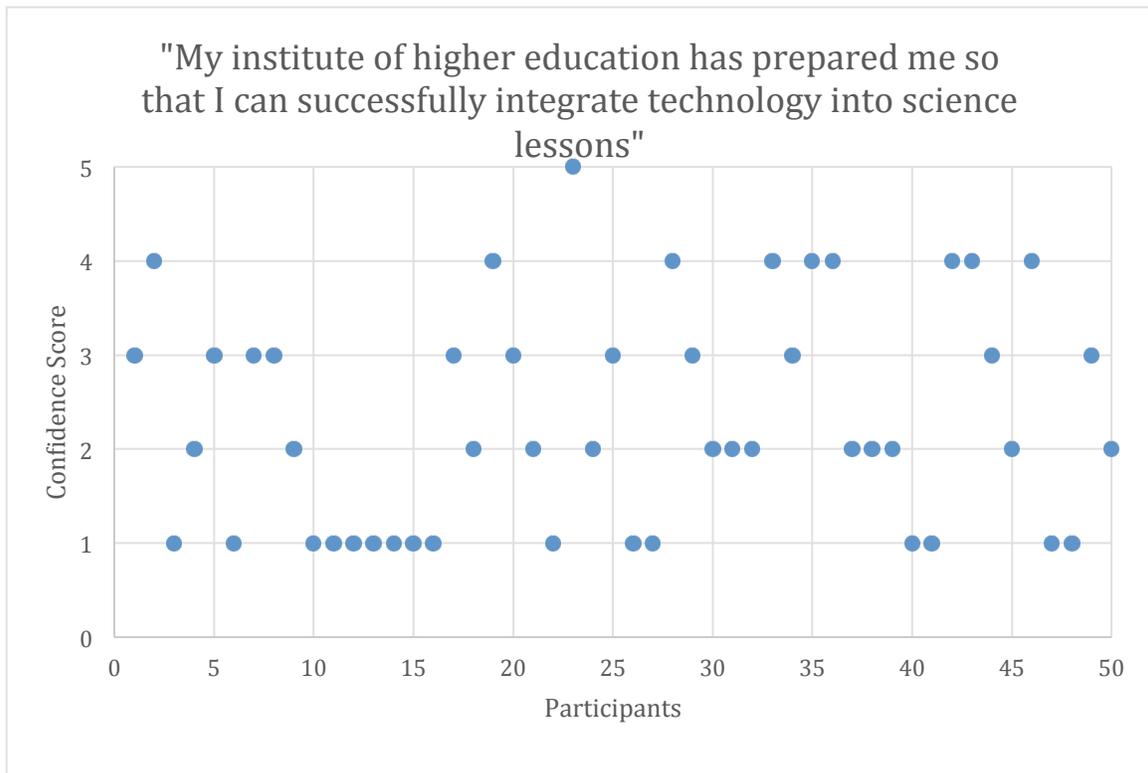


Figure 11 shows the results of confidence levels in response to the statement, “My institute of higher education has prepared me so that I can successfully integrate technology into science lessons.” The total raw score in this category was 116/250 a 46.4% confidence score. The mean that developed was a 2.32/5. In this table, only one participant scored a 5/5 (Participant 23), while 16 participants scored a low 1/5 (Participant 3, 6, 10, 11, 12, 13, 14, 15, 16, 22, 26, 27, 40, 41, 47, and 48). The results from this statement category are displayed below in Figure 11:

Figure 11



In the next chart, Figure 12, I show the results for the statement, “My institute for higher education has prepared me so that I can successfully integrate technology into social studies lessons.” This statement, as well as Figure 10, displays an almost perfectly balanced answer of 50.40% confidence score. The total raw score was a 126/250 and the mean was a 2.52 out of 5. For this prompt, 7 participants rated a 5/5 confidence rating with this statement (Participant 23, 28, 35, 37, 43, 48, and 49) while 14 participants rated a 1/5 (Participant 1, 3, 4, 6, 10, 11, 14, 15, 16, 18, 22, 39, 41, and 47). The results from this statement category are displayed below in Figure 12:

Figure 12

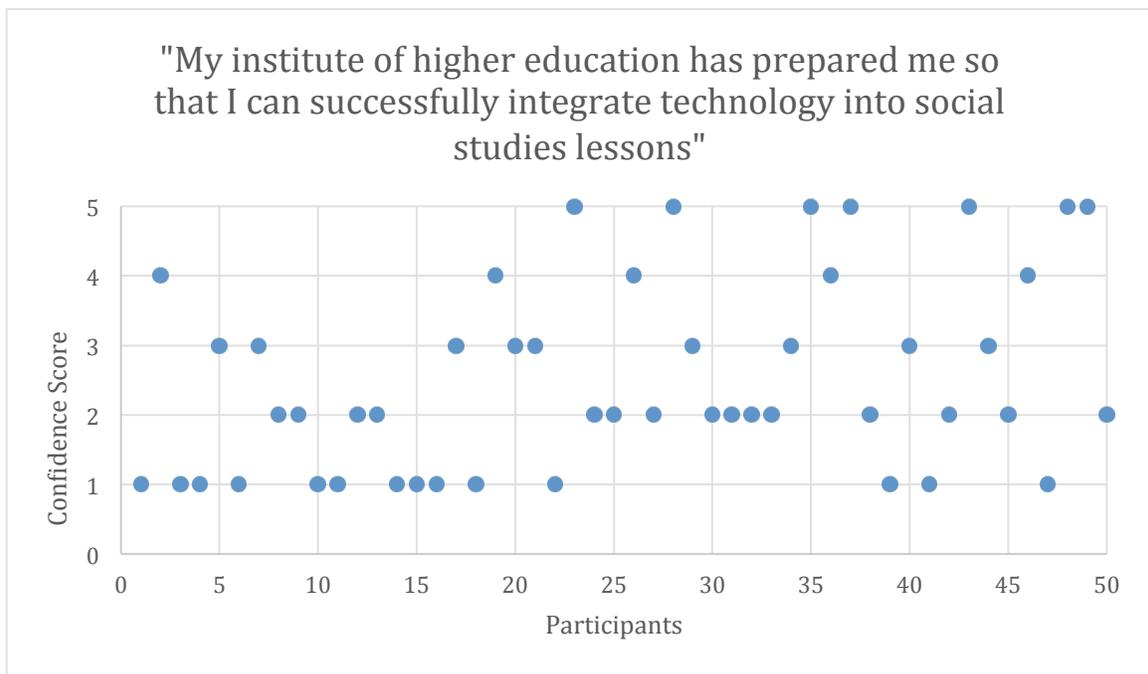


Figure 13 exhibits the results of confidence levels regarding the statement, “My institute of higher education has prepared me so that I can successfully make an interactive SMARTBoard lesson.” The total raw score for this category was 121/250 that equated to 48.4% confidence score. The mean of this prompt was 2.42 out of 5 points. From the chart, one can see many lower ratings of 1/5 and 2/5, but still three participants rated a 5/5 in confidence of successfully creating SMARTBoard lessons (Participant 23, 43, and 49). The results from this statement category are displayed below in Figure 13:

Figure 13

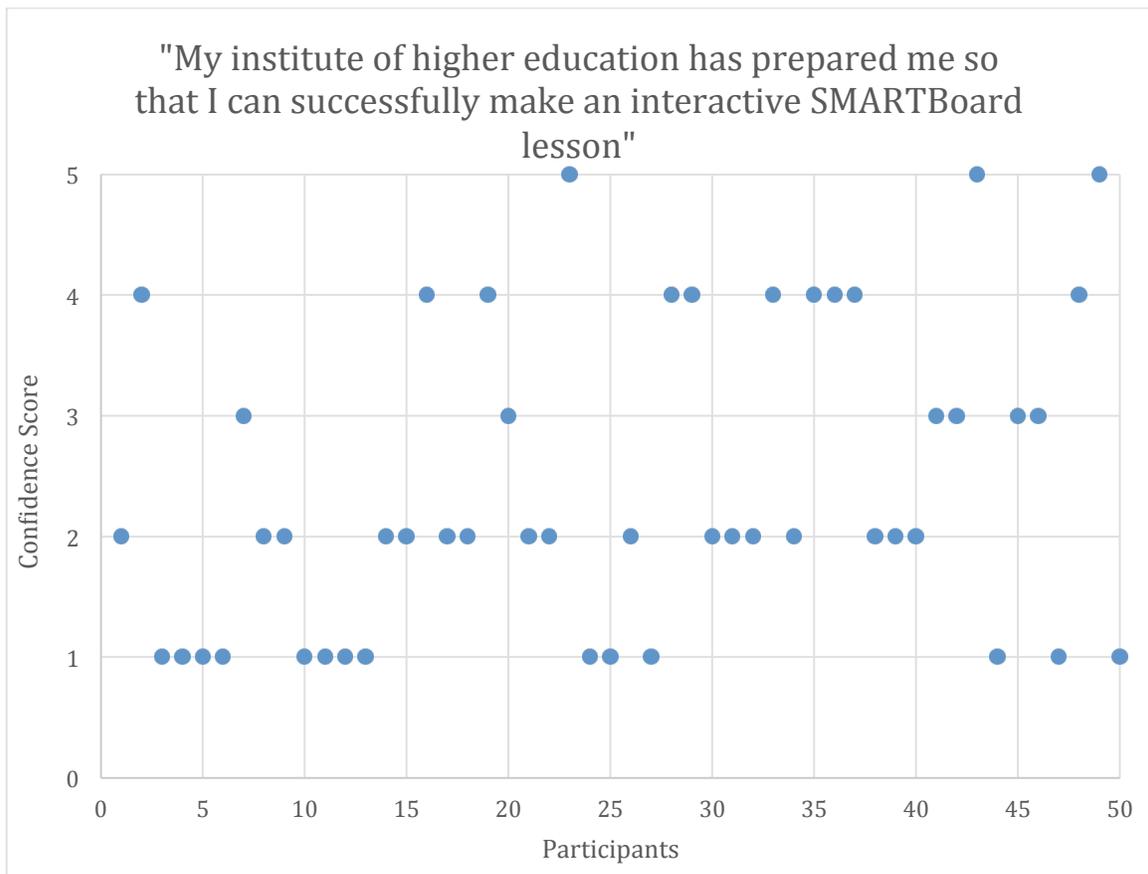
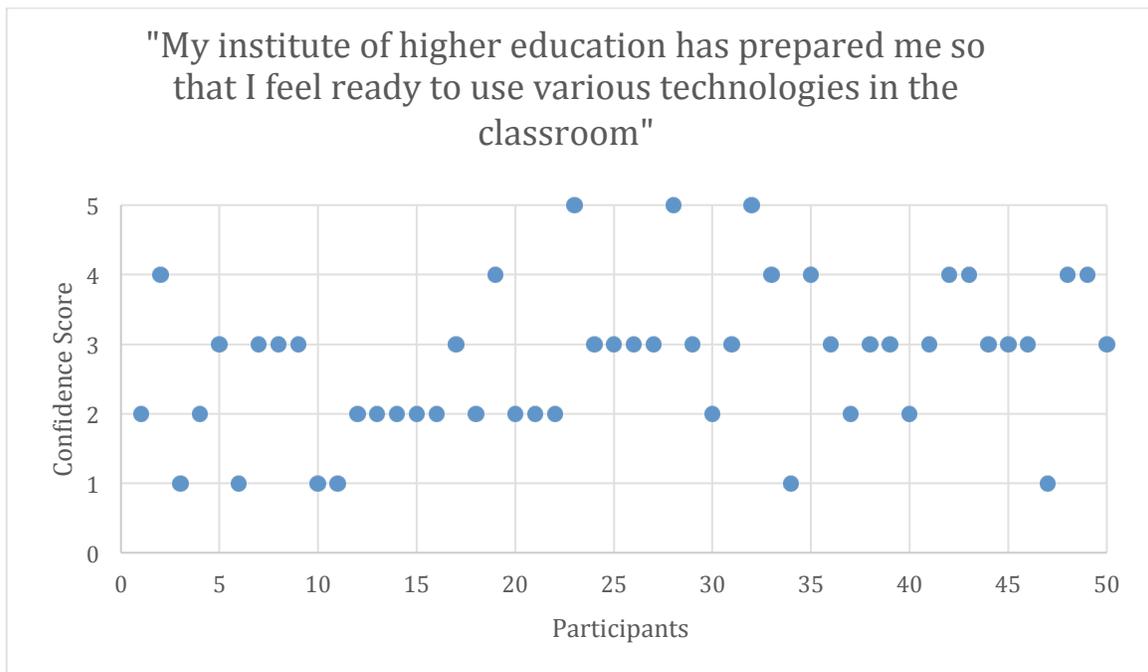


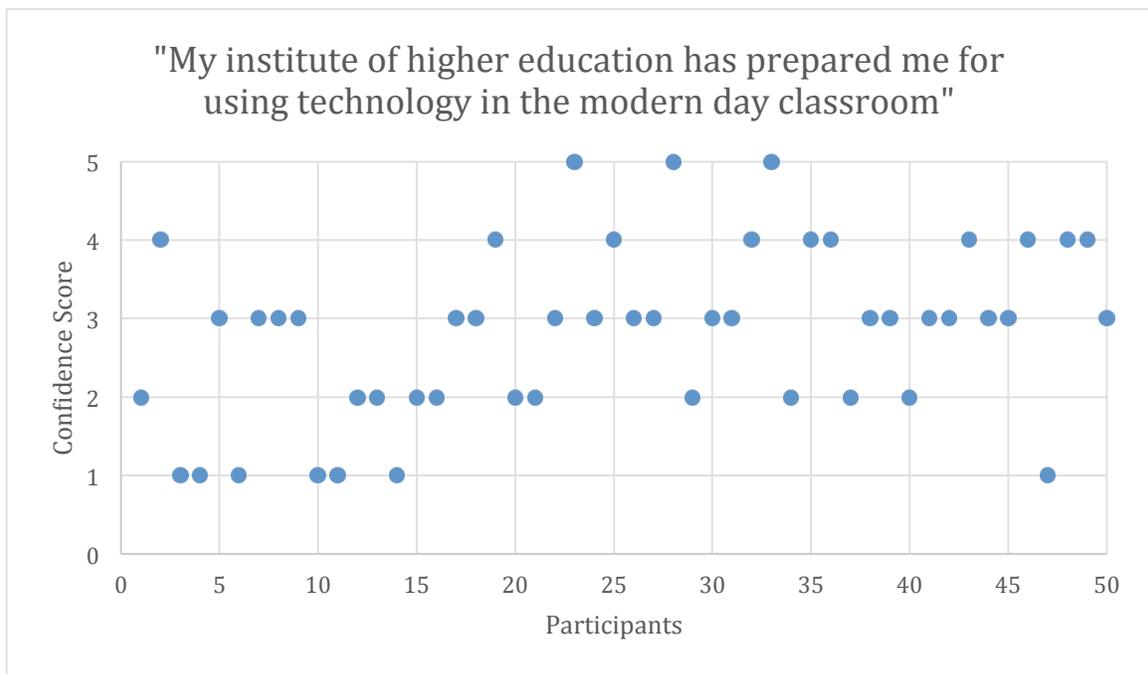
Figure 14 shows the confidence ratings from the statement, “My institute of higher education has prepared me so that I feel ready to use various technologies in the classroom.” The total raw score of this category was 138/250, a 55.20% confidence rating. The mean of this category was a 2.76 out of 5. The mode of this chart is clearly a 3/5 confidence in this statement with three participants rating 5/5 (Participant 23, 28, 32) and 6 participants rating a 1/5 (Participant 3, 6, 10, 11, 34, and 47). The results from this statement category are displayed below in Figure 14:

Figure 14



The final chart, Figure 15, shows the confidence scores regarding the statement, “My institute of higher education has prepared me for using technology in the modern day classroom.” This generalized statement received a 141/250 total raw score and a 56.4% confidence rating. The mean of this category was a 2.82 out of 5 with the mode, again being a mid-answer of 3/5. Three participants felt most confident with a 5/5 rating score (Participant 23, 28, 33) while 7 participants felt least confident with a 1/5 score (Participant 3, 4, 6, 10, 11, 14, and 47). The results from this statement category are displayed below in Figure 15:

Figure 15



Based on the survey results from the “50 Education Technology Tools Every Teacher Should Know About” from the Global Digital Citizen Foundation (GDC Team, 2014), pre-service teachers felt most confident in the Useful Tools category. Those resources included common tools such as Twitter, Dropbox, and LiveBinders. Pre-

service teachers felt the least confident using websites from the Learning Tools category with resources such as FunBrain, Animoto, and Socrative.

From the prompt questioned section, pre-service teachers noted that they confidently believe that future employers will expect them to be knowledgeable on how to use technology in the classroom, with a staggering 90.8% rating. The data described that these same pre-service teachers felt the least confident in integrating technology into science lessons (46%), however, most confident in integrating technology into ELA lessons (54%). To be noted, there was only an 8% variance reported in confidence levels throughout the major courses of study in education.

Interviews

My research in the interviewing process analyzed two purposeful participants whom were graduate (Participant A) and undergraduate (Participant B) pre-service students at the college that were planning on entering the teaching field within the next five years. The principle investigator initiated these contacts by setting up meeting times and asking pre-developed questions that sought to answer large topics. Through my research, I developed common threads in four main areas: current levels of comfort with technology, classes from the college that utilized ICT preparedness, the importance of technology preparedness to pre-service teachers, and the ways in which the college's programs could better prepare pre-service teachers.

In terms of current levels of comfort with computer and information technologies, both Participant A and B felt they were lacking. Participant A stated that,

As far as what I have used in student teaching- it was really just SMARTBoards, but I don't think it was even enough for me to even feel comfortable with using as

an everyday thing yet – I think I would need more practice with it to be confident because it really wasn't used in my coursework it was just when I was actually teaching. So it was kind of a learning curve as I was going along *laugh* and uh, other than that I have used some iPad apps and things like that that are pretty self-explanatory to use, but nothing other than that.

Similarly, when asked about current comfort levels in the classroom, Participant B said, “I am not totally comfortable using almost any technology, which is comical. Um, my current location where I am completing my student teaching does not offer much technology, however, I have used SMARTBoards and Promethean Boards and the Elmo and I can use a laptop.” Both participants touched upon SMARTBoards as a common tool in the modern classroom through student teaching and substituting experience, however, both lack a mastery understanding of the tool.

In regard to the courses offered at the school that aided in ICT development, Participant A and B had varying experiences. Participant A found success in a class that helped give her tools and resources to use in her future classroom. She said that, “Um, in my graduate program I just took EDU 528 which is technology in the classroom. And – I think I got the most out of that than anything else I have learned in undergrad so I wouldn't say I felt that adequately prepared after undergrad. We took one literacy and technology class in undergrad, but I felt that as I was learning those things they were already becoming outdated. So I didn't find a lot of what I used from that was useful when I went to teach. So definitely the technology in the classroom was the most updated to what kids are using now.” However, Participant B was not exposed to a class that utilized multiple technology resources. She commented that, “I took exactly one class on

integrating technology and that was lit and tech in my undergrad and it was not very-really useful so I learned really nothing about integrating technology. Which.... now that I think about it, it is kind of sad. I mean- I guess I have never thought about this. A lot of rooms have a SMARTBoard in them, but I can't really recall ever using, um, one. That's strange." As a common strand, both participants did make mention that they were open to self-exploration to figure out how to use technologies. This was notable when Participant B was prompted about using unfamiliar technology in the classroom: "Again, not that I feel confident in my ability, but I mean, it isn't hard for, you know, students to help out. I mean they potentially see it all the time. So like, that makes it easier for myself... To I guess, pick up?" Participant A spoke about the resources becoming out dated and added, "And, I learned a lot, like, of basically like updated versions of what we learned on." In regard to coursework, both participants have had experience in a technology driven course throughout their time in the program; however, both noted that the experience seemed out of date.

Both Participant A and B felt that pre-service teacher preparedness for multiple technologies in the classroom is very important. Both provided ideas and insights through their interview responses. Participant A spoke about that importance by noting that, "As younger kids are being born into this technology generation that it is increasingly more important because not only are there attention spans less, but they are going to be able to learn more easily, because they have been used to it since the moment they were born that they have had that technology around. So, it is different for teachers who maybe teaching now or have been for 20 years to catch up to that, but I think it's very important to catch up for those student who need it." Participant B agreed with that

idea, but added the expectation from future employers, “Most likely you are going to be expected to know how and a certain amount of technology to use in the classroom- so it would be good to be prepared to be able to do so, so they feel as though you are a value to their instruction. It’s something everyone looks for- so going into the field I would hope that I am able.” This insight couples with the survey results that pre-service teachers feel strongly that future employers will expect new teachers to be knowledgeable and experienced with using various ICT tools in the classroom.

The last topic that was heavily touched upon in the interview sessions was the improvements that could be made to the education program at the college in which the investigation was set. Participant A and B both felt that change is necessary as time goes on. Participant A took the stance that it is a professor’s responsibility to integrate those technology lessons into their curricula:

Uhm... *long pause, looking over interview question sheet* I don't know I think it is hard for programs to – it takes so long for changes to be made in pre service programs that I think that we are in a position right now where they are maybe now trying to catch up – but it’s like, it takes so long for something to be implemented that those technology classes are already outdated by the time they are put into place. So I think, it’s kind of the teacher's responsibility, so who's teaching that literacy and technology class to take it upon themselves to go find what is relevant and change what they are doing from year to year. Instead of like, I have my syllabus for the past – uhm, five years and I have been teaching these ten things that may have been great 3 years ago- but are not the most beneficial or the most effective that are out there now. I mean apps are like, every 6 months,

like thousands of new apps that are out. So, I think those teachers, whether, y'know those new courses aren't going to come out right away- they need to be responsible and update on their own time because a lot of what they are doing is becoming irrelevant quickly. And it's not even their fault- it's just the way technology is moving right now.

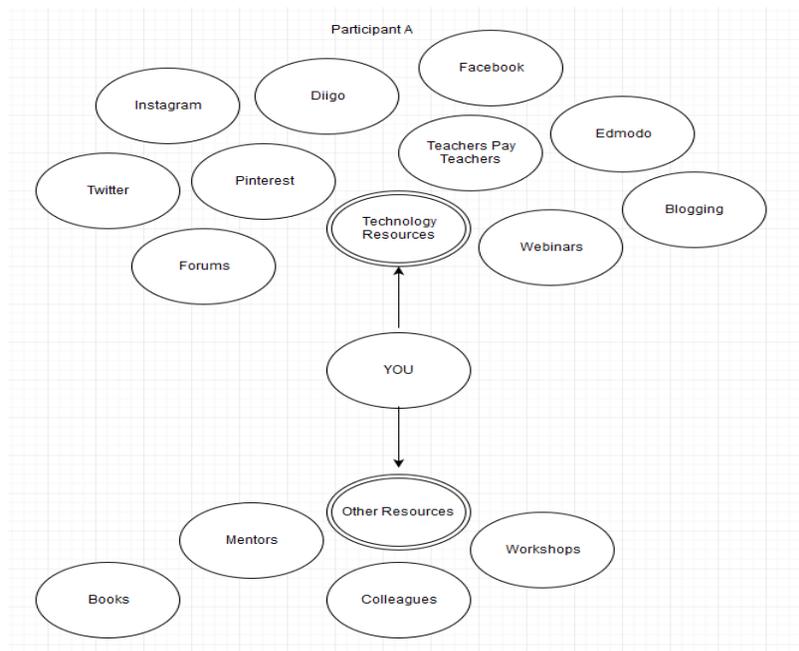
Participant B in particular commented on the technology that is already in the classrooms but is never used: "Um – actually us using technology in our classrooms. I mean, we have a SMARTBoard and it's broken in the one room. That's the only example. Like, we pay a technology fee and it's broken – so there is that. Maybe having teachers actually teach using the technology would reinforce my readiness." The participants note the need for the present-day Education Department to remain current in their information and coursework. Both noted the lack of utilizing the technology in the classroom, such as SMARTBoards, as well as outdated syllabuses that are reused over a long period of time.

Professional Learning Network

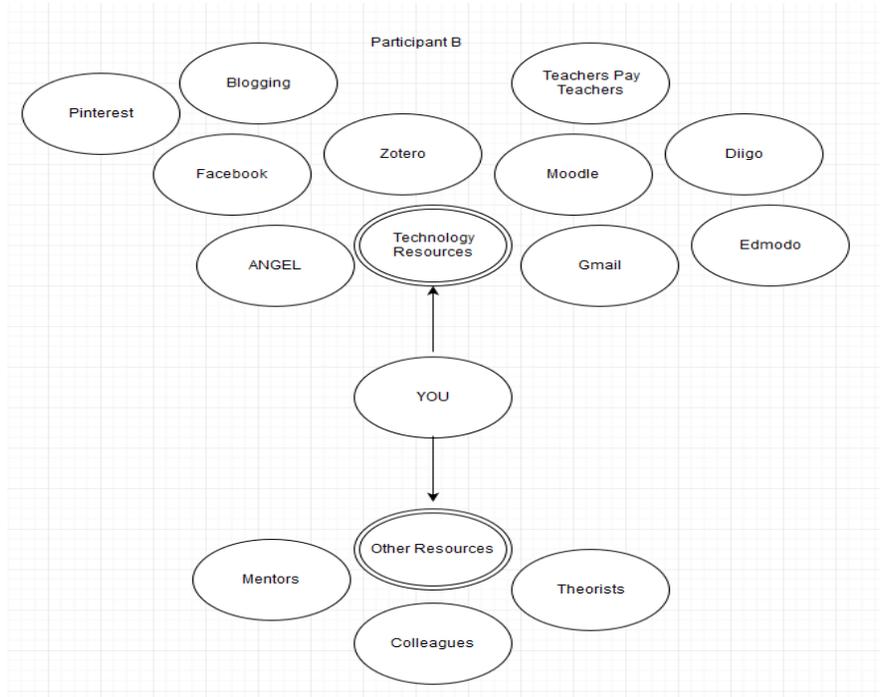
For the Professional Learning Network (PLN) activity at the end of the interview, both interviewees took 5-7 minutes to sit and fill in technology resources and other resources in which their ICT and professional skills are expanded. The final product was a small web graphic organizer that displayed the various avenues each participant takes to learn and teach.

Participant A noted 10 technology resources that she plans on using while in the field. These resources included forums, Twitter, Pinterest, Instagram, Diigo, Teachers Pay Teachers, Facebook, Edmodo, blogging sites, and webinars. As seen below,

Participant A was able to easily note many different technology based resources in which she uses for teaching:



Participant B noted 10 technology resources as well on her graphic organizer: Teachers Pay Teachers, Edmodo, ANGEL, Pinterest, Facebook, Zotero, Diigo, Moodle, Gmail, and Kahoot. Similarly to Participant A, Participant B noted a large amount of technology resources frequently used when planning to teach. You can see Participants B data below:



For the other resources portion of the PLN, Participant A and B both wrote about various colleagues, mentors, and books they would use as a teacher. Participant A also added professional workshops, and Participant B added theorists that she would look up. It was noted that both Participants found it much easier to fill in the technology resources for teaching than the other resource option.

Conclusions

Based on all the insights gained through this chapter, there is a strong development of pre-service teacher attitudes toward using technology in the classroom. The participants in my study adamantly feel technology is important and recognize that future employers will expect them to have experience and a strong understanding of how to implement technology into the classroom. Although technology-driven courses are available in the educational program, the coursework is sometimes outdated and does not utilize all the technology it could. Pre-service teachers showed only about a 50%

confidence in their abilities to implement technology throughout all areas of study from ELA (highest confidence) to science (lowest confidence).

In the next chapter, I will spend time analyzing and making generalizations based on the research that was pointed out. I will look further into the survey categories and use the interviews to further the understanding of pre-service teacher attitudes toward ICT in the classroom.

Chapter 5 – Discussion

In the previous chapter, I described the results of my study of pre-service teachers' views of technology integration through three different data collection tools: surveys, interviews, and a PLN mapping activity. Through these results, I noted that pre-service teachers at a rural, state university in Western New York have a perceived attitude toward their readiness to use technology in the classroom. This final chapter will seek to interpret the findings and provide insight on implications, future research opportunities, and final thoughts on these attitudes.

Implications

The data collected in this study implies that pre-service teachers believe that technology is important and prevalent in the modern day classroom. Over the past 10 years, the traditional classroom has evolved into a globalized learning community (Howard, Miles, & Rees-Davies, 2012; Mohammad & Mohammad, 2012; O'Hara, 2011). In this community, new and diverse technologies are being used to connect teachers and students to limitless opportunities for information and communications technology, ICT, exploration. It is in this way that the teacher must manage the classroom as an active facilitator. As stated in Chapter 4, there were four common threads that developed through my data: (1) current levels of comfort with technology (Howard, Miles, & Rees-Davies; Mohammad & Mohammad; O'Hara), (2) classes from the college that utilized ICT preparedness, (3) the importance of technology preparedness to pre-service teachers (Campbell & Scotellaro, 2009; Garcia & Rose, 2007; Masoumi, 2015; Sancar Tokmak & Ozgelen, 2013), and (4) the ways in which the college's programs could better prepare pre-service teachers (Asing-Cashman, Gurung, Limbu, & Rutledge, 2014; Bautista &

Boone, 2015). In the following paragraphs, I will further discuss all implications from my research.

Current Levels of Comfort

To find success in the modern day classroom, teachers must feel confident in their abilities to use ICT resources (Chen & Chang, 2006; Couse & Chen, 2010; Howard, Miles, & Rees-Davies, 2012; Mitchell & Dunbar, 2006; O'Hara, 2011; Plowman & Stephen, 2005; Robert-Holmes, 2014). My research supports the claim that technology is important in the classroom. Pre-service teachers reported that technology is important, with an 86.8% agreement rating, the second highest confidence score given in the survey. However, given the 56.7% overall confidence rating of the statement, "My institute of higher education has prepared me for using technology in the modern day classroom," there is still evidence of a lack of pre-service teacher confidence. With teachers' lacking confidence in use capability to use ICT resources, research has proven that there is a direct relationship between teachers' lack of preparation and negative effects on student achievement using ICT resources (Chen & Chang; Plowman and Stephen).

There were varying answers in the survey in regard to comfort levels. For example, three participants answered with the most confident score of 5/5, while 7 participants only rated a 1/7. This implies that pre-service teachers are having varying experiences throughout the education programs provided by their college. This is due in part to student teaching placements. In the interviews, I found that my participants got their ICT experience while engaging in hands-on activities and self-exploring the tools in their early field and student teaching placement schools. When the participants first got to their placements, they recalled not having much confidence in using the tools such a

SMARTBoards and iPads from their college, but navigated these tools with the help of cooperating teachers, self-exploration, and even the students. Participant B also noted that at her current student teaching placement, there are limited ICT tools available to her and that, as a result, she is not utilizing any forms of ICT in her classroom. The placement a pre-service teacher is assigned plays an instrumental role in their comfort levels with ICT integration in the classroom, due to the hands-on training and experience they receive in their placements.

Courses that Utilized ICT Preparedness

A common theme developed through my research that implied that the coursework offered at the institute of higher education did not meet the demanding needs of ICT implementation in classrooms. The data described pre-service teachers feeling least confident in integrating technology into science lessons (46%) and most confident in integrating technology into English Language Arts (ELA) lessons (54%). All major areas of study yielded confidence levels below 55%. This is due to the fact that core classes through the education department are not using technology in their classrooms.

Science instruction was shown to be the lowest scoring confidence level in pre-service teachers in terms of integrating technology. This is likely due to science's lessened demand in the education program. Pre-service teachers are provided with ample courses in ELA and mathematics content areas; however, only one science methods course is expected for pre-service teachers without a science concentration. As a result, ICT resources were only practiced in a one-semester course with one professor. In addition, public school systems are restricting science time to make way for more ELA and mathematics content. Therefore, in student teaching placements, the pre-service

teachers are not given as much of an opportunity to explore and use technology during science lessons (Bautista & Boone, 2015). A recommendation for this combating this lack of confidence would be for the college to explore the impact of a TeachME Lab as a virtual classroom in teaching science lessons, which has proven to increase pre-service teacher self-efficacy beliefs. Following this increase, the lab also improved confidence levels of pre-service teachers in using technology in science and their ability to translate lab activities into their classroom practices in one study (Bautista & Boone).

With a 54% confidence rating, ELA proved to be the highest confidence score in terms of content area. This is due to the abundance of English concentrators in the program. By looking at the surveys, a large majority, 27, carried English concentrations. As a result of this, the majority of the pre-service teachers surveyed had extra practice and coursework in the field of ELA. With this abundance of extra coursework, there was a much better chance of gaining ICT resources and confidence through many various classes. In addition, ELA is arguably the most important core content area in terms of childhood development. Student teaching placements often put a large emphasis on teaching ELA effectively, and pre-service teachers are more likely to try new resources and ICT tools to teach the subject. Finally, the amount of resources and applications geared toward English development is plentiful. Pre-service teachers' perceptions are higher in confidence when they are able to introduce students to educational computer games geared toward reading (Sancar Tokmak & Ozgelen, 2013). Utilizing pre-made technologies and being an active facilitator creates confident educators in the field.

The participants from my interview had varying experiences in terms of coursework that prepared them for ICT. Participant A, an English concentrator as an

undergraduate, as well as a current graduate student in the Curriculum and Instruction program at her institute of higher education, noted that she took part in two technology focused courses through her program. Participant B, a mathematics concentrator and current undergraduate student, noted only one class that was ICT focused. Both participants took an undergraduate course focused on connecting literacy skills with technology integration and noted that the coursework seemed to be outdated. Participant A, in particular, touched upon the fact that when she student taught, she did not even use any of the resources from the course. The class that was noted to be most successful was a graduate level course that concentrated on integrating technology in the classroom. In the coursework, many of the resources that were found on the survey were explored and taught through this course. This may explain why a few participants (Participants 23, 28, 33) in the survey felt most confident in many of the different resources listed.

Importance of Technology Preparedness

From the survey, the highest confidence rating came from the claim that, “I believe that my future employers will expect me to be knowledgeable on how to use technology in the classroom.” With a confidence score above 90%, the data clearly depicts that technology is an inevitable and an expected component of today’s educational climate (Couse & Chen, 2010; Howard, Miles, & Rees-Davies, 2012; O’Hara, 2011; Robert-Holmes, 2014, Sackes, Trundle, & Bell, 2011). Similarly to the reality noted in the research, after 2010, virtually all classrooms are equipped with at least one computer and the possibility of integrated technology. It is vital that pre-service teachers feel prepared (Campbell & Scotellaro, 2009). By analyzing the survey data and rating a majority of confidence scores below 40%, the pre-service teachers surveyed at

this particular institute of higher education did not feel adequately prepared for navigating technology in the modern day classroom. By examining the 50 Common Tools Every Teacher Should Know About and noting that all categories suffered greatly with many participants rating a question mark, which meant they have never even heard of the resource, it is determined that not enough is being done to give pre-service teachers technology-based tools to assist them in their future jobs. The Learning Tools category, which scored a mere 7.48% confidence rating, included tools such as FunBrain that many teachers use in their classroom with students to improve academic achievement scores. Pre-service teachers are clearly not receiving exposure and practice to the tools that educators are currently using in the field.

In order for pre-service teachers to feel prepared, they must have an arsenal of resources on which to depend. The PLN mapping activity demonstrated the resources that these pre-service teachers are employing to help with lesson planning and teaching strategies. Both participants noted significantly more technology resources than other resources. However, the resources noted were that of commonly used social media outlets as opposed to research-based educational sources. For example, Participant A noted resources such as Pinterest, Facebook, Twitter, and Instagram as avenues in which she would look for teaching guidance. These websites can be used for educational purposes; however, their main use is for social networking. This shows that pre-service teachers are using their own networking base to seek help as opposed to using a database to search articles. This reflects the modern-day cultural climate by showcasing that pre-service teachers are looking for quick blurbs or pictures to solve a problem instead of reading long research literature.

How College Programs Could Better Prepare Pre-Service Teachers

Institutes of higher education need to constantly update their programs in order to reflect the reality of classrooms of that state. That is, a classroom climate of multiple computers, iPads, SMARTBoards, and various other technologies. The survey claim, “My institute of higher education has prepared me for using technology in the modern day classroom” scored a confidence of 56.4%, only 10% higher than the lowest confidence score of 46% of integrating technology into science lessons. This reflects a need for more to be done during teacher preparation in undergraduate courses.

The PLN mapping activity that yielded resources that are not considered researched-based or strictly educational reveals that pre-service teachers are relying on themselves to find information on lesson planning and teaching strategies. When asked how the college could better prepare pre-service teachers, both participants agreed that something in the college curriculum needed to change. Participant A argued that syllabi needed to be updated with new technologies, reflecting the modern day classroom. For example, this would mean using Google Drive as a means to hand in papers and open a communication between teacher and student for commenting and correcting assignments. Participant B suggests that current technologies on the campus should be utilized to their full potential. For example, many education classrooms are equipped with a SMARTBoard; however, professors only use a projector during their lectures. Participant B noted that professors modeling the correct way to use new technologies would reinforce readiness as well as give exposure to pre-service teachers on the correct way to use ICT tools.

Limitations

The limitations of my study are mostly due to the geographic location and participant population. As a result of being a graduate student with no budget to complete this study, I chose to do my research at one particular institute of higher education. The rural institution itself had a student population consisting of predominately white, middle class students. The population of my study was limited because there were a determined number of education majors that met all the requirements to participate. The pool of eligible participants revealed itself as being predominately females of who are childhood education undergraduate majors.

Future Research

My study looked at one rural liberal arts college and its ICT preparation of pre-service teachers. For future research, a larger participant pool should be created that analyzes a larger geographic area and the state universities within it. In this research agenda, there should be a preliminary step where federal funds and budgets are analyzed to look at the funds that school districts, private and public, are receiving for technology advancement. Based on that information, state universities should also research college professors and the ICT resources that they are using in their own collegiate classrooms.

After those first steps of developing a foundation of current standards that should be met, pre-service teachers should be surveyed again with an emphasis on the areas of ICT that need more instruction. Through my research, I noted that Learning Tools are the greatest weakness, but looking at a larger pool of various universities may prove that a different area is lacking. Based on that knowledge, college professors should reevaluate

their own syllabi and coursework to not only reflect their own curricula, but to also integrate useful tools that will help pre-service teachers prepare for their own classrooms.

Conclusions

Based on the prior research and an upward trend of ICT use in the classroom, it is inevitable that pre-service teachers will use technology during their careers in some capacity. Although not all classrooms are equipped with a SMARTBoard or set of iPads, that is the way in which the modern day classroom is evolving. Due to this, pre-service teachers need to be prepared and to be on the cutting edge of technology integration. As a generation of upcoming teachers who have been exposed to the advent of this technological age, it is imperative that we embrace this change and learn the ways in which to be effective facilitators in the classroom.

It is my recommendation that institutes of higher education begin changing their standards to meet the advancing needs of ICT growth. Professors should no longer teach in a lecture manner if it has been proven that teacher-centered instruction is ineffective. As models, collegiate professors should act as a guide to pre-service teachers and introduce them to all tools and resources they may encounter in the first few years of teaching. To meet this expectation, universities should provide ongoing professional development opportunities to professors and students that deal exclusively with technology integration and implementation. College courses should become even more computer-focused. Instead of PowerPoint presentations, pre-service teachers should be stretched to get out of their comfort zones and use resources with which they are unfamiliar. For example, a recommendation would be using multimodal avenues to display information such as creating a music video to teach a math concept. By exposing

and promoting diverse ICT resources, pre-service teachers are able to practice their skills so that they feel more confident in their abilities.

Technology is an ever-going field, and children are embracing it. It then becomes our job as educators to notice a child's interest, and build upon it. By being bystanders we offer no encouragement for children to explore and learn from technology. Although I do not feel it should overtake all learning content, I feel teachers must be as confident with ICT as they are with a printed handout. By creating diverse lessons that use many multimodal aspects, children are more likely to stay interested in the topic. Also, technology enables teachers the ability to create academic reinforcement to students that is differentiated and geared toward students' skill levels. This individualizes learning and gives a teacher a better look at the levels at which students are performing at that moment. Instead of running away, pre-service teachers should be constantly growing and mastering new ICT resources for their classroom. As a result of this, higher confidence will build from these new teachers and even higher academic achievement can be reached. This all begins with the educational programs that prepare these pre-service teachers for the field, and thus should be well funded.

References

- Abeler, M. (2013). Pass the salt. *Youtube*. Treehouse Cinematography. Retrieved from:
https://www.youtube.com/watch?v=6_xTxP1hD4.
- Asing-Cashman, J. G., Gurung, B., Limbu, Y. B. & Rutledge, D. (2014). Free and open source tools (FOSTs): An empirical investigation of pre-service teachers' competencies, attitudes, and pedagogical intentions. *International Journal of Teaching and Learning in Higher Education*, 26(1), 66-77. ISSN 1812-9129.
- Bautista, N. U. & Boone, W. J. (2015). Exploring the impact of TeachMe lab virtual classroom teaching simulation on early childhood education majors' self-efficacy beliefs. *The Association for Science Teacher Education*. 26, 237-262. doi:
10.1007/s10972-014-9418-8.
- Campbell, A. & Scotellaro, G. (2009). Learning with technology for pre-service early childhood teachers. *Australasian Journal of Early Childhood*, 34(2), 11-18.
Retrieved from: <http://www.earlychildhoodaustralia.org.au/wp-content/uploads/2014/06/AJEC0902.pdf>.
- Chen, J.Q. & Chang, C. (2006). Using computers in early childhood classrooms: Teachers' attitudes, skills and practices. *Journal of Early Childhood Research*, 4(2), 169-188. Retrieved from: <http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ794879&site=ehost-live>.

Couse, L. J. & Chen, D. W. (2010). A tablet computer for young children? Exploring its viability for early childhood education. *Journal of Research on Technology in Education*, 43(1), 75–98. Retrieved from:

[http://search.ebscohost.com.dbsearch.fredonia.edu:](http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ898529&site=ehost-live)

[2048/login.aspx?direct=true&db=eric&AN=EJ898529&site=ehost-live.](http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ898529&site=ehost-live)

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.

Garcia, P. & Rose, S. (2007). The influence of techno centric collaboration on preservice teachers' attitudes about technology's role in powerful learning and teaching.

Journal of Technology and Teacher Education. 12(2), 247-266. Retrieved from:

[http://www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract&paper_id=19849.](http://www.editlib.org/index.cfm?fuseaction=Reader.ViewAbstract&paper_id=19849)

GDC Team. 50 Education Technology Tools Every Teacher Should Know About. (2014, July 22). Edudemic. Retrieved from <https://globaldigitalcitizen.org/50-education-technology-tools- every-teacher-should- know-about>.

Gray, L., Thomas, N. & Lewis, L. (2010). Teachers' use of educational technology in the U.S. public schools: 2009. *National Center for Education Statistics*. Retrieved from: <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010040>.

Howard, J., Miles, G. E. & Rees-Davies, L. (2012). Computer use within a play-based early years curriculum. *International Journal of Early Years Education*, 20(2), 175–189. Retrieved from: [http://search.ebscohost.com.dbsearch.fredonia.edu:2048/.](http://search.ebscohost.com.dbsearch.fredonia.edu:2048/)

- Johnson, R. B & Christensen, L.B. (2012). *Educational research: Quantitative, qualitative, and mixed approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.
- Mangen, A. (2010). Point and click: Theoretical and phenomenological reflections on the digitization of early childhood education. *Contemporary Issues in Early Childhood*, 11(4), 415–431. Retrieved from <http://cie.sagepub.com/content/11/4/415.abstract>.
- Masoumi, D. (2015). Preschool teachers' use of ICTs: Toward a typology of practice. *Contemporary Issues in Early Childhood*. 16(1), 5-17. Retrieved from: <http://cie.sagepub.com/content/16/1/5.full.pdf+html>.
- Mitchell, D. R. & Dunbar, C. A. (2006). Learning and development in the nursery setting: The value of promoting emergent information and communications technology skills. *Child Care in Practice*, 12(3), 241–257. Retrieved from <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ818006&site=ehost-live>.
- Mohammad, M. & Mohammad, H. (2012). Computer integration into the early childhood curriculum. *Education*, 133(1), 97–116. Retrieved from: <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ996976&site=ehost-live>.
- O'Hara, M. (2011). Young children's ICT experiences in the home: Some parental perspectives. *Journal of Early Childhood Research*, 9(3), 220–231. Retrieved from: <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login>.

- aspx?direct=true&db=eric&AN=EJ943085&site=ehost-live.
- Plowman, L. & Stephen, C. (2005). Children, play, and computers in pre-school education. *British Journal of Educational Technology*, 36(2), 145–157. Retrieved from: <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ685349&site=ehost-live>.
- Roberts-Holmes, G. (2014). Playful and creative ICT pedagogical framing: A nursery school case study. *Early Child Development and Care*, 184(1), 1–14. Retrieved from <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ1026402&site=ehost-live>.
- Sağkes, M., Trundle, K. C. & Bell, R. L. (2011). Young children's computer skills development from kindergarten to third grade. *Computers & Education*, 57(2), 1698–1704. doi:10.1016/j.compedu.2011.03.011.
- Sancar Tokmak, H. & Ozgelen, S. (2013). The ECE preservice teachers' perception on factors affecting the integration of educational computer games in two conditions: selecting versus redesigning. *Educational Sciences: Theory and Practice*. 13(2), 1345-1356. Retrieved from: <http://files.eric.ed.gov/fulltext/EJ1017333.pdf>.
- SUNY Fredonia. (2014). Fast Facts. *Fredonia Academic Affairs*. Retrieved from: <http://www.fredonia.edu/academicaffairs/facts/>.

- Wilber, D. (2012). Trying to get ahead of the curve: Raising and understanding current themes in new literacies practices. *Educational Forum*, 76(4), 406–411. Retrieved from: <http://search.ebscohost.com.dbsearch.fredonia.edu:2048/login.aspx?direct=true&db=eric&AN=EJ981279&site=ehost-live>.
- Wilson, M. (2010). Baby works iPad perfectly. Amazing must watch. *Youtube*. Retrieved from: <https://www.youtube.com/watch?v=MGMsT4qNA-c>.
- Yilmaz, N. & Alici, S. (2011). Investigating pre-service early childhood teachers' attitudes towards the computer based education in science activities. *Turkish Online Journal of Educational Technology - TOJET*, 10(3), 161–167. Retrieved from: <http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ944957&site=ehost-live>.
- Zanetis, J. (2010). The beginner's guide to virtual field trips. *Learning & Leading with Technology*, 37(6), 20–23. Retrieved from: <http://eds.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=5&sid=89314f7c-fbcc-4d9b-a7cc-a0442dbdd576%40sessionmgr106&hid=12>.

Appendices

Appendix A:

Informed Consent

Protocol Title: Do Small, Liberal Arts State Institutions of Higher Learning Produce Pre Service Teachers with an Adequate Amount of Exposure and Training to Navigate and Use Technology in the Modern Day Classroom

Please read this consent document carefully before you decide to participate in this study.

Purpose of the research study:

To study college graduate students, specifically pre service teachers, planning to enter the educational field within five years. This study will exam technological preparedness of pre service teachers attending a rural, public university in Western New York and their attitudes toward information and communication technologies (ICT) in the classroom.

What you will be asked to do in the study:

To respond to a survey that includes both Likert scale style and open ended questions.

To respond to open ended interview questions in a one-on-one setting with the administrator.

Time Required:

Time required to complete the questionnaire is individual to each participant.

Questionnaires will be collected in-person during classroom times.

Compensation:

There is no compensation for participating in the study.

Confidentiality:

Your identity will be kept confidential to the extent provided by the law.

Participant comments and responses may be associated with specific programs in the institute.

Voluntary participation:

Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study:

You have the right to withdraw from the study at any time without consequence.

You do not have to answer any questions you do not want to answer.

Potential Benefits and Risks:

This investigation will serve as a snapshot of the current status of teacher preparedness in liberal arts, rural higher education institutes in getting teachers ready for the modern day classroom. The findings of this research will reflect the overall perspective of pre service teachers in the education program and their comfort levels with using technology in the classroom. It is possible that the survey could serve as a means of reflection on the educational program and ICT requirements in the college. Following this investigation, participants will be allowed to map out their own professional learning network, PLN, of what technologies they feel most comfortable using in their future classroom. Participants can also reflect on their own comfort levels with dealing with technologies seasoned teachers in the field are currently utilizing. Only questionnaire responses relevant to the research question will be used in the final research paper. Comments made about other teachers or students will not be a part of the final paper.

Whom to contact if you have questions about the study:

Meghan Greiner, Graduate Student

Email: grei0318@fredonia.edu

Whom to contact about your rights as a research participant in the study:

Dr. Judith Horowitz
Associate Provost for Graduate Studies, Sponsored Research and Faculty
Development
Maytum Hall 805
Judith.horowitz@fredonia.edu
(716) 673-4708

**I have read the procedure outlined above. I voluntarily agree to
participate
in this study and have received a copy of this description.**

Participant's signature

Date

Principal investigator's signatures

Date

Appendix B

Do Small, Liberal Arts State Institutions of Higher Learning Produce Pre Service Teachers with an Adequate Amount of Exposure and Training to Navigate and Use Technology in the Modern Day Classroom?

Program: _____
 Years Attended This Institution: 1 2 3 4 or more

Please rate your confidence level in using these various technologies in the classroom:

	Least Confident	Moderately Confident	Very Confident	Don't Know
<i>Social Learning Tools:</i>				
Edmodo:	1	2	3	4 5 ?
Grockit:	1	2	3	4 5 ?
EduBlogs:	1	2	3	4 5 ?
Skype:	1	2	3	4 5 ?
Wikispaces:	1	2	3	4 5 ?
Pinterest:	1	2	3	4 5 ?
Schoology:	1	2	3	4 5 ?
Quora:	1	2	3	4 5 ?
Ning:	1	2	3	4 5 ?
OpenStudy:	1	2	3	4 5 ?
ePals:	1	2	3	4 5 ?
<i>Learning Tools:</i>				
Khan Academy:	1	2	3	4 5 ?
MangaHigh:	1	2	3	4 5 ?
FunBrain:	1	2	3	4 5 ?
Educreations:	1	2	3	4 5 ?
Animoto:	1	2	3	4 5 ?
Socrative:	1	2	3	4 5 ?
Knewton:	1	2	3	4 5 ?
Kerpoof:	1	2	3	4 5 ?
StudySync:	1	2	3	4 5 ?
CarrotStick:	1	2	3	4 5 ?
<i>Lesson Planning and Tools:</i>				
Teachers Pay Teachers:	1	2	3	4 5 ?
Planboard:	1	2	3	4 5 ?
Timetoast:	1	2	3	4 5 ?
Capzles:	1	2	3	4 5 ?
Prezi:	1	2	3	4 5 ?
Wordle:	1	2	3	4 5 ?
QR Codes:	1	2	3	4 5 ?
MasteryConnect:	1	2	3	4 5 ?
Google Docs:	1	2	3	4 5 ?
Youtube:	1	2	3	4 5 ?
TED-Ed:	1	2	3	4 5 ?
Glogster:	1	2	3	4 5 ?
Creaza:	1	2	3	4 5 ?
Mentor Mob:	1	2	3	4 5 ?

Useful Tools:

Evernote:	1	2	3	4	5	?
Twitter:	1	2	3	4	5	?
Google Education:	1	2	3	4	5	?
Dropbox:	1	2	3	4	5	?
Diigo:	1	2	3	4	5	?
Apple iPad:	1	2	3	4	5	?
Aviary:	1	2	3	4	5	?
Jing:	1	2	3	4	5	?
Popplet:	1	2	3	4	5	?
Google Earth:	1	2	3	4	5	?
DonorsChoose:	1	2	3	4	5	?
SlideShare:	1	2	3	4	5	?
LiveBinders:	1	2	3	4	5	?
AudioBoo:	1	2	3	4	5	?

Miscellaneous Tools:

Smart Boards:	1	2	3	4	5	?
Assessment Programs i.e. STAR, ARtests, etc.	1	2	3	4	5	?

Please rate these statements by your confidence:

I believe that integrating technology into the classroom is important

1 2 3 4 5

I believe that my future employers will expect me to be knowledgeable on how to use technology in my classroom

1 2 3 4 5

My institute of higher education has prepared me so that I can successfully integrate technology into ELA lessons

1 2 3 4 5

My institute of higher education has prepared me so that I can successfully integrate technology into math lessons

1 2 3 4 5

My institute of higher education has prepared me so that I can successfully integrate technology into science lessons

1 2 3 4 5

My institute of higher education has prepared me so that I can successfully integrate technology into social studies lessons

1 2 3 4 5

My institute of higher education has prepared me so that I can successfully make an interactive Smart Board lesson

1 2 3 4 5

My institute of higher education has prepared me so that I feel prepared to use various technologies in the classroom

1 2 3 4 5

My institute of higher education has prepared me for using technology in the modern day classroom

1 2 3 4 5

Appendix C

Do Small, Liberal Arts State Institutions of Higher Learning Produce Pre Service Teachers with an Adequate Amount of Exposure and Training to Navigate and Use Technology in the Modern Day Classroom.

Principle Investigator: _____

Interviewee: _____

Are you currently completing a graduate degree at the same institute for higher education you received your B.A.?

What educational graduate program are you currently enrolled in and how long have you been in your program?

Why do you think technology preparedness is important to pre service teachers?

What technology are you comfortable using in the classroom?

What class have you learned the most about integrating technology into the classroom?
Undergraduate or graduate.

What kind of technologies have you seen in classrooms you student taught/substituted in?

Have you felt confident in your ability to use those forms of technology while teaching?

Do you have any experience using Smart Boards in the classroom?

Do you feel confident creating multi-modal lesson plans in which students use a range of information technologies?

Do you feel your institute for higher education has adequately prepared you for the technology demands of the modern day classroom?

How do you feel your program could better prepare you for using technology in the classroom?