

10-2014

A mixed methods study of the beliefs and attitudes of teachers regarding the developmental appropriateness of technology in early childhood

Brandi-Lyn Mendham

Follow this and additional works at: <http://commons.emich.edu/theses>



Part of the [Education Commons](#)

Recommended Citation

Mendham, Brandi-Lyn, "A mixed methods study of the beliefs and attitudes of teachers regarding the developmental appropriateness of technology in early childhood" (2014). *Master's Theses and Doctoral Dissertations*. 633.
<http://commons.emich.edu/theses/633>

This Open Access Dissertation is brought to you for free and open access by the Master's Theses, and Doctoral Dissertations, and Graduate Capstone Projects at DigitalCommons@EMU. It has been accepted for inclusion in Master's Theses and Doctoral Dissertations by an authorized administrator of DigitalCommons@EMU. For more information, please contact lib-ir@emich.edu.

A MIXED METHODS STUDY OF THE BELIEFS AND ATTITUDES OF TEACHERS
REGARDING THE DEVELOPMENTAL APPROPRIATENESS OF TECHNOLOGY
IN EARLY CHILDHOOD

by

Brandi-Lyn Mendham

Dissertation

Submitted to the Department of Leadership and Counseling

Eastern Michigan University

in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Dissertation Committee:

James Berry, Ed.D., Committee Chair

David Anderson, Ed.D., Committee Member

Julie Chlebo, Ph.D., Committee Member

Toni Stokes Jones, Ph.D., Committee Member

October 2014

Ypsilanti, Michigan

Acknowledgments

I would like to thank my dissertation committee for their ongoing support, expertise, and encouragement. Thank you to Dr. Jim Berry for his willingness to not only serve as my program advisor from the very beginning, but also as my Chair who was available to me often and encouraged me as both a student and as a professional. While he recognized my responsibilities outside of the coursework, he reminded me of my ability to persevere. Although it may have taken me longer than I would have liked to narrow in on the topic, we finally got to “home plate” as he reminded me. I would like to extend my gratitude to Dr. Suzanne Mannes who provided a review of my writing at each stage of the dissertation process and to Dr. Tom Granoff who guided my learning related to statistics deepening my confidence and ability in that area while reminding me of my insanely busy life along the way! Thank you to Dr. Julie Chlebo for her shared passion in the field of early childhood and willingness to serve on my committee with an open mind regarding a fairly controversial topic in our field. Thanks to Dr. Toni Stokes Jones for her enthusiasm and dedication to the field of technology and the way she exemplifies a desire to continue to be a life-long learner like myself. And last, but certainly not least, thank you to Dr. David Anderson for your expertise in the field of statistics and research in general. Your questions probed for deeper understanding and helped me to realize the significance of this degree and the requirements behind it. To all of you, thank you for helping me grow professionally and personally along the way. I am truly a stronger individual as a result of this doctoral journey.

To my beloved EMU Crew, thank you for sticking together on this long and arduous journey. We laughed, cried, and cheered each other on all the way. Forrest, Julie, Kathy, Jenn, and Scott, you were once colleagues and now you are more like family.

To my former colleagues in the West Shore Educational Service District, thank you for your willingness to support my research. You were all so willing to take part in the study and made yourselves available to me to learn more about your beliefs and experiences with the young students you are responsible for. I have great respect for all of you and know that you helped me to grow by being your colleague. I look forward to the future of technology in education, specifically within the field of early childhood. You all are pioneers of this important work and have tremendous influence on the young lives you touch. In all things, continue with passion and intention and know I appreciate all you taught me along the way.

Dedication

This dissertation is dedicated to my incredibly supportive and loving family. John, without your constant support and encouragement, this would not have been possible. Thank you for not only being with our children, but enjoying your moments with them and helping them to understand that this sacrifice we made was to obtain my professional goal. In the sacrifice, it is my hope they realize that nothing worthwhile comes without significant effort. Thank you for being there when I could not and helping our kids to not miss a beat. Thank you for waiting on me and knowing our life can now resume without the interference of reading and writing each weekend.

To my parents, thank you for your unending support and willingness to be there when John and I were both busy with work. While I felt guilt in being away, our children felt nothing but pleasure in the days they spent at your house by the lake. Thank you for always reminding me, “You can do this!” Your belief in me and willingness to do whatever it takes is so appreciated. Mom, you told me when I applied for the program that we were in this together. You were right, and I dedicate this degree to you as well.

To my grandmother, thank you for your constant support and well wishes. Our phone calls on my long commutes helped me to push on. You always told me the light was getting brighter and the end was in sight. I am so thankful that you kept my eye on the finish line and believed I could get there.

To my twin daughters, Mya and Madison, and my son, Ty, thank you for understanding that the best place for me to be is with you, but that I had to be away to accomplish this dream. I hope you see that goals are within reach when the people who care about you support you and understand the sacrifices you sometimes have to make. I

look so forward to our beach days next summer now that my dissertation is complete and to all of the days in between that I can just be your mom.

To my network of friends and extended family, thank you for all of your well wishes and motivation along the way. I cannot count how many times you all told me, “You got this!” I am so excited to say that I do and look so forward to having time to spend with you all again now that my study has drawn to a close. The best things in life are certainly worth working for!

Abstract

In this study, teacher self-efficacy regarding technology use was examined. Data from a sample of teachers were analyzed to determine the degree to which these educators felt comfortable and confident with the infusion of technology in their practice. Additionally, the beliefs and attitudes these educators held toward the developmental appropriateness of technology were analyzed to determine if the level of integration in their classrooms was impacted by these beliefs and attitudes. This study analyzed surveys from 41 teachers (preschool and kindergarten) along with interviews of six participating teachers in the West Shore Educational Service District region in Michigan. Four of the primary findings of the study were the existence of a clear division between districts that have access to technology and those who do not based on a perceived unequal distribution of funding or focus on technology in the classroom. A second finding was that even in districts where technology was available, there were concerns about teachers struggling with the integration of it due to lack of training. Often times, teachers were feeling unprepared to teach with the tools provided and they were apprehensive about the use and worried children will perceive their limitations. The third primary finding was the importance of the teacher facilitating the learning and guiding the use of the technology tools with early learners so that they are used purposefully and with intention. Finally, the fourth primary finding was that the level of technology implementation tended to be higher for teachers with more years of experience, but was significantly higher for teachers who used the iPad in more personal ways suggesting that those who were using the devices outside of their classroom instruction were also those who were implementing more in the classroom.

Table of Contents

Chapter 1: Introduction, Background, and Overview	1
Background and Context of Study	2
Statement of the Problem	5
Purpose of the Study	6
Significance of the Study	8
Research Questions	9
Conceptual Framework	10
Research Design, Methods, and Procedures	12
Definition of Key Terms	13
Delimitations and Limitations of the Study	15
Summary	15
Chapter 2: Review of the Literature	17
Overview	17
Impact and Barriers	18
Controversial Nature of Technology in Early Childhood	19
The Digital Divide	20
Teacher Attitude Toward Technology	23
Technology Training	25
Teacher Self-Efficacy	26
Summary	29
Chapter 3: Research Design, Methods, and Procedures	30
Study Design	30

Survey Research..... 34

Participant Selection..... 34

Ethical Considerations..... 36

Delimitations and Limitations of the Study 37

Chapter 4: Results.....39

 Introduction.....39

 Research Questions.....53

 Additional Findings from the Teacher Survey.....54

 Results of the Open-Ended Survey Questions.....55

 Results of the Qualitative Interviews 62

 Theme 1: Developmentally Appropriate Use of Technology.....63

 Theme 2: Technology Support System in Place.....66

 Theme 3: Beliefs about the Impact of Technology on Students and on Teachers’
 Instruction.....70

 Theme 4: The Use of iPads in Early Education Classrooms.....73

 Summary.....77

Chapter 5: Conclusions, Implications, and Recommendations.....78

 Summary of the Findings.....78

 Conclusions.....80

 Educational Implications and Recommendations.....86

 Recommendations for Future Research.....88

 Recommendations for Policy.....89

 Chapter Summary89

References	91
Appendix A: Survey	96
Appendix B: Interview Protocol	100
Appendix C: Participant Informed Consent Agreement for Interviews.....	102
Appendix D: Participant Informed Consent Agreement for Survey	103
Appendix E: Qualitative Interview Transcripts	104
Appendix F: Human Subjects Approval.....	155

Chapter 1: Introduction, Background, and Overview

This study sought to explore the phenomenon of technology integration in early childhood classroom environments. In these preschool-kindergarten classrooms, data were gathered to examine the degree to which teachers were implementing technology and what beliefs and attitudes they held toward the use of technology in these early years of schooling. Additionally, qualitative data were gathered related to the way participants perceived the use of technology in the classroom as well as the way they perceived themselves along the continuum Rogers (1995) identified in his diffusion of innovation theory.

The study included a mixed methods design whereby an electronic survey questionnaire was deployed to participants to gather the quantitative data while one-on-one semi-structured interviews were conducted to gather the related qualitative data adding substance and texture to the quantitative results. The current study may provide insights regarding teachers' beliefs and attitudes toward technology and their impact on implementation. Similarly, it was hoped that knowledge would be generated through the study regarding the impact of self-efficacy on educational practice and technology pedagogy of early childhood educators.

Participants of this study included teachers responsible for preschool-kindergarten in the West Shore Educational Service District (WSESD) in Michigan. The potential sample size was ($N = 75$). This region was comprised of the following eight local school districts: Baldwin Community Schools, Hart Public Schools, Ludington Area Schools, Mason County Central Schools, Mason County Eastern Schools, Pentwater Public Schools, Shelby Public Schools, and Walkerville Public Schools. Within this participant group, one of the school districts had recently passed a K-12th grade technology bond

and deployed 1:1 devices in the form of iPads for their student population during the 2013-2014 school year.

The quantitative data were gathered via an electronic survey that was disseminated to the region; however, fewer participants were selected to share their experiences and insights through the qualitative portion of the study. Preschool and kindergarten teachers in the WSESD region who had additional insights to share beyond the survey were invited to participate in the semi-structured interview process. Through engaging in this action research, the researcher hoped to either confirm or repudiate the quantitative findings adding additional substance to the survey results.

Background and Context of Study

In the current times, schools are investing considerable resources to infuse technology across all levels. Although these resources are flowing into educational settings, research in the area of early childhood technology is limited, yet growing, due to technological advances that occur at an alarming rate. With the widespread use of technology in all areas of everyday life including the educational sector, it is unsettling to note that the research suggests there has been little, if any, impact on schools in the United States (Norris, Sullivan, Poirot, & Soloway, 2003). The literature does suggest the possibilities for such an impact, yet in looking back over the past 25 years, the impact on primary and secondary education has been essentially zero (Cuban, 2001). It seems as if life continues as usual inside the walls of schools across the country with traditional instructional methods and materials immune to the powerful impact of technology outside in the everyday lives of the children, that is until the recent advent of touch screen devices that are seemingly more appropriate for early users. Resistance has been noted

and barriers are plentiful as cited in the research. The barriers identified in a recent study by Ciftci and Kurt (2012) included “limitations in physical settings, availability of materials, conditions of equipment and maintenance, lack of training and interest, low socioeconomic status, and crowded classrooms” (p. 225). These barriers were the six that seemed to recur most often in the participants’ responses. The researchers in this study point to the fact that ultimately, teachers make the decision about whether or not to integrate technology. It is their premise that by attending to the barriers that are deterring integration, the likelihood that teachers may attempt to integrate is increased.

In addition to Ciftci and Kurt (2012), there is a growing body of research studying technology implementation in the school setting (Dawson, Cavanaugh, & Ritzhaupt, 2006; Leonard & Guha, 2001; Norris et al., 2003). The impact of the related teacher preparation with a focus on building teacher capacity and comfort with technology implementation is also a current trend in the field (Abbitt, 2011; Brinkerhoff, 2006; Laffey, 2004). On the contrary, much less research is available on the implementation of technology in early childhood settings. Many children are entering school from technology rich backgrounds and in most cases, being asked to *leave their technology at the door* (Parette, Quesenberry, & Blum, 2010). Conversely, there are others entering school from impoverished home settings devoid of technology. Unfortunately, the inequity they experience in their everyday lives is sometimes mirrored by their inequity in terms of technology access in their educational environment. Although schools are investing in technological resources to put in the hands of students, the inequity persists in the access and availability for children from various socioeconomic groups. Children from poor families were less likely to use computers at school (75%) and at home (32%)

than children living in a high socioeconomic status whereby their use was 83% at school and 75% at home in 2001 (Judge, Puckett, & Bell, 2006).

In addition to the varying degrees of access, there is evidence that even when access is not the issue, the inclusion of informational technology in classrooms serving the youngest students is inherently controversial (Burnett, 2010). Miller (2005) highlights the opponents of technology in early childhood citing their concerns about how it may distract children from activities that are more natural, healthy, and developmentally appropriate. Additionally he suggests that the opponents contend that these young children may access inappropriate content or engage in an uncritical, passive manner with information. Laffey (2004) corroborated these contentions when he suggested, “Some of the resistance to the use of technology in early childhood education for preservice teachers may be rooted in the controversy about how exposure to technology may be harming young children” (p. 362). In the Alliance for Childhood’s report, *Fool’s Gold: A Critical Look at Computers in Childhood* (2001), the authors advised, “Computers are perhaps the most acute symptom of the rush to end childhood” (p. 19). Their primary concern is the expectation that the analytic and abstract thinking associated with the use of computers is a milestone that occurs later in human development. Additionally, the sedentary behavior that computers elicit as well as the repeated motions in terms of fine motor development are concerning. NAEYC, the National Association for the Education of Young Children, (2012) refutes some of these claims in their updated position statement advocating instead, “When used wisely, technology and media can support learning and relationships. Enjoyable and engaging shared experiences that optimize the potential for children’s learning and development can support children’s relationships

both with adults and their peers” (p. 1). Drawing on the research that is readily available regarding children’s growth and development, informed decisions should be made about implementing technology in a developmentally appropriate manner.

Statement of the Problem

Technology is infiltrating the classrooms across the country at a rapid rate. While the integration of technology in general is not a new concept, the inclusion of technology in early childhood settings is more recent and is drawing attention. The advent of touch screen devices that allow the end user to manipulate what they see on the screen without having to navigate extraneous hardware like a mouse or a stylus has allowed for a more developmentally appropriate experience. One device that has been deployed in varying configurations in classrooms across the country is Apple’s iPad released in 2010. There are districts that are providing single iPads in classrooms mainly for teacher use while others are deploying them in a 1:1 model where every child has his/her own device. Still another implementation model is the inclusion of an iPad mobile lab where teachers and classrooms share the devices across the building and use them for small group, large group, or one-on-one instruction and experiences. Regardless of the implementation model selected, the primary goal of integrating a device like an iPad is to increase student engagement and achievement.

Gaps exist in the current literature regarding the integration of technology including iPads and other related devices in early childhood settings. The concept presents both advocates who contend that the devices are increasing engagement and achievement as well as opponents who criticize the inclusion of technology in early childhood citing elements of developmentally appropriate practice and the need for

experiences with real and natural materials rather than electronic devices. Given the rapid rate at which schools and districts are expending resources to provide technology in these early childhood settings makes this an optimal time to carry out this study to determine how technology is being implemented in these settings and how the related beliefs and attitudes of the teachers affect the integration. Additionally, the study sought to explain the impact touch-screen devices have on the instruction in early childhood environments as teachers navigate their pedagogy aimed at addressing the educational needs of the digital natives they are responsible for.

Purpose of the Study

In this study, teacher self-efficacy regarding technology use was examined. In other words, data from the sample of teachers were analyzed to determine the degree to which these educators felt comfortable and confident with the infusion of technology in their practice. Additionally, the beliefs and attitudes these educators hold toward the developmental appropriateness of technology were analyzed to determine if the level of integration in the classroom is affected by them. Building on the previous work that has been done in this domain, the current focus of study provided implications and considerations for teacher preparation and professional growth focused on the integration of technology in developmentally appropriate ways in early childhood settings.

In an attempt to address what others like Parette et al. (2010) have advanced, technology in early childhood was the primary focus. He contends that

we as an American society are still not focusing on the importance of teaching appropriate uses of technology in early childhood settings even though there are

both national and international frameworks, or macro cultures, of technology use and recommended standards across societies and states. (p. 338)

Included in these frameworks are examples of standards such as the U.S. National Performance Indicators for Technology-Literate Students in Grades PreK-2 as well as NAEYC's updated (2012) position statement on appropriate technology use in early childhood. Additionally, the National Education Standards for Teachers and for Students from the International Society for Technology in Education (ISTE) are worldwide standards for technology proficiency. Clearly, there are criteria in place indicating the need for both students and teachers to have rich-quality technology experiences embedded in instruction. The lack of research targeted specifically on these experiences in early childhood justifies the current focus of this study.

In agreement with the frameworks and standards that exist both nationally and internationally, Parette et al. (2010) affirmed the necessity of students becoming proficient with technology. Specifically, "at the core of these twenty-first century skill sets are needs for students to learn to use lifelong learning skills together with technology tools" (p. 337). Living in the information age, students must possess both academic as well as technical competencies. Addressing the need to advance with the technology that is available, NAEYC has recently released a revision to their initial position statement regarding technology in early childhood. In this current publication, a favorable view of the inclusion of technology in early childhood is noted "Educators should provide a balance of activities in programs for young children, and technology and media should be recognized as tools that are valuable when used intentionally with children to extend and support active, hands-on, creative, and authentic engagement with those around them and

with their world” (p. 12). Looking beyond the early years, Reinhart, Thomas, and Toriskie (2011) warned, “Without teachers effectively applying technological innovation in this way, there is a real potential for the marginalization of students who are not prepared to be active participants in the twenty-first century workforce” (p. 185). It is clear from organizations poised to advocate for best practice in early childhood, alongside others who are concerned with the academic preparation of our future workforce, that research in this domain is both worthwhile and necessary.

Significance of the Study

We exist in the midst of a technology era. Never before have we been so immersed with technology influencing our everyday lives. Rosen and Jaruszewicz (2009) revealed, “Educators and parents understand that children must learn how to live on a wired planet” (p. 163). The landscape on this wired planet is continually changing with technological advances occurring continuously. Parette et al. (2009) suggested that technology use permeates virtually all aspects of twenty-first century society. The impact of this technology-rich era has been felt by all, including our youngest. NAEYC agreed, “Technology tools for communication, collaboration, social networking, and user-generated content have transformed mainstream culture” (p. 2).

In addition to the way in which these devices and the related instructional content are changing the classroom, they are having similar impacts in the household. Parents and children are interacting with such tools in their everyday lives. As a result, learning more about the implications of embedding technology in thoughtful, intentional ways in early childhood is critical on a number of fronts. First, efforts to better understand the impact on early childhood are necessary attending to the resources that schools are investing to

provide access to their students as well as the potential for impact on student engagement and achievement (Dawson et al., 2006; Gimbert & Cristol, 2004; Judge et al., 2006).

Secondly, research in this domain can either support or discern the previous arguments for and against the inclusion of such technology with the youngest learners. Lastly, this research focus revealed suggestions regarding the training of early childhood teachers, both in their college preparation as well as their professional development once practitioners in the classroom. The careful analysis of teacher attitudes and beliefs regarding the developmental appropriateness of technology in early childhood settings can reveal their impact on the level of integration in the classroom. Recognizing that technology is here to stay and is a viable part of our very existence in the current times, educators will need to be supported as they work to integrate it meaningfully and intentionally in their daily instruction at all levels.

Research Questions

In light of the increased prevalence of technology in early childhood educational settings and the inherent controversial nature of its presence with regard to the tenets of developmentally appropriate practice, the researcher studied the following questions in order to determine to what degree a relationship exists between the identified variables:

Research Question 1: Is there a relationship between the beliefs and attitudes of preschool and kindergarten teachers related to the developmental appropriateness of technology and the level of implementation of technology in the classroom?

Research Question 2: Is there a relationship between the demographics of preschool and kindergarten teachers and their beliefs and attitudes related to the developmental appropriateness of technology?

Research Question 3: Is there a relationship between the level of implementation of technology in preschool and kindergarten classrooms and the demographics of the teachers?

Conceptual Framework

In the study, the researcher focused on the integration of technology in early childhood classrooms and the related beliefs and attitudes of the teachers in these classrooms. This area of focus was born out of the researchable problem related to the pace at which technology is finding its way into early childhood where it is either met with teachers who have strong self-efficacy related to its integration and are not hindered by their beliefs; or, alternately, in settings where teachers are much more fearful or even staunchly opposed to its existence based on their belief that the integration of technology is not developmentally appropriate.

Krathwohl (2009) contended, “Initial conceptual support...involves clarifying the constructs used to describe a relationship; embedding them in an explanation, theory, or rationale; and translating them into operational definitions for use in the study” (p. 139). Miles and Huberman (1994) defined the purpose of a conceptual framework suggesting that it “explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them” (p. 18). Based on the limited research currently available in the field, it is believed that the current study contributed to the body of knowledge with an emphasis and focus on early childhood. It was situated in the field amongst studies that largely focus on older students and grade levels proving useful to districts and administrators who may be considering the adoption of technology in the earliest settings. The problem being studied is of

particular interest to the researcher, and also to the field, given the rapid efforts of integrating technology in areas that have not been studied as thoroughly.

Standing on existing theories in the field of education as well as a possible collaborating theory in the related field of sociology, the researcher formulated a conceptual framework for this study. Bandura's Social Cognitive Theory as well as Rogers' Diffusion of Innovation Theory was used as a framework to guide the research efforts.

According to Bandura's work, efficacy is a measure of capability. Zimmerman et al. (1992) suggested, "Perceived self-efficacy influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties" (p. 664). Bandura (2011) further asserted,

People's beliefs in their efficacy influence whether they think pessimistically or optimistically, in self-enabling or self-debilitating ways. Self-efficacy beliefs influence how well people motivate themselves and persevere in the face of difficulties through the goals they set for themselves, their outcome expectations, and causal attributions for their successes and failures (p. 13).

Since the focus of the current study was on teacher attitudes as well as their perceived level of knowledge related to the integration of technology in early childhood environments, Bandura's assertion that beliefs about efficacy influence how people think, motivate themselves, and persevere was directly applicable to the analysis of the survey data and the interview information that were collected.

Since this study occurred during the course of the 2013-14 school year, which was also the beginning of the 1:1 iPad district initiative taking place at one of the sites

selected, Roger's Diffusion of Innovation Theory was applied to frame the process by which the staff responded to the innovation. In addition to the district that has successfully passed a technology bond enabling the 1:1 movement, all other districts in the WSESD region have varying degrees of access to technology for their early childhood students thereby positioning staff across the region at various points on the innovation continuum.

The innovation-decision process is defined by Rogers (2003) as the process through which an individual passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation, to making a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. (p. 168)

This process focuses on social change. Rogers (2003) revealed, "When new ideas are invented, diffused, and adopted or rejected, leading to certain consequences, social change occurs" (p. 6). The infusion of technology in the early years of schooling is a relatively new phenomenon. With technology becoming more prevalent in these classrooms, utilizing the diffusion of innovation theory as a lens to view the related actions of the teaching staff and their related consequences seemed plausible. Analyzing where teachers are along the continuum Rogers identified regarding the adoption of an innovation can inform school leadership of necessary next steps to further support implementation.

Research Design, Methods, and Procedures

With the approval of the University's Institutional Review Board (IRB), the research investigated the impact of teacher beliefs and attitudes related to the integration

of technology in early childhood. The mixed methods study employed both a survey distributed to the preschool and kindergarten participants identified in the WSESD region as well as the qualitative interview processes that followed to gather additional related data. The one-on-one interviews were conducted with teachers who had further thoughts to share about their experiences with technology implementation in the region. The data collected during the semi-structured interview process were digitally recorded and transcribed for analysis.

The sample consisted of early childhood teachers in grades preschool-kindergarten employed in the WSESD region ($N = 75$). This sample included teachers from the following districts: Baldwin, Hart, Ludington, Mason County Central, Mason County Eastern, Pentwater, Shelby, and Walkerville. This sample of convenience was selected by the researcher based on her knowledge of the region having served as the General Education Services Coordinator and Early Childhood Specialist for WSESD.

By employing survey research alongside semi-structured one-on-one interviews, the researcher hoped to gather qualitative data that could assist in explaining the quantitative results. This research design is what Creswell (2008) refers to as an explanatory mixed methods design or a two-phase model. “The rationale for this approach is that the quantitative data and results provide a general picture of the research problem; more analysis, specifically through qualitative data collection, is needed to refine, extend, or explain the general picture” (p. 560).

Definition of Key Terms

To provide a shared understanding of certain terms related to this study that may also be utilized in other fields, this study includes the following definitions:

Developmentally appropriate practice: “Developmentally appropriate practice, often shortened to DAP, is an approach to teaching grounded in the research on how young children develop and learn and in what is known about effective early education” (Copple & Bredekamp, 2009).

Developmentally appropriate technology use: “Use that both respects the unique challenges represented by children's levels of development and capitalizes on children's natural desire to actively, collaboratively construct knowledge and solve problems” (Rosen & Jaruszewicz, 2009, p.162).

High-impact professional learning: “Has three essential characteristics: (a) a focus on student learning, (b) rigorous measurement of adult decisions, and (c) a focus on people and practices, not programs” (Reeves, 2010).

Implementation: How teachers, administrators, and students are using technology in the educational setting; the frequency and type of use and where and how the technology is being used.

Self-efficacy: A measure of capability; “Perceived self-efficacy influences the level of goal challenge people set for themselves, the amount of effort they mobilize, and their persistence in the face of difficulties” (Zimmerman, Bandura, & Martinez-Pons, 1992).

Technology integration: “Using still and video cameras, multi-touch mobile devices, interactive websites, graphics, and office applications, and many other devices, anytime, anywhere” (Simon & Nemeth, 2012).

Delimitations and Limitations of the Study

A delimitation of the study is that data were collected in the middle to the end of the 2013-2014 school year. Being time bound, the data gathered at a point in time might not be the same as data gathered at another point in the school year. Additionally, this study sought only to research the beliefs, attitudes, and technology implementation of early childhood (preschool-kindergarten) teachers in the WSESD region. The level of access to technology, both in the school and in the home setting, varies dramatically from region to region as well as the level of emphasis and focus placed upon the inclusion of technology in instruction, thereby necessitating this delimitation.

Limitations of the study include the use of a survey questionnaire and the related issue with return rate. Additionally, a possible limitation was the fact that one of the schools included in the sample was a district that had recently passed a technology bond. Due to these new resources being appropriated for technology specific activities and training, the research findings might have been influenced in this particular district. Including the other seven districts, each with varying degrees of technology access and focus, was the researcher's attempt at making the research findings more generalizable. Finally, the researcher's presence in the semi-structured interviews as well as the self-reporting that was involved both in the survey questionnaire and the interview process were possible limitations.

Summary

In this chapter, the current status of technology was explained, both in early childhood as well as today in current times. The lack of related research around its implementation was also noted. Because of the increased use of technology in early

learning environments and the lack of guiding research to make sound decisions about its use, participants' attitudes and beliefs were studied to determine what impact they have on implementation. In the chapter that follows, an in-depth literature review regarding technology in early childhood is offered.

In subsequent chapters, a detailed description of the research design, methods, and procedures, as well as measures that were taken to ensure the integrity and trustworthiness of the research is offered. Further chapters present an analysis of the data as well as a summary of the implications, outcomes, and recommendations for further study.

Chapter 2: Review of the Literature

Overview

In educating the workforce of the future, it is important to note the differences in the approaches to learning of what has come to be known as the “digital natives” versus the “digital immigrants.” According to Prensky (2001) as cited by Kumar and Vigil (2011), “Digital natives have been defined as people born after 1984 who have grown up with digital technologies, are at ease with new technologies, and expect the use of new technologies in their education.” (p. 144). Research in this area can offer suggestions for necessary changes in instructional pedagogy to better support the specific needs of today’s learners. In a study of 54 preservice teachers from a large private university, the researchers found that the way the study participants were educated had an impact on the way they were currently teaching others in that they did not necessarily infuse technology in their academic content regularly, but adopted technology for their personal use instead (Kumar & Vigil. 2011). Subsequently, the authors of the study urged that “preservice teachers cannot be depended on to independently make the connection between technology, pedagogy, and their subject matter” (p. 151). Instead, the use of such technology has to be modeled with opportunities provided for these preservice teachers to practice implementing it in real-life settings with an intentional focus. Similar to the gaps in terms of those who have access to technology and those who do not, a gap exists in the learning differences between those who have been brought up in the digital age and those who must make adjustments and accommodations in order to integrate it and utilize it to the fullest potential in instruction. Obviously there are a number of factors at play influencing the degree to which technology is integrated. Among these factors are

variables such as teacher self-efficacy, the presence or lack of high quality training opportunities, and the recognition as well as attention to the differences in learning styles of today's students.

Impact and Barriers

With the widespread use of technology in all areas of everyday life including the educational sector, it is unsettling to note that the research suggests there has been little, if any, impact on schools in the United States (Norris et al., 2003). The literature does suggest the possibilities for such an impact, yet in looking back over the past 25 years, the impact on primary and secondary education has been essentially zero (Cuban, 2001). It seems as if life continues as usual inside the walls of schools across the country with traditional instructional methods and materials immune to the powerful impact of technology outside in the everyday lives of the children. Resistance has been noted and barriers are plentiful as cited in the research. The barriers identified in a recent study by Ciftci and Kurt (2012) include "limitations in physical settings, availability of materials, conditions of equipment and maintenance, lack of training and interest, low socioeconomic status, and crowded classrooms" (p. 225). These barriers were the six that seemed to recur most often in the participant's responses. The researchers in this study point to the fact that ultimately, teachers make the decision about whether or not to integrate technology. It is their premise that by attending to the barriers that are deterring integration, the likelihood that teachers may attempt to integrate is increased.

In addition to Ciftci and Kurt (2012), there is a growing body of research studying technology implementation in the school setting (Dawson et al., 2006; Leonard & Guha, 2001; Norris et al., 2003). The impact of the related teacher preparation with a focus on

building teacher capacity and comfort with technology implementation is also a current trend in the field (Abbitt, 2011; Brinkerhoff, 2006; Laffey, 2004). On the contrary, much less research is available on the implementation of technology in early childhood settings. Many children are entering school from technology rich backgrounds and in most cases, being asked to 'leave their technology at the door' (Parette et al., 2010). Conversely, there are others entering school from impoverished home settings devoid of technology. Unfortunately, the inequity they experience in their everyday lives is mirrored by their inequity in terms of technology access in their educational environment. Although schools are investing in technological resources to put in the hands of students, the inequity persists in the access and availability for children from various socioeconomic groups. Children from poor families were less likely to use computers at school (75%) and at home (32%) than children living in a high socioeconomic status whereby their use was 83% at school and 75% at home in 2001 (Judge et al., 2006).

Controversial Nature of Technology in Early Childhood

In addition to the varying degrees of access, there is evidence that even when access is not the issue, the inclusion of informational technology in classrooms serving the youngest students is inherently controversial (Burnett, 2010). Miller (2005) highlighted the opponents of technology in early childhood citing their concerns about how it may distract children from activities that are more natural, healthy, and developmentally appropriate. Additionally he suggested that the opponents contend that these young children may access inappropriate content or engage in an uncritical manner with information. Laffey (2004) corroborated these contentions when he suggests "Some of the resistance to the use of technology in early childhood education for preservice

teachers may be rooted in the controversy about how exposure to technology may be harming young children” (p. 362). In the Alliance for Childhood’s report, *Fool’s Gold: A Critical Look at Computers in Childhood* (2001), the authors advised that “computers are perhaps the most acute symptom of the rush to end childhood” (p. 19). Their primary concern is the expectation that the analytic and abstract thinking associated with the use of computers is a milestone that occurs later in human development. Additionally, the sedentary behavior that computers elicit as well as the repeated motions in terms of fine motor development are concerning. NAEYC refuted some of these claims in their updated position statement advocating instead “when used wisely, technology and media can support learning and relationships. Enjoyable and engaging shared experiences that optimize the potential for children’s learning and development can support children’s relationships both with adults and their peers” (p. 1). Drawing on the research that is readily available regarding children’s growth and development, informed decisions can be made about implementing technology in a developmentally appropriate manner.

The Digital Divide

While the literature has highlighted the troubling lack of impact, schools continue to invest in educational technology for students across all age levels. In so doing, the *digital divide* between those who have access to technology and those who do not has been addressed to some degree. From 1994 to 2002, schools with the highest poverty concentrations (75% or more students eligible for free or reduced meals) saw an increase in the percentage of classrooms with Internet access from 2% to 89% (Judge et al., 2006). Such an increase is cause for celebration; however the need to continue to pursue the social justice goal of *digital equity* is paramount. According to Judge et al. (2006) digital

equity is intended to ensure “that all students have access to information and communication technologies for learning, regardless of socioeconomic status (SES), disability, language, race, gender, or any characteristics that have been linked with unequal treatment” (p. 52). Judge et al. further suggested that as a student’s age, parent education, and family income increase, so too does their tendency to use computers and the Internet. This, in essence, further widens the digital divide referenced earlier. Reinhart et al. (2011) study of 94 practicing K-12 grade teachers in urban, suburban, and rural areas revealed a difference in *how* students were being taught in relation to the socioeconomic demographics surrounding their experience. Those students attending schools with low socioeconomic conditions had teachers who provided support and guidance with technology in basic ways. Conversely, their peers in more affluent settings were guided by teachers who provided not only the basic technology support but simultaneously provided the scaffolding for higher order thinking aligned to their technology use. Again, this difference points to the continued digital divide.

Literature in the sociology field delineates yet another dimension of discrepancy coined by the term, *Second-Level Digital Divide* or *SLDD*. “This newer divide...is no longer a simple delineation between those who have access to technology and those who do not. The SLDD refers to the difference in *how* technology is utilized” (p. 181). No longer is it only a matter of who has access, especially in light of the resources that schools are infusing in the current times, but rather a focus on how or if those resources are being used. A study by Ciftci and Kurt (2012) illustrated that the impact of socioeconomic status on technology integration is not solely felt in the United States. Their research substantiated that these issues exist in the country of Turkey as well.

Survey results there revealed that “all the teachers...mentioned that socioeconomic status was a barrier to the adoption of technology” (p. 233). It is essential that all students have experiences with technology regardless of their socioeconomic status. Zevenbergen (2007) advocated,

Computers need to have a higher profile in the early childhood setting, particularly when considering issues of equity and access. They have considerable potential to address the divide between those who come to preschool settings with a wealth of experiences with technology and those who come from technology-poor families. (p. 27)

Data collected by Norris et al. (2003) indicate that the average school ratio of computers to children is 5 to 1. While that ratio may seem plausible, it is important to note that this ratio is not always indicative of a single classroom’s access. Instead, often computers are housed in lab settings in schools and teachers report varying access to these labs further limiting the exposure that children have to technology in their daily school lives (Judge et al., 2006). In a study by Norris et al. (2003) with 3,665 teachers representing a geographically diverse population from California, Florida, Nebraska, and New York, two thirds of the teachers in the study reported having no more than one computer in their classrooms. As a result, 44% of these survey participants reported using the computer in their curricular activities less than fifteen minutes per week. Norris et al. further argued that the variable of teacher attitude toward technology was of no statistical value in predicting their technology use.

Teacher Attitude Toward Technology

Many other studies have focused on this important aspect of technology implementation (Brinkerhoff, 2006; Dussault, Deaudelin, & Brodeur, 2004; Laffey, 2004; Vannatta & Fordham, 2004) and have suggested that teacher attitude toward technology, their beliefs about computers, as well as their self-efficacy related to integrating it in their instruction have a significant impact. The study by Norris et al. (2003) simply refuted that arguing that limited access alone was the cause for not implementing technology in instruction. In other words, since the teachers did not have the technology available to them, they were not able to utilize it. Other researchers like Stevenson (2009) analyze the digital divide in a different way. Rather than focus solely on the socioeconomic divisions, he considered the intersection of class and its relationship to information, both the creation and ownership of it, demonstrating that the digital divide is far more complex than mere access. Stevenson declares,

The construction of the digital divide as primarily a problem of access to the technology effectively (a) foreclosed on the possibility of alternative problem definitions by making the problem a technical and administrative problem rather than an issue of historic class struggle, and (b) as defined, the problem was resolvable in large part through market forces. (p. 18)

So by providing access to technology, the digital divide is seemingly addressed when in actuality, the different ways in which this technology is utilized is contingent upon the hierarchy of class and access to related information.

Considering the billions of dollars being spent to integrate technology into educational settings with the goal of addressing the current gap between those that have

access and those that do not, it is important to examine what other factors may be impacting the divide. Much has been put forward in the research regarding teacher belief, self-efficacy, and attitude toward technology in practice. In a study conducted by Brinkerhoff (2006), the effectiveness of a long-term professional development academy designed to address barriers to technology implementation and to increase technology integration in instruction was evaluated. The results of this study were on one hand positive in that the survey responses revealed gains in teachers' reported self-efficacy as well as their self-reported technology skills after participating in the academy. On the other hand, this same study revealed that the successful implementation of technology in instruction is a process that requires time since the participant's survey results revealed little to no change in their integration beliefs and actual practices even with their reported gain in self-efficacy and technology skills. Horsley and Loucks-Housley (1998) as cited in Brinkerhoff (2006) pointed out that "such change is a slow, uncomfortable process rather than an event, and as such, requires extended time for changes in attitude and acceptance of differing perspectives to take place" (p. 27). In addition to the time it takes for such integration to occur, it is important to note the power of influence school administrators have on technology integration. Vannatta and Fordham (2004) contended that school administrators are responsible for establishing either a *change* or a *maintenance* culture in their respective buildings. Furthermore, they suggested that in addition to extensive training in technology, teacher educators and administrators should "facilitate the dispositions of openness to change and commitment to teaching improvement" (p. 256). Focusing on those dispositions as well as the actual technology skills and related pedagogy, educators can be supported through this process. This

support is critical in light of research that indicates teachers do not feel prepared to integrate technology following their college completion. Chen and Chang (2006b) emphasized how early childhood teachers are trained as generalists. Additionally, the authors advocate for a professional development approach that is ongoing as it mirrors their professional growth over their career. They maintained that these teachers need direct, specific development rather than typical training in order to more readily integrate technology. This specific support would take into account their personal growth and capacity with regard to technology.

Technology Training

Other studies corroborate what Vannatta and Fordham (2004) suggested related to a more comprehensive approach to technology training. These studies, however, were targeted toward the early childhood professional. In the first study cited above, Chen and Chang (2006a) researched a comprehensive approach to technology training for early childhood teachers whereby the areas of skill and knowledge were studied alongside teachers' attitudes and practices. Studying 175 teachers from the Head Start program with Chicago Public Schools wherein 134 participated in a 2-day introductory technology training while the remaining 41 participated in a yearlong professional development program utilizing a comprehensive approach, the researchers found that those who participated in the yearlong program

expressed more positive expectations about the educational value of computers, rated their computer knowledge and skills at higher levels, reported higher frequencies of using different methods to promote children's computer use, and

indicated more classroom practice creating computer-generated instructional materials. (p. 457)

The results of this survey are in line with those highlighted earlier from Norris et al. (2003) suggesting that teacher attitude is not, in and of itself, a barrier to technology integration. Instead, barriers arise from teachers experiencing traditional training focused on developing technology skills in isolation from developing a more comprehensive “whole teacher” approach. Reinhart et al. (2011) urged for the implementation of “robust systems of ongoing professional development” (p. 191). Advocating for an approach that is somewhat consistent to Norris et al.’s *whole teacher* approach, these authors insisted that this professional development focus on both pedagogical change as well as the support of higher-order thinking skills for students, particularly those in lower socioeconomic settings. Similarly, NAEYC (2012) advocated for professional communities of practice accompanied by in-depth, hands-on practice for early childhood educators with regard to technology (p. 12). In a study of Florida’s Leveraging Laptops Initiative by Dawson et al. (2006), the results indicated that positive changes in teaching practice related to technology integration were “a result of both the presence of one-to-one computing resources and the statewide and local professional development opportunities available to each teacher” (p. 155). Dawson et al. of this study noted the power of teacher attitude, experiences, and skills related to technology and suggest that those factors deserve as much emphasis as the actual technology being implemented.

Teacher Self-Efficacy

Seeking to find a correlation between teacher’s self-efficacy with technology and their related implementation, Dussault et al. (2004) examined the impact of teacher self-

efficacy on the integration of information technology in the classroom. Like the studies cited previously, these authors acknowledge that even with the accessibility of technology, the actual implementation in the classroom is difficult. Possible explanations for this difficulty include “omission of taking into account the values, abilities, and beliefs of the people using them” (p. 1375). In order for children to have access and exposure to developmentally appropriate technology instruction that is intentionally threaded through curriculum, teachers must demonstrate a willingness to change to some degree. Gimbert and Cristol (2004) echoed this with their premise that “calls crescendo for educators to demonstrate a sound understanding of technological knowledge and skills that resonate with curriculum” (p. 207). Sadly, the technology instruction provided through most colleges of education is focused on technology in and of itself, rather than integrating it across the curriculum. This focus on technology as a detached concept does not allow for the meaningful, intentional integration that is essential in order to obtain the maximum benefit in regard to student achievement and engagement. So, rather than learn about technology, teachers must really learn *how* to teach with technology. The difficulty then is the natural tendency to avoid change. Parette et al. (2010) cited Casey (2000) as they surmised, “Inherent in the cultural characteristics of schools is the instinctive resistance to change, resulting in the educational establishment remaining in essence unchanged since the late nineteenth and early twentieth century” (p. 338). Along with the resistance to change, teachers’ previous experiences with technology as well as generational differences in both use and implementation are important variables impacting practice. Examining the factors related to technology integration in instruction may provide indications for the greater probability of implementation. Hughes’ (2005) in-

depth case study of English Language Arts teachers indicated that “content-based technology learning leads to content-based technology pedagogy” (p. 298). Hughes also negated the common assumptions that exist suggesting that new teachers more readily integrate technology. Challenging that assumption, she contended that, “experienced teachers (who often have less technology experience) are more poised to integrate technology simply because they possess more knowledge, with which to connect” (p. 299). In other words, these experienced educators can offer the context with which to embed the technology that their new colleagues may not have solidified due to their lack of experience. The research that exists on the impact of technology professional development suggests that stand-alone technology training, focused on skill development is insufficient to ensure intentional integration. Rather, professional development coupled with hands-on, classroom-embedded practice yields richer experiences for educators. Hughes (2005) recommended collaborative, subject-specific technology inquiry groups as a vehicle to support the professional development of educators working on making the shift in pedagogy with meaningful technology integration.

Along with high-quality professional development that takes into account a teacher’s disposition toward technology as well as the experiences that she or he has had, it is important to note that the development is not necessarily a linear one. Laffey (2004) advised that the development instead be viewed through the frameworks of appropriation and mastery. He proposed that

(technology) tools mastered, but not appropriated, be appropriated for some roles in some contexts while not in others, and that it may be more useful to see

appropriation as not simply a psychological or individual stance but rather a stance within a context. (p. 363)

In other words, the rich meaningful experiences that are provided to teachers, either in their college preparation or their professional development, are the vehicle to build self-efficacy. As a result, skill mastery and later appropriation in the classroom can occur.

To date, the vast majority of studies conducted on technology implementation in the field of education have utilized surveys and case studies as their primary methodologies. Mixed methods studies are useful in this particular area since quantitatively, one can note differences in growth and implementation while qualitatively, that growth can be clarified. In the early childhood realm, observational assessments and data collection are common and could be useful instruments to gather necessary insights in order to advance what has been proposed to date regarding the developmental appropriateness of technology use.

Summary

In this chapter, a literature review was presented to provide a contextual foundation for the use of technology in early childhood. Key focus areas of the literature review included impacts and barriers that exist, an overview of the controversial nature of technology in the early childhood field, an acknowledgement of the existing digital divide, teacher attitudes toward technology, various aspects to consider regarding technology training, and finally, the impact of teacher self-efficacy on implementation. In the subsequent chapter, a description of the research design, methods, and procedures, as well as the measures taken to ensure the integrity and trustworthiness of this research, are detailed.

Chapter 3: Research Design, Methods, and Procedures

Study Design

According to Kerlinger and Lee (2000), “The most useful way to categorize variables is either as an independent or dependent variable. . . . An *independent variable* is the *presumed* cause of the *dependent variable*, the *presumed* effect” (p. 47). In the present study, the main variables are categorized in the following way: The independent variables include the age of the teacher, the years of experience a teacher has in the early childhood education field, the level of education attained by the teacher, the iPad use of the teacher, and the attitudes and beliefs related to the developmental appropriateness of technology. The level of technology implementation in the classroom is the dependent variable. Recognizing that educational research is really a form of behavioral research, identifying a bivariate design is not ideal. Instead, many other variables may be at work when studying the area of focus identified in the present study. Such examples include age of teacher, years of teaching experience, availability and access to technology in the school setting, use of technology outside of the school setting, level of education attained by the teacher, amount of technology training received, type of technology training received, and so on.

To address the multivariate nature of the area of focus identified by the researcher as well as to determine what relationship exists between the beliefs about technology of early childhood teachers and the level of integration in their classrooms, descriptive research, also known as survey research, was utilized. Kerlinger and Lee (2000) cautioned, “to account for the complex psychological and sociological phenomena of education requires design and the analytic tools which are capable of handling the

complexity that manifests itself above all in multiplicity of independent and dependent variables” (pp. 208-209). Creswell (2008) defines survey research design as “procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviors, or characteristics of the population” (p. 388). The survey methodology employed with this study consisted of a questionnaire that addressed the independent variables, teacher beliefs and demographics, as well as the dependent variable, level of technology implementation. The additional independent variables that were identified were included in the questionnaire through which data were sought related to these variables including teacher age, years of experience, type of program, and the amount of technology training received. This survey questionnaire was intended to assess teachers’ attitudes about technology integration, their current practices with technology in the classroom, and their beliefs about developmentally appropriate practice related to technology. Given at the beginning of the study, the survey method was selected due to its ability to generate data regarding teachers’ beliefs, behaviors, attitudes, and demographics in an efficient manner. In depth, semi-structured, one-on-one interviews followed the survey administration to invoke additional qualitative data to further inform the survey results.

The current study employed a cross-sectional survey design. According to Creswell (2008), this design required the collection of data at a single point in time. It included the attitudes, beliefs, and opinions of the early childhood teachers (preschool-kindergarten) in the WSESD region regarding the integration of technology. This data may be different from the teachers’ actual practices and in order to carry out a robust study, qualitative data regarding these practices was also sought. The inclusion of both

the quantitative survey data as well as the qualitative interview data resulted in this study employing mixed methods. Creswell (2008) claimed, “The basic assumption is that the use of both quantitative and qualitative methods, in combination, provides a better understanding of the research problem and questions than either method by itself” (p. 552).

The survey was disseminated to the early childhood teachers (preschool-kindergarten) at the end of December, 2013. During this time, one of the districts comprising the sample had launched a district-wide 1:1 iPad initiative as a result of a technology bond that was passed in the spring of 2012. Teachers in this particular district were expected to integrate technology during the course of the year while attending further professional development opportunities. An emphasis on technology was evident in other districts in the sample as well with iPad carts available in several of the early childhood centers as well as newer technology tools integrated in the classrooms.

Semi-structured one-on-one interviews were conducted to gather the qualitative data for the study. The interviewees were early childhood (preschool-kindergarten) teachers that contacted the researcher and suggested they had additional data to share regarding technology implementation. In these interviews, data were gathered regarding the teachers’ beliefs and current practices.

By employing survey research alongside semi-structured one-on-one interviews, the researcher hoped to gather qualitative data that could assist in explaining the quantitative results. This research design is what Creswell (2008) referred to as an explanatory mixed methods design or a two-phase model. “The rationale for this approach is that the quantitative data and results provide a general picture of the research

problem; more analysis, specifically through qualitative data collection, is needed to refine, extend, or explain the general picture” (Creswell, 2008, p. 560).

The study analyzed the related data utilizing descriptive statistics including measure of central tendency (mean, median, and mode) as well as measures of variability (variance, standard deviation, and range). Inferential statistical methods were also utilized to test the researcher’s hypotheses, including (a) a teacher’s positive belief/attitude about technology in early childhood will result in increased integration in their classroom and conversely, and (b) a teacher’s belief/attitude that technology is not developmentally appropriate will result in a reduced implementation in their classroom.

In addition to descriptive and inferential statistics, the design necessitated the use of multiple regression techniques when analyzing the data collected in the survey questionnaires. This technique “analyzes the common and separate influences of two or more independent variables on a dependent variable” (p. 209). It is a “method for studying the effects and the magnitudes of the effects of more than one independent variable on one dependent variable, using principles of correlation and regression” (Kerlinger & Lee, p. 755). Since the integration of technology in early childhood classrooms is a complex phenomenon, utilizing the multivariate method of multiple regression that recognizes this complexity seemed logical. The data were analyzed in a two-step fashion whereby the first step involved analyzing all five independent variables collectively. In other words, did the five independent variables together help to explain the varying levels of implementation? The final step of analysis using the multiple regression technique considered each independent variable in isolation to determine if they were indicators on their own.

To analyze the qualitative data that were collected, they were digitally recorded and transcribed for review. Using Atlas ti.7, the data were analyzed, coded, and themes were sought. The initial codes used were based on the research questions of the study as well as the open-ended questions in the survey and included *demographics*, *attitudes*, *beliefs*, and *barriers*. This qualitative data provided an element of description regarding the degree to which technology was being implemented in the participants' settings. The Word document that was created with the participants' answers to the open-ended survey questions was downloaded into the Atlas ti.7 qualitative analysis software and subcodes were developed for the initial codes that were predetermined based on the research questions and survey questions. Collectively, those codes and subcodes illustrated the emerging themes.

Survey Research

The research instruments utilized were an electronic questionnaire included in Appendix A. The survey in Appendix A was authored by Derscheid (2003). Permission was granted from the author to utilize and modify the survey on July 22, 2013. Creswell (2008) asserted, "Designing good survey instruments is a challenging and complex process" (p. 397). As such, an existing tool was selected with permission granted from the author. In addition to the electronic survey that was administered, semi-structured one-on-one interviews were conducted with participants utilizing the questions in Appendix B.

Participant Selection

The sample studied consisted of early childhood teachers in grades preschool-kindergarten employed in the WSESD region ($N = 75$). This sample included teachers

from the following districts: Baldwin, Hart, Ludington, Mason County Central, Mason County Eastern, Pentwater, Shelby, and Walkerville. This sample of convenience was selected by the researcher based on her knowledge of the region having served as the General Education Services Coordinator and Early Childhood Specialist for WSESD.

The participants and their districts lent themselves to purposive sampling which, according to Krathwohl, “is most often used in qualitative research to select those individuals or behaviors that will better inform the researcher regarding the current focus of the investigation” (p. 172). Ludington Area Schools was able to secure the resources necessary to mobilize a 1:1 K-12 initiative for the 2013-2014 school year through the passing of a technology bond. As such, there was a district expectation that technology is infused in every classroom after having spent a year piloting various technology configurations in pilot classrooms across the grade levels. In addition, there have been additional technology pilots occurring across the three county regions being studied. Mobile iPad labs are available in most early childhood buildings as well.

The choice to employ the survey questionnaire method in conjunction with the semi-structured one-on-one interviews was made for a number of reasons. First, the sample was readily available. The researcher interacted with the region in the course of her professional position. Secondly, there was interest on the part of district leadership to better understand the implications of the technology integration, especially in the early grades as work was being done to better prepare students for the online assessments of the future. Finally, it is clear that the story of the phenomena of interest here may not be fully told through quantitative data. Instead, the semi-structured one-on-one interviews provided data that were shared with the researcher as themes were sought across the data

set. As the interviews were conducted, the researcher monitored for saturation. In other words, at a point along the research and interview process, the researcher began to hear similar things mentioned. According to Seidman (2013), the saturation point is “a point in a study at which the interviewer begins to hear the same information reported ... no longer learning anything new” (p. 58). Seidman (2013) concluded,

The method of in-depth, phenomenological interviewing applied to a sample of participants who all experience similar structural and social conditions gives enormous power to the stories of a relatively few participants...At some point, however, the interviewer may recognize that he or she is not learning anything decidedly new and that the process of interviewing itself is becoming laborious rather than pleasurable (Bertaux, 1981). That is a time to say enough. (p. 59).

To date, the vast majority of studies conducted on technology implementation in the field of education have utilized surveys and case studies as their primary methodologies. Mixed methods studies are useful in this particular area since quantitatively, one can note differences in growth and implementation while qualitatively, that growth can be clarified. In the early childhood realm, observational assessments and data collection are common and are useful instruments to gather necessary insights in order to advance what has been proposed to date regarding the developmental appropriateness of technology use.

Ethical Considerations

In any study involving human participants, ethical considerations must be taken regarding the data that are collected as well as the methods employed to collect it. In attending to these necessary considerations, the researcher worked with the University's

IRB committee to develop an informed consent form for participants through which the study and its potential implications were outlined. The informed consent was provided through the electronic survey and required participants to sign off on it by clicking prior to advancing to the first survey item. Participants were advised that their participation was completely voluntary and no adverse consequences would be experienced should they decline to participate. Further, the informed consent documents were shared with the participating teachers in the interview process to ensure they were fully aware of the study's intent. Prior to administering the survey, the researcher shared the informed consent document with the Superintendents responsible for each local district represented in the WSESD region so they were fully informed of the study's purpose and goals as well.

In addition to informed consent, confidentiality was attended to. Participants were advised that their responses would be kept confidential on the researcher's password protected computer and that pseudonyms would be assigned to them if they chose to participate in the semi-structured interviews. Finally, participants were advised that their responses to the survey would be presented in aggregate form only and that all materials related to the data collection would be destroyed upon completion of the study to further protect their confidentiality.

Delimitations and Limitations of the Study

A delimitation of the study is that data were collected in the middle to the end of the 2013-2014 school year. Being time bound, the data gathered at a point in time might not be the same as data gathered at another point in the school year. Additionally, this study was only used to research the beliefs, attitudes, and technology implementation of

early childhood (preschool-kindergarten) teachers in the WSESD region. The level of access to technology, both in the school and in the home setting, can vary dramatically from region to region as well as the level of emphasis and focus placed upon the inclusion of technology in instruction, thereby necessitating this delimitation.

Limitations of the study include the use of a survey questionnaire and the related issue with return rate. Additionally, a possible limitation is the fact that one of the schools included in the sample is a district that had recently passed a technology bond. Due to new resources being appropriated for technology specific activities and training, the research findings might have been influenced in this particular district. Including the other seven districts, each with varying degrees of technology access and focus, was the researcher's attempt at making the research findings more generalizable. Finally, the researcher's presence in the semi-structured interviews as well as the self-reporting that was involved both in the survey questionnaire as well as the interview process were possible limitations.

Chapter 4: Results

Introduction

In this study, teacher self-efficacy informed by their beliefs and attitudes regarding technology use was examined. In other words, data from the sample of teachers were analyzed to determine the degree to which those educators felt comfortable and confident with the infusion of technology in their pedagogy and practice. Surveys from 41 teachers as well as semi-structured interviews with six participating teachers were used in this study. This study sought to research the following questions:

Research Question 1: Is there a relationship between the beliefs and attitudes of preschool and kindergarten teachers related to the developmental appropriateness of technology and the level of implementation of technology in the classroom?

Research Question 2: Is there a relationship between the demographics of preschool and kindergarten teachers and their beliefs and attitudes related to the developmental appropriateness of technology?

Research Question 3: Is there a relationship between the level of implementation of technology in preschool and kindergarten classrooms and the demographics of the teachers?

Table 1 displays the frequency counts for selected variables in the teacher sample ($N = 41$). Almost all of the teachers were female (92.7%). Years in early childhood education ranged from “1 year or less (9.8%)” to “21+ years (14.6%)” with the median number of years in early childhood education being 8. The ages of the teachers ranged from “21-29 years (12.2%)” to “60 or older (2.4%)” with the median age being 44.50 years old. Most teachers (92.7%) indicated that their students used iPads, and 87.8% of

the teachers used iPads themselves. Most of the sample had either a bachelor's degree (46.3%) or a master's degree (46.3%). Three-quarters of the teachers (75.6%) had taken computer training and all but one teacher (97.6%) had their own personal computer. Additionally, 88% had an iPad available for their personal or professional use. The number of iPads in the classroom ranged from "none (19.5%)" to "every child has one (12.2%)" with the median number of iPads in the classroom being two. The number of students in the classroom ranged from "13-15 (7.3%)" to "25 to 30 (9.8%)" with the median being 17.50 students per classroom. Computer/iPad usage ranged from "less than daily usage (39.0%)" to "over 30 minutes daily (7.3%)" with the median amount of usage being 7.50 minutes per day. The frequency of usage ranged from "1 day per week (22.0%)" to "over 3 days per week (29.3%)" with the median usage being 2 days per week. Thirty-two percent reported that their school/center had technology guidelines and about two thirds of the teachers (68.3%) reported that they were familiar with their school's/center's technology standards and expectations (Table 1).

Table 1

Frequency Counts for Selected Variables (N = 41)

Variable	Category	<i>n</i>	%
31. Gender	Female	38	92.7
	Male	3	7.3

Table 1 *Continues*

34. Years in Early Childhood ^a

1 year or less	4	9.8
2-5 years	10	24.4
6-10 years	9	22.0
11-15 years	7	17.1
16-20 years	5	12.2
21+ years	6	14.6

35. Age ^b

21-29	5	12.2
30-39	14	34.1
40-49	12	29.3
50-59	9	22.0
60 or older	1	2.4

^a Years: *Mdn* = 8 years.

^b Age: *Mdn* = 44.50 years old.

Variable	Category	<i>n</i>	%
<hr/>			
36. Student iPad use			
	Yes	38	92.7
	No	3	7.3
37. Teacher iPad use			
	Yes	36	87.8
	No	5	12.2
38. Education completed			
	Associate's degree	2	4.9
	CDA credential	1	2.4
	Bachelor's degree	19	46.3
	Master's degree	19	46.3
39. Computer training			
	Yes	31	75.6
	No	10	24.4
41. Own personal computer			
	Yes	40	97.6
	No	1	2.4

Variable	Category	<i>n</i>	%
42. Computer/iPad use - Own iPad	Yes	36	87.8
	No	5	12.2
45. iPads in classroom ^c	None	8	19.5
	1 iPad	9	22.0
	2 iPads	5	12.2
	3 or more	14	34.1
	Every child has one	5	12.2
46. Students in classroom ^d	13 to 15	3	7.3
	16 to 19	24	58.5
	20 to 24	10	24.4
	25 to 30	4	9.8

^c iPads: *Mdn* = 2 iPads.

^d Students: *Mdn* = 17.50 students.

Variable	Category	<i>n</i>	%
48. Computer/iPad use time by students ^e	Less than daily usage	16	39.0
	5-10 minutes daily	6	14.6
	11-15 minutes daily	8	19.5
	16-20 minutes daily	5	12.2
	21-30 minutes daily	3	7.3
	Over 30 minutes daily	3	7.3
49. Computer/iPad use frequency by students ^f	1 day per week	9	22.0
	2 days per week	16	39.0
	3 days per week	4	9.8
	Over 3 days per week	12	29.3

^e Time: *Mdn* = 7.50 minutes daily. ^f Students: *Mdn* = 2 days a week.

Variable	Category	<i>n</i>	%
51. School/center technology guidelines	Yes	13	31.7
	No	28	68.3
52. Familiar with technology standards and expectations	Yes	28	68.3
	No	13	31.7

Table 2 displays the descriptive statistics for the 28 attitude / belief items related to the developmental appropriateness of technology. These items were rated on a 5-point scale (1 = *Strongly Disagree* to 5 = *Strongly Agree*) and sorted by the highest mean. Most agreement was for item 21, “If new computer technology was available at my school/center, I would be interested in learning to use it ($M = 4.37$)” and item 22, “I have a desire to include iPads in my classroom ($M = 4.34$).” Lowest levels of agreement were for item 19, “Preschooler’s computer use should be primarily without teacher assistance ($M = 2.41$)” and item 3, “iPads should be introduced to 0-2 year olds ($M = 2.46$)” (see Table 2).

Table 2

Descriptive Statistics for Attitudes/Beliefs Related to the Developmental Appropriateness of Technology Sorted by the Highest Mean (N = 41)

Survey item	<i>M</i>	<i>SD</i>
21. If new computer technology was available at my school/center, I would be interested in learning to use it.	4.37	0.70
22. I have a desire to include iPads in my classroom.	4.34	0.91
4. iPads make learning fun for preschool and kindergarten children.	4.32	0.79
27. Developmentally appropriate practice can occur using iPads in preschool.	4.10	0.77
26. I feel comfortable working with iPads.	4.07	0.85
28. Children benefit from their experiences with technology beginning in preschool.	4.00	0.87
20. I know how iPads can be used to teach reading skills.	3.98	0.72
15. A computer learning center should be part of a preschool or kindergarten classroom.	3.95	1.07
29. Students can use the iPad for self-directed learning.	3.90	0.83
10. I know how iPads can promote children's learning through play.	3.90	0.62
6. Integrating computer experiences and learning opportunities is an important part of the preschool classroom.	3.90	0.92

Note. Ratings based on a 5-point metric: 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

Survey item	<i>M</i>	<i>SD</i>
12. iPads should be introduced at the preschool level.	3.90	0.83
23. I know how iPads can be used to teach writing skills.	3.88	0.71
5. Preschool children should learn to use iPads.	3.88	0.81
18. I know the extent to which iPads can support preschool teachers in their professional work.	3.83	0.89
16. I know how to identify developmentally appropriate software or apps.	3.73	0.87
24. I feel I need more training in the use of iPads.	3.56	1.21
13. I know how iPads can be used to teach preschoolers oral language skills.	3.56	0.78
8. I am knowledgeable about the extent to which iPads should be used as learning tools in preschool classrooms.	3.51	0.84
7. Computer instruction should have high priority in the school's/center's budget.	3.49	1.00
9. I am knowledgeable about the extent to which preschool teachers should learn to use iPads.	3.41	0.81
30. The introduction of the iPad frees the teacher to be more facilitative in his/her instruction.	3.39	0.83

Note. Ratings based on a 5-point metric: 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

Survey item	<i>M</i>	<i>SD</i>
25. I feel I need more training on choosing what is developmentally appropriate software or apps.	3.37	1.09
11. I am knowledgeable about the extent to which iPads can be used to promote preschoolers' creativity.	3.29	0.84
14. I know how iPads can be used to teach social skills.	3.12	0.93
17. iPads should be first introduced in the primary grades.	3.12	1.10
3. iPads should be introduced to 0-2 year olds.	2.46	1.12
19. Preschooler's computer use should be primarily without teacher assistance.	2.41	1.09

Note. Ratings based on a 5-point metric: 1 = *Strongly Disagree* to 5 = *Strongly Agree*.

Table 3 displays the 14 survey items that were used to develop the level of implementation scale. Eighteen items were originally considered for inclusion in the scale (items 36, 37, 44a-44e, and 47a-47k). The 14 items that remained in the scale had the following characteristics: (a) were dichotomous; (b) had positive intercorrelations with virtually all of the other items; and (c) had a corrected item-total correlation of at least $r = .20$. The resulting Cronbach alpha reliability coefficient for the 14-item scale was $\alpha = .81$. For the 14 implementation items, the highest frequency of occurrence was for Item 47d, "Technology Integration - Educational Games/Apps (82.9%)" and Item 44e, "More than one iPad available (73.2%)." The least commonly implemented items were

item 44d, “iPad - 1:1 Child to Device Ratio (17.1%)” and item 47b, “Technology Integration - Simulations (17.1%)” (see Table 3).

Table 3

Frequency Counts for Level of Implementation Scale Variables Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
47d. Technology integration - Educational games/qpps	34	82.9
44e. More than one iPad available	30	73.2
47j. Technology integration - Individual student use	26	63.4
47h. Technology integration - Small group	25	61.0
47g. Technology integration - Presentation	23	56.1
47f. Technology integration - Direct Instruction	23	56.1
44a. iPad - Classroom setting	21	51.2
44c. iPad - Mobile cart with checkout	16	39.0
47a. Technology integration - Drill and practice	15	36.6
47i. Technology integration - Partner work	14	34.1
47e. Technology integration - Remediation	13	31.7
47c. Technology integration - Rewards	13	31.7
47b. Technology integration - Simulations	7	17.1
44d. iPad - 1:1 Child to device ratio	7	17.1

Table 4 displays the frequency counts for teaching role variables. The most common teaching roles were “lead teacher (85.4%)” and “center director (12.2%)” (Table 4).

Table 4

Frequency Counts for Teaching Role Variables Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
32a. Lead teacher	35	85.4
32c. Center director	5	12.2
32b. Assistant teacher	2	4.9
32d. Principal	1	2.4
32e. Other role	0	0.0

Table 5 displays the frequency counts for the types of students taught. The most common were “kindergarten (46.3%)” and “teach 4 year olds (31.7%)” (Table 5).

Table 5

Frequency Counts for Type of Student Taught Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
33c. Teach kindergarten		
33b. Teach 4 year olds		
33d. Teach great start readiness		

33a. Teach 3 year olds

33e. Teach head start

33f. Teach special education

Table 6 displays the frequency counts for teacher training variables. The most common were “in-service training (46.3%)” and “self-taught (39.0%)” (Table 6).

Table 6

Frequency Counts for Teacher Training Variables Sorted by the Highest Frequency (N = 41)

Survey Item	<i>n</i>	%
40c. Computer training - In-service training	19	46.3
40e. Computer training - Self-taught	16	39.0
40a. Computer training - 4 year college/university	9	22.0
<i>Table 6 Continued</i>		
40b. Computer training - Community college	8	19.5
40d. Computer training - Computer store	2	4.9

Table 7 displays the frequency counts for how the teacher used the iPad. The most common were “searching the Internet (90.2%)” and “word processing (90.2%)” (Table 7).

Table 7

Frequency Counts for Variables Pertaining to How the Teacher Used the iPad Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
43d. Computer/iPad use - Searching the Internet	37	90.2
43a. Computer/iPad use - Word processing	37	90.2
43c. Computer/iPad use - Educational games/apps	35	85.4
43f. Computer/iPad use - Social media	31	75.6
43e. Computer/iPad use - Presentations	24	58.5
43b. Computer/iPad use - Spreadsheets	23	56.1

Table 8 displays the frequency counts for variables pertaining to the way iPads were available in school. The most common were “classroom setting (51.2%)” and “mobile cart with checkout (39.0%)” (Table 8).

Table 8

Frequency Counts for Variables Pertaining to the Ways iPads were Available in the School

Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
44a. iPad - Classroom setting	21	51.2
44c. iPad - Mobile cart with checkout	16	39.0

44e. iPad - Only 1 available to use for teachers and students	11	26.8
44d. iPad - 1:1 Child to device ratio	7	17.1
44b. iPad - Lab setting	4	9.8

Table 9 displays the frequency counts for variables pertaining to how technology was integrated. The most common were “educational games/apps (82.9%)” and “individual student use (63.4%)” (Table 9).

Table 9

Frequency Counts for Variables Pertaining to How Technology was Integrated Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
47d. Technology Integration - Educational games/apps	34	82.9
47j. Technology integration - Individual student use	26	63.4
47h. Technology integration - small group	25	61.0
47g. Technology integration - Presentation	23	56.1
47f. Technology integration - Direct instruction	23	56.1
47k. Technology integration - Assessment	18	43.9
47a. Technology integration - Drill and practice	15	36.6
47i. Technology integration - Partner work	14	34.1
47e. Technology integration - Remediation	13	31.7
47c. Technology integration - Rewards	13	31.7
47b. Technology integration - simulations	7	17.1

Table 10 displays the frequency counts for variables pertaining to additional training needs. The most common were “in-service training (75.6%)” and “in-class instructor (58.5%)” (Table 10).

Table 10

Frequency Counts for Variables Pertaining to Additional Training Needs Sorted by the Highest Frequency (N = 41)

Survey item	<i>n</i>	%
50c. Want technology training at an in-service	31	75.6
50b. Want technology training with in-class instructor	24	58.5
50a. Want technology training online	14	34.1

Table 11 displays the psychometric characteristics for the three summated scale scores. The three scores, developmental appropriateness ($M = 3.67$), level of implementation ($M = 6.51$) and number of personal iPad uses ($M = 4.56$), all had acceptable levels of internal reliability (Table 11). According to Krathwohl (2009), “Internal consistency refers to the consistency with which all items measure the same thing” (p. 414). This table is useful in illustrating the consistency of measurement and demonstrates to what extent participants gave similar responses since $\alpha \geq 0.81$.

Table 11

Psychometric Characteristics for the Summated Scale Scores (N = 41)

Scale score	Number					
	of items	<i>M</i>	<i>SD</i>	Low	High	α
Developmental appropriateness	28	3.67	0.48	2.14	4.46	.91
Level of implementation	14	6.51	3.49	0.00	14.00	.81
Number of personal iPad uses	6	4.56	1.78	0.00	6.00	.82

Research Questions

Research Question 1 asked, “Is there a relationship between teachers’ beliefs/attitudes related to the developmental appropriateness of technology and the level of implementation of technology in the classroom?” To answer this question, Table 12 displays the Spearman rank-ordered correlation between the two variables. A Spearman correlation was used instead of a more common Pearson correlation due to the small sample size ($N = 41$). Inspection of the table found the correlation not to be significant ($r_s = .21, p = .18$) (see Table 12).

Table 12

Spearman Rank-Ordered Correlations for Selected Variables with the Developmental Appropriateness Scale and the Level of Implementation Scale ($N = 41$)

Variable	Appropriateness	Implementation
Developmental appropriateness scale	1.00	
Level of implementation scale	.21	1.00
35. Age	-.17	.11
34. Years in early childhood education	-.05	.28 *
38. Education completed	.06	.12
Number of personal iPad uses scale	.50 ***	.36 **

* $p < .10$. ** $p < .05$. *** $p < .001$.

Research Question 2 asked, “Is there a relationship between teachers’ beliefs/attitudes related to the developmental appropriateness of technology and the teachers’ demographic characteristics?” To answer this question, Table 12 displays the

Spearman rank-ordered correlations for the developmental appropriateness scale and four demographic variables (age, years of early childhood education experience, completed education, and the number of personal iPad uses scale). Only the correlation between the developmental appropriateness scale and the number of personal iPad uses scale was significant, ($r_s = .50, p = .001$; see Table 12).

Research Question 3 asked, “Is there a relationship between the teachers’ level of implementation of technology in the classroom and the teachers’ demographic characteristics?” To answer this question, Table 12 displays the Spearman rank-ordered correlations for the level of implementation scale and the four demographic variables (age, years in early childhood education, completed education, and the number of personal iPad uses scale). Level of implementation tended to be higher for teachers with more years of experience ($r_s = .28, p = .08$) but was significantly higher for teachers who used the iPad in more personal ways ($r_s = .36, p = .02$; Table 12).

Additional Findings from the Teacher Survey

As an additional analysis, Table 13 displays the results of the multiple regression model predicting the level of implementation based on the four demographic variables (age, years in early childhood education, completed education, and the number of personal iPad uses scale) and the developmental appropriateness scale. The full model was significant ($p = .005$) and accounted for 37.0% of the variance in the dependent variable. Inspection of the beta weights found the level of implementation to be higher for teachers with more years of early childhood educational experience ($\beta = .35, p = .04$) and more different personal iPad uses ($\beta = .59, p = .001$). In addition, the developmental

appropriateness scale was not related to the level of implementation ($\beta = -.05, p = .76$) (see Table 13).

Table 13

Prediction of Level of Implementation Based on Selected Variables (N = 41)

Variable	<i>B</i>	<i>SE</i>	β	<i>p</i>
Intercept	-3.38	4.93		.50
35. Age	0.29	0.55	.09	.60
34. Years in early childhood education	0.77	0.37	.35	.04
38. Education completed	0.42	0.63	.09	.51
Number of personal iPad uses scale	1.16	0.31	.59	.001
Developmental appropriateness scale	-0.33	1.08	-.05	.76

Full Model: $F(5, 35) = 4.11, p = .005, R^2 = .370$.

Results of the Open-Ended Survey Questions

To provide further depth and substance to the quantitative data, semi-structured interviews with six teachers responsible for either preschool or kindergarten in the WSESD region were conducted. In addition, the responses from the open-ended questions 53-60 on the survey were analyzed. Those questions included:

Q53: At what age should children start using the computer or iPads in the classroom?

Q54: Please share your thoughts regarding technology in early childhood.

Q55: Please explain how you utilize developmentally appropriate practice in your classroom when you integrate technology.

Q56: Has the iPad impacted the way you teach? If so, how?

Q57: Has the iPad impacted the way your children learn? If so, how?

Q58: Please share the success you have had implementing technology in your

classroom.

Q59: Please share your concerns regarding technology in early childhood classrooms.

Q60: What barriers exist when implementing technology in early childhood settings?

The initial survey results were compiled in an Excel document that was later modified into a Word document. The Word document that was created with the participants' answers to the open-ended survey questions was downloaded into Atlas ti.7 qualitative analysis software and subcodes were developed for the initial codes that were predetermined based on the research questions and open-ended survey items. Collectively, those codes and subcodes illustrated the emerging themes.

Regarding the open-ended survey questions, there were 41 responses provided; however, the only question that was answered by everyone was Q53: At what age should children start using the computer or iPads in the classroom? Nearly 35% of the survey respondents left at least one open-ended question blank. Furthermore, 7 participants left all questions unanswered except for Q53. This particular question focused on the age demographic which was one of the initial codes identified. The survey responses for Q53 had a range in age from 2.5 years to fifth grade. Most respondents felt that the ages of 3 or 4 were most appropriate for children to start using iPads or computers. There were some participants who identified the start of kindergarten was the time children should begin using this technology. Four survey participants indicated a child should be at a certain developmental age, yet they did not allude to a method or tool to determine that developmental readiness. For example, one participant suggested, "At any age that the child can understand to be responsible for materials that belong to others." Another related remark was, "I believe computers and iPads can be integrated into the classroom as early as possible as long as they are used as a resource, guided by teachers, and used in

a developmentally appropriate manner.” Finally, a participant remarked, “Preschool-age at very limited amounts of time and with monitoring and interaction from teaching staff.” Based upon the themes that emerged in the analysis of the interview data and the open-ended survey responses, the following results are offered.

The second code that was analyzed was attitude. The responses to two survey items, Q56: Has the iPad impacted the way you teach? If so, how? and Q57: Has the iPad impacted the way your children learn? If so, how?, were examined and revealed two opposing themes. The first theme resulted from teachers who indicated the iPad was a great tool for lessons or assessment. One participant revealed, “Yes, the children are more engaged with learning and are more willing to take chances.” Regarding the use of an iPad for assessment purposes, one teacher replied, “I often use the iPad for assessment purposes which has been wonderful. I just wish I had another for the children to use while I am assessing.” Similarly another response,

Yes, I have definitely learned a lot more about the iPad, and have shared that knowledge with the students. I have also used the iPad for my anecdotal notes. I have used it to share pictures (of students and activities) with parents at conferences as well.

In addition to the focus on using the iPad for assessment, another teacher noted the usefulness of the device for lessons,

I have found that preschoolers learn through their senses, and a majority of young children are strong visual learners. Using the iPad allows more visuals to take place in the classroom. It also helps to broaden the children’s view of cultures.

The opposing theme arose from teachers who felt the iPad had not impacted the way they teach as they answered no to Q56. One participant simply responded, “No,” to Q56 with no explanation. Similarly, another replied, “No, I haven’t seen any difference in students from our preschool that have used iPads and those that haven’t.” Lack of access appeared to be an issue to some participants as indicated by their responses. “No, we don’t have them available unless they are our own personal iPad.” Another response, “My own personal children, yes, not my classroom children, due to lack of access.” Finally, a fifth participant suggested, “No I don’t use them. They are used during specials with the special teacher only.” Some teachers were not receptive to the use of an iPad and still others used the device to make their assessments or their lesson planning easier and more organized. The analysis indicated that the teachers who felt the iPad did not work well in the classroom were more likely to have access only to a single iPad. This device was most often used for their administrative work in the classroom doing things like assessment or anecdotal note-taking. Four teachers indicated they use their own personal iPad in the classroom in order to have access to one.

The third code that was analyzed involved both beliefs and barriers. The survey responses to Q58: Please share the success you have had implementing technology in your classroom, Q59: Please share your concerns regarding technology in early childhood classrooms, and Q60: What barriers exist when implementing technology in early childhood settings? were analyzed. Regarding the code focused on teacher beliefs, one participant identified both a success and barrier in her response, “It has been a tough road but the kids just love using the iPads and keep asking for more ways to use them in the classroom. It has been a

culture shift.” Another teacher illustrated the value of the device for struggling students,

Children that have been struggling with specific content often find the games on the iPad fun and easy to use. I often see these skills improve after using the learning apps on the iPad. They are playing while being exposed to these key concepts.

Another participant’s response illustrated the connection that is possible between school and home with technology,

The children now ask to use the iPad, and they ask to look up certain criteria when we are talking about a new topic or theme and are engaged when shown that presentation. I have had families send in emails with new pictures of pets, and we were able to show those pictures to the preschoolers on the iPad. There is a new respect for the device, and the children are teaching one another social skills since we only have 1-2 iPads per classroom. During work time, the children work independently on the iPads choosing different apps that are in a specific location for the week.

Finally, a respondent shared her belief about the willingness of children to take more risks,

When I have used the class set of iPads, all of the children used them for their writer’s workshop. They loved the ability to stretch through and write words without worrying about forming the letters. They were more willing to take risks with their writing.

Focusing specifically on the code that was identified as barriers, the survey respondents held differing opinions. The similarity of most respondents was their identification of funding as a barrier. The participants acknowledged there were districts where funding was not an issue and others that certainly had that barrier.

For our district, I would identify budget and priority as barriers. The district administration has not had the equipment or the time to provide our program with technology or age-appropriate technology training. The district's priority lies with getting technology to their older students (rightly so). We have an awesome piece of technology, a Promethean board, sitting in our classroom that we cannot use because we lack the training.

Another participant indicated their district had resources for technology, yet acknowledged her colleagues who may not,

Sometimes funding, although not for us. I feel we are fortunate to have strong technology leadership in our district. Funding for others could be an issue. I also see that seasoned staff, not all, but some, are not as comfortable with technology and need more technology skills.

The lack of access was again identified in a response to Q59 and Q60,

As stated above, not having enough iPads has been a challenge, especially when we are doing assessments. Preschoolers are not known for having a vast amount of patience, so explaining that they have to wait for their turn is sometimes a struggle.

Even when access is not the issue, there was concern raised about the ongoing expense of maintaining technology,

I would say initial cost and then replacement cost. A few years ago I wrote a grant for netbooks. We were awarded the grant and purchased four. Unfortunately, they were not heavy duty ones and after 4-5 years of preschool use, two had broken screens and two had broken hinges, not to mention that the software is outdated. I worry about iPads as well, as the glass covers can be easily broken and it seems like a new model comes out every year.”

Furthermore, even when access is not the issue, teachers identified a lack of training as a barrier that prevents the full implementation of the technology they do have. A participant suggested the need for, “Training on how to effectively use technology in a creative way, time to learn how to use technology in a developmentally appropriate way, knowing how to "fix" problems that arise.” Still another confided, “I believe the biggest barrier is my own limited knowledge. There are so many things I know could be done on the iPad or using the interactive display and yet I lack the know how.” Finally, a participant summarized barriers that exist, “Availability of the technology, lack of in-service training, and time to search out and find apps that will reinforce the necessary skills.”

A belief that resonated in the survey analysis that could be a potential barrier for some was the concern regarding the impact of technology on the development of social skills with children. Teachers referenced that children could be engaged on the iPad without relating to one another. When identifying concerns on the survey, one respondent specifically mentioned, “Social skills and learning how to get along with each other.” Two teachers responded that there is

no additional staff available to assist children as they work with technology. One teacher commented,

(I am) concerned it will be used as a sole means of "instruction" in early childhood. The students can hop to different apps when they feel like it so are they really learning anything by sticking with a topic or jumping around?

Another shared these concerns, "Time and the lack of adults to assist in the technology area. Children tend to push wrong buttons and freeze them up. Then a teacher can't interact with others because she/he is tied up in this area."

The overall analysis of the open-ended survey responses seemed to reveal a clear division between districts that have access to technology and those who do not based on a perceived unequal distribution of funding or focus on technology in the classroom. Even in districts where technology was available, there were concerns about teachers struggling with the integration of it due to lack of training. Additionally, participants underscored the importance of the teacher facilitating the learning and guiding the use of the technology tools.

Results of the Qualitative Interviews

The researcher conducted semi-structured in-depth interviews with six teachers—one male and five females. Interestingly, the gender representation in this study closely mirrors that of teachers in early childhood education where the majority is certainly female. All six of the teachers interviewed shared that they were experienced early childhood educators. Before entering the data into the qualitative software, the interviews were digitally recorded and transcribed. Through the transcription process, the researcher

read through the interviews listening for potential codes and emerging themes. The data were downloaded into Atlas ti 7 after codes based on the research were entered into the database for sorting. The analysis was based on research Question 1, which asked, *Is there a relationship between the beliefs and attitudes of preschool and kindergarten teachers related to the developmental appropriateness of technology and the level of implementation of technology in the classroom?* Reflecting on the qualitative responses to Questions 53-60 on the survey, teachers had identified their perceived barriers as well as the need for additional training to integrate the technology (iPads) effectively. Additionally, some of the survey participants expressed concern that technology would be used too much and could potentially exclude essential tactile skill building with their young students. In the context of what research question 1 was asking as well as the similar responses that were shared through the open-ended survey questions, the researcher used the codes *attitudes, beliefs, implementation, acceptance, developmental appropriateness, technology, classroom, funding, and technology support* to analyze the qualitative data in the interviews. Those codes and their subcodes were developed into four families, which later led to the development of four themes out of the collected data. The themes that emerged were (a) developmentally appropriate use of technology, (b) technology support system in place, (c) beliefs about impact of technology on students and teachers' instruction, and (d) the use of iPads in early education classrooms.

Theme 1: Developmentally Appropriate Use of Technology

Most of the teachers who were interviewed felt that iPads could be used in developmentally appropriate ways in the early childhood classroom. The teachers offered

context for their responses identifying necessary aspects to have in place in order for the use to be considered developmentally appropriate.

Um, I think it is definitely developmentally appropriate if it's used effectively.

Our kids now have to use to that type of technology, whether they have it at home, or their parents have it on their phone, or- there's so many well-developed apps out there that can definitely enhance their learning. Again, it's just a balance of, is the program correct? And you really have to take the time to research the program and make sure it's addressing the skill that you want and it's not just kind of busy work for that student. (P4)

Another interviewee alluded to the necessity of considering what access children have in their home environments when integrating technology in the classroom.

I had to integrate it slowly because some of these children are coming from homes that have never had an iPad in there or a computer. They may have a smart phone. You kind of figure out what they have first and then slowly introduce the iPads. You introduce apps that take them along and teach them as well about how to use the technology, right from the get go, I did use the interactive white board by getting them to come up with the baton and click on a number or drag a word across the board or a letter. Um, my calendar is completely on the whiteboard now. I don't have a calendar station in my room. (P2)

Another teacher shared her belief that the iPad can be developmentally appropriate, "I see it as a huge gain if it's developmentally appropriate and the person that is in lead of it is knowledgeable about what it's intention should be using it with the kids." (P6)

Even though the teachers acknowledged the potential for iPads to be used in a developmentally appropriate manner, they also reinforced concerns regarding essential activities and experiences in the early childhood classroom and their desire to not see those replaced by technology.

I think again, as long as it's used in a manner that helps with development and that kind of thing, I think it's okay. But I wonder with the one-to-one how closely supervised they are? I mean, I'm sure you might have a couple Angry Birds guys somewhere. (P4)

Another teacher alluded to her struggle with the implementation of technology in her preschool classroom.

This is one I actually struggle with. I think it's good that the kids- I mean, technology is here to stay. It's stuff that they're going to need. But, in moderation. Because kids, young kids need all the tactile, hands-on stuff that I don't, you know, I don't ever want to see replaced, obviously. Just like I said with the books. They were much more into the tech, the ebooks, than the real books. And they had to develop that desire to go look at a real book. So, you know, I struggle with that. I think that they need the knowledge because it is here to stay. But, definitely not replace other things. (P1)

A kindergarten teacher went on to comment about the interactions he witnesses in his classroom when children are engaged with technology. The researcher opened with,

I know there are a lot of things...a lot of people who were concerned about as you mentioned before the social nature of our world and how that's changing with devices and how people don't necessarily engage in conversation/communication

in the same ways and so do you see when the kids have the devices in hand, do you see them doing anything differently communication-wise? Do you worry about them not communicating? Do you see them doing more of it because they are sharing in their learning? What does that look like?

The teacher responded explaining that he sees children responding in a variety of ways as they are engaged with technology.

It's kind of a 50/50 split. Either you have the really social kids that want to share every single thing they are doing on their ipads and then you have the other children that are too self engulfed in the technology that they are just sitting there tapping away in their own little world and not real...I mean a bomb could go off next to them and they wouldn't even know because they are so into what they are doing. Now, which one's right and which one's wrong? I can't tell you that (laughs). (P2)

The term *developmentally appropriate* was mentioned 19 times in the analysis of the interview transcripts, indicating the teachers recognize a need to identify whether or not the technology use falls under this category. While most of them acknowledged it can be used appropriately with young children, they often shared their views regarding the necessary parameters that must be in place for it to be effective.

Theme 2: Technology Support System in Place

Analyzing the various technology support systems that were in place in the districts the teachers represented, three possible systems were identified. Either there was simply no system of support in place, the teachers worked to support each other with technology use, or there was an actual technology support person employed by the

school district to assist teachers with technology. Similar to the earlier results of the study, these various support systems reflected the divide between districts that have and those that do not. Districts with adequate funding were more likely to have a technology specialist who helped and supported them in their use of technology in the classroom. Although there might have been a technology support person in some of the districts, this individual was often the only support person in the district for technology and was charged with assisting all grades, preschool-12th. Thus, the support that was present in some areas was minimal given the expectation for vast coverage of grades and devices. “We can call him and he is available to come and assist us with some troubleshooting we may have or kind of helping us in that direction of what he feels would benefit us most out here.” (P5) Similarly,

We have one technology director that we share, preschool to twelfth grade. And he is fantastic, and he- we have a good working relationship, so he normally comes and helps me out whenever he can. But again, he is one person. So if there is something in technology that goes astray, or something's not working, he comes and gets to it as quick as he can, but he has a lot of people and buildings to watch over. So as far as fixing it, there's just that one person. Otherwise there's a couple staff members that we try to piece together and fix what we can. But there's not really anyone who comes in and supports instruction- or how to use technology in my instruction. (P4)

In those districts where the teachers supported one another in their technology use, interviewees mentioned there was no shame in seeking support. Additionally, those who had children of their own often recommended useful apps to their colleagues

after having used them in their own life outside of the school setting. “I think sharing among colleagues of different apps. Because I don't have young children. So some of the other colleagues do. And they'll say, “Oh, over the summer we found this app and it's really fun.” (P3) Still another teacher mentioned how she relies upon her own child to guide her technology learning.

Just, I like technology, so I'm willing to try it out and see what happens and, you know, experience it. I have a son who's very techie. And so he's always bringing me up to speed with different things that I may not have known without him. (P1)

Acknowledging the reliance on one another with regard to technology support, one teacher mentioned,

We're a team so well. Um, people don't feel dumb by asking questions which is nice. You know, we're constantly knocking on each other's doors...hey, have you done this? I tried this and it didn't work or you should've saw what happened when I did this. The kids loved it or don't try this because that's not going to work...just the way we share...um, you know... (P2)

One teacher who was interviewed emphasized the complexities that exist when working to not only integrate, but learn the technologies that are available. Surprisingly, this teacher was in a district that had a technology support person as well as focused technology training.

Um, in the classroom, I'm getting more and more comfortable. At the beginning of the year, I was quite apprehensive, but excited because I had so many different technologies going on and learning how to juggle everything from audio systems, a Smartboard, one to one devices, my own computer,

software...it was a lot all at once even though we had the support system and the training, you don't really pick that up until you are in the fire. (P2)

His colleagues who were interviewed also attested to the need for ongoing training and identified themselves as learners. Even some who considered themselves *early adopters* concluded that they have to work to keep up with the constant technological changes.

We are just starting, our district is just starting to implement more technology within the students throughout the whole district. So, they're looking into tablets and right now, they're having the debate, is it an iPad or more towards Windows? What is gonna be best for the kids? We are installing Google Drive throughout the district now, so all of our laptops have been taken for some time to have some work done on those and so I feel like, we're in a very positive movement and I am supported in that movement and have been asked to be on that committee. It's been open invitation for everyone. Um, but our voice is being heard and our superintendent is very conscious of things that are going on around us in those positive and negative things and he's kind of looking over and deciding what's going to be best for us out here in this area where we don't always necessarily have internet connection or families don't have the opportunity, a lot of our families go to the library to read their email or they'll actually come to school and ask if they can get on a computer. (P3)

Realizing that teachers are not the only individuals who require support for technology implementation to be successful, students too need support. Teachers who were interviewed raised the concern about the *digital divide* indicating that geography in

terms of the rural nature of the schools the teachers were part of and access can be potential barriers.

Theme 3: Beliefs About the Impact of Technology on Students and on Teachers'

Instruction

Through the interviews, teachers commented on the impact technology has had on their pedagogy as well as the impact it has had directly on their students. While the interviewees did acknowledge that there are *early adopters* of technology, they continued to stress the importance of limits with regard to its use in early childhood.

Well, I think that we're in this really cool part of our, you know, life where it affects everything. And I think that if they aren't seeing that, and being able to touch it and experience it and use it, that they're at a huge disadvantage. I mean, what in their world is going to be coming as they're older. I mean, if we're able to do the things we are now at this point, imagine by the time these kids are in high school what's going to be available. So I think that they have to foster that learning and be comfortable with it. Because even like, I mean, my parents are terrified of technology. My mother was just saying that she left for a week and my dad deleted every number out of the phone. (P5)

Another teacher agreed and reinforced the importance of the limits.

Well like I said before, with the- it's here to stay- it's not going away. So they need it. They need to know that- how to use it, and that it's going to be a part of their life from here on out. You know? But again, definitely in moderation, because at this age they need to learn the communication skills. It's amazing how-

you don't realize that children don't know how to say, "Will you play with me?"

You know? And not that that's technology's fault or anything. (P1)

As teachers reflected on the impact technology was having on their students, they provided examples from their experiences.

It is really impacting them at a high level. I think it's taking them up that Bloom's taxonomy, that scale so much faster because they're able to...they're not just watching the teacher do it. You are handing them their device and saying okay, it's your turn. They get to that mastery a lot faster because they are able to experience it. It's not one person doing everything. (P2)

The male kindergarten teacher recalled his experience with a second language learner and the impact that technology had on her alluding to the fact that we may be unaware of the breadth of impact technology is capable of having.

It's surprising. I think that it has more of an impact than we maybe even have the knowledge of currently. I think I shared with you- I had a headphone system installed in my classroom, gosh, right at the very end of the year. Then I was beginning to even try that out for the first time and I was very hesitant. I didn't really want to wear this microphone around my neck and I had a student that sat kind of at one of my back tables and she was a very quiet kid but she's very intelligent and very on grade level, and she's a fabulous reader. And I used it, on the very first day she went, "Hey, I can hear you so much better!" And it was really a shock to me because I didn't realize- cause she's always participating, always engaged- her learning was on track. She just couldn't hear me that well sometimes. So just that little adding of the microphone made a huge impact on

just what she was able to pick up from what I was saying. So I'm assuming that if it made such a difference for an on-grade-level, attentive student, just what a difference it'll have when I'm able to use it this whole school year with kids that maybe aren't picking up on- or wouldn't necessarily pick up on everything. Now the same way, I've seen my lower language students, they used that software this year, and it did- slowly- but it did start to bring up their vocabulary and the intensity and talking little bit more in class. So I think it maybe has even more of an impact than we realize it has or think that it could have. (P2)

A female preschool teacher and center director confided that the impact may be clouded by teachers' own lack of confidence or experience with technology.

Um, it has...it could...potentially it could have a great impact on our students, but I am just fearful that our district might purchase things that as a district, we as teaching staff are not ready ourselves to use and then to try to teach with those things with the children and...and they may see us fail at it and then not be as interested so I know that technology has wonderful, wonderful things to offer but I feel like we are so limited in our, in the professional development that they give us that we may only use a tiny piece of it and so and personally, I have a child who is in a district that uses technology, but he told me this last semester, that he was really disappointed in how much he used it and that he felt that he carried it more than he used it so um, I think that for my preschoolers, I definitely need more education. I need to know what's out there that's not just so commercial and eye catching, but that actually has research behind it that it's gonna be beneficial for me to use with the children in the classroom and to make an impact on their

learning versus just having it there just because the new things to use this year is iPads or whatever the technology might be, so I'm a firm believer in looking into the research first before just jumping and using it and making sure we're prepared to use it in the right manner. (P3)

Along with the limitations teachers encouraged, these teachers had a desire to be a part of the selection process for apps or software to ensure they are high quality and intentional. They further promoted additional professional development focused on technology. Overall, the implementation of technology was challenging for some while others were willing to try. Those who were willing wanted to have a support system and the related professional development so that they could feel competent when they were in the classroom teaching with the technology.

Once more, within this theme that was analyzed the *digital divide* was apparent. Two interviewees felt as though the use of technology in their school districts had an impact on the children—especially in regard to how their future would be impacted and the deficit students would have if they had no technology training in school. In direct contrast, those schools without the resources to fund the purchase of these devices have students at a disadvantage due to the lack of access.

Theme 4: The use of iPads in early education classrooms

Teachers were very open to share their thoughts regarding the use of iPads in the early childhood classroom. The majority of their responses were positive in nature and alluded to the benefits of utilizing the devices with young children. One teacher highlighted the positive energy that exists when children are handed their devices in his

one-to-one kindergarten environment and how technology has transitioned over time as he has been teaching in his district.

They absolutely LOVE getting their iPads. The day you hand them their iPads, oh my goodness, sometimes it's hard to keep them on the floor and you know those little guys, they are very excited. They jump right up to want to participate and coming up to the board, they want the microphone, they want you to put the microphone around their neck. They want to share with their friends what they have written. Um, like during writing time, I'll walk around with my iPad and take snapshots of their work and then I reflect them up on our screen and I'm able to pass the microphone around to those kids and everyone can see it. They're not just holding up the 8x11 sheet of paper and reading it. They can look at their paper, they don't have to be in front of the class. They can be in the back of the room reading their paper off of the screen and they have much more confidence in their voice and the kids are like, oh look at! They did this or they did that in their writing and you can, depending on how you reflect it with what app you use, you can actually make corrections, show them, highlight what they've done really well, what they need to work on and really have changed how you teach. When I came to the district, it was use the overhead projector and that was the technology.

(P2)

In addition to the positive energy that exists and the children's desire to utilize the devices, teachers acknowledged their role in having to moderate the activity when students become so engaged that they do not want to leave the device. Having time to use

the iPad in these early childhood environments is a popular choice activity for the children.

Well, totally- the kid that is on it is totally engaged. I mean, the fire alarm could go off and they'll probably still be playing. [laughs] But, you know, then there's always somebody yammering in their ear, "You've been on there long enough! I want my turn!" So, I mean, those kind of interactions happen often, but as a collaborative interaction, sometimes not so much. (P5)

The teachers' positive comments regarding the use of the iPad and technology in general in the early childhood classroom were balanced with the concerns they offered regarding appropriate use and worries about the social impact these devices might have. In regards to the social nature of the interactions of students engaged with technology, one teacher noted, "Conversation is very limited. So it's another reason that at four years old, they need to have moderation on the ipads." (P6) Another interviewee addressed the concerns related to hands-on, tactile learning.

It has to be balanced because again, kindergartners are so tactile. They have to have those objects in their hands as opposed to junior high/high school where the device is probably more captivating than the teacher. (laughs) The kids need that human component at such a young age and sometimes I think the device starts to turn children...um...into not really social misfits, but they miss social skills that they need and I think our world sees that today. How many people do you see walking down the street with their head into their phone? (P2)

While teachers were eager to offer the potential benefits technology can have in the early childhood environment, they urged for its use in moderation and with intention. "I think

they're necessary, but definitely moderation. You know? I think the kids need it. But not to be the primary focus. Definitely can't take away from teaching by any means (P5). A colleague agreed and raised the need for children to have choice in the activity and supervision as they use the technology tools.

I think it's pretty developmentally appropriate. I mean, especially if the kids are choosing what they want. But again, it has to be monitored. Because I used it at one point for a project-based learning lesson. We were doing trains. We were using them- we used the iPads for research so the kids could figure out- they had questions that they wanted to learn. And they used the iPads to find the answers to those questions. And I had looked over—I had probably four kiddos at my table- and I looked over at the student and they turned back, and somebody was playing Angry Birds. So. [laughs] I mean, they know how to maneuver around the iPad. So it really- they kind of- they do need a little bit of a guide. Because I think when we're getting into that, it depends on what they're using the iPads for where the developmental appropriateness kind of falls into place. (P5)

This theme reflected the willingness of teachers to have iPads present in their early childhood classrooms within certain parameters to ensure the most benefit for students. Intentional and monitored use was a reoccurring point. Teachers reflected on the eagerness of young children to use technology and also their natural tendency to experiment with the devices and possibly move from a learning tool to simply a gaming device. While iPads may enhance the learning in these early childhood classrooms, the teachers who were interviewed reminded the researcher that they are tools that must be supported and facilitated by the teacher and not left open for independent learning.

Summary

In summary, this study analyzed surveys from 41 teachers along with interviews of six participating teachers to examine the impact of their beliefs and attitudes on technology usage. Three of the primary findings of the study were the existence of a clear division between districts that have access to technology and those who do not based on a perceived unequal distribution of funding or focus on technology in the classroom. A second primary finding was that even in districts where technology is available, there were concerns about teachers struggling with the integration of it due to lack of training. Often, teachers were feeling unprepared to teach with the tools provided, and they were apprehensive about the use and worry children will perceive their limitations. The third primary finding was the importance of the teacher facilitating the learning and guiding the use of the technology tools with early learners so that they are used purposefully and with intention.

In the final chapter, these findings will be compared to the literature, conclusions and implications will be drawn, and a series of recommendations will be suggested.

Chapter 5: Conclusions, Implications, and Recommendations

Summary of the Findings

In this chapter, the findings of this study will be compared to the literature, conclusions and implications will be drawn, and a series of recommendations will be suggested. Based on the current trend to implement technology in the classroom across all levels, the information drawn from this study will be useful to both practitioners and policy makers. Suggestions for supporting educators as technology evolves will be offered as well as ideas to support effective integration at the earliest grades.

In this study, teacher self-efficacy regarding technology use was examined. In other words, data from the sample of teachers were analyzed to determine the degree to which these educators felt comfortable and confident with the infusion of technology in their practice. Additionally, the beliefs and attitudes these educators held toward the developmental appropriateness of technology were analyzed to determine if the level of integration in their classrooms was impacted by these beliefs and attitudes. The study employed the following research questions:

Research Question 1: Is there a relationship between the beliefs and attitudes of preschool and kindergarten teachers related to the developmental appropriateness of technology and the level of implementation of technology in the classroom?

Research Question 2: Is there a relationship between the demographics of preschool and kindergarten teachers and their beliefs and attitudes related to the developmental appropriateness of technology?

Research Question 3: Is there a relationship between the level of implementation of technology in preschool and kindergarten classrooms and the demographics of the teachers?

The study revealed some key results including the finding that teachers have a desire to integrate iPads in their early childhood classrooms as well as an interest in learning more about integrating technology in their instruction. Through the in-depth interviews with teachers, it became clear that there is a need for additional technology training and that apprehension does indeed exist for teachers who feel ill-prepared to implement it fully given their current access to professional development and training. Secondly, the findings indicated very clearly that teachers felt it was essential to guide young children in their use of technology and that the use be intentionally planned. There was concern mentioned about technology not replacing certain essential activities or experiences in the early childhood classroom. Third, this study highlighted the *digital divide* that exists between those who have access and those who do not and in these cases, it was due to either a lack of resources to provide the technology or a lack of focus on technology in early childhood that prevented equal access for all districts represented in the sample. Finally, this study revealed that there was not a significant correlation between teacher's attitudes and beliefs regarding the developmental appropriateness of technology and their level of implementation in the classroom. To further clarify these findings, correlations between the level of implementation scale that was developed and the four demographic variables that were identified (age, years in early childhood education, completed education, and the number of personal iPad uses) were examined. The level of implementation was significantly higher for teachers who used the iPad on

their own for personal use. In other words, a teacher's personal use of an iPad tended to matter more than their beliefs and attitudes when examining their level of implementation. Furthermore, the level of implementation was higher for teachers who had more years of early childhood experience.

Conclusions

This study found that there was not a significant correlation between teachers' attitudes and beliefs and the level of technology implementation in the classroom. This was consistent with Norris et al. (2003) who argued that the variable of teacher attitude toward technology was of no statistical value in predicting their technology use. Rather than attitude, Norris et al. suggested limited access alone was the cause for not implementing technology in instruction. Responses to the open-ended survey questions reiterated this point, "No, we don't have them available unless they are our own personal iPad." Another response pointed to the lack of impact the participant saw on her students, "My own personal children, yes, not my classroom children, due to lack of access." Even though the current study found so significant correlation between the teachers' beliefs and attitudes and their related technology implementation, other studies have suggested that providing training and opportunities to learn the technology can stimulate positive beliefs and attitudes. According to Lee, Y.-H. et al. (2011),

well-designed trainings should be provided for employees to familiarize themselves with the fundamental knowledge about how to use the e-learning systems as well as the trial opportunities to build a better understanding in the operational functions. The trainers' frequent demonstration of the use of e-learning systems help the employees form positive beliefs and attitudes, which in

turn influences their behavioral intention and actual use of e-learning systems, (p. 135).

The results of the current study overwhelmingly suggest the need for additional professional development opportunities focused on technology in the early learning environments. While providing these trainings, teacher capacity can be increased and their attitudes could potentially be impacted positively as well.

Since the majority of participants in this study used iPads themselves (87.8%), limited teacher access was not an issue; however, student access often was. The data revealed a significant correlation between the number of personal iPad uses and the developmental appropriateness scale that was analyzed. Ciftci and Kurt (2012) identified common barriers to technology implementation in their research and ultimately highlighted the point that teachers make the decision about whether or not to integrate it in their instruction. In this study, teachers who tended to employ iPads for their own personal use were more likely to also implement them in their classroom instruction. Conversely, Kumar & Vigil (2011) found in their study of pre-service teachers that they were not infusing technology in their instruction, but had only adopted it for their personal use instead.

This study revealed that the level of technology implementation tended to be higher for teachers with more years of experience in early childhood education. The teachers who participated in the semi-structured interviews all classified themselves as experienced early childhood educators. While they each were implementing technology in their respective classrooms, the degree to which it was being used varied. One teacher reflected on his technology integration from the beginning of the school year: “Excited

because I had so many different technologies going on and learning how to juggle everything from audio systems, a Smartboard, one-to-one devices, my own computer, software” (P2). His colleague in another district illustrated how different her experience had been: “We are just starting, our district is just starting to implement more technology within the students throughout the whole district” (P3). Hughes (2005) contended that, “experienced teachers (who often have less technology experience) are more poised to integrate technology simply because they possess more knowledge, with which to connect” (p. 299). Experienced teachers may have a more solid understanding of the context through which they can embed technology than their colleagues who are newer to the field. Kumar and Vigil (2011) offered the caution that “pre-service teachers cannot be depended on to independently make the connection between technology, pedagogy, and their subject matter” (p. 151). Abbitt (2011), Brinkerhoff (2006), and Laffey (2004) emphasize the importance of teacher preparation with a focus on building teacher capacity and comfort with technology implementation. In other words, teachers can better be supported in their college coursework to feel more confident with technology integration and this focus on growing more comfortable with the tools can enhance teacher capacity.

While this study indicated that there was not a significant correlation between teachers’ attitudes and beliefs about technology and their classroom implementation, other studies have offered conflicting results. Brinkerhoff (2006), Dussault, Deaudelin, and Brodeur (2004), Laffey (2004), and Vannatta and Fordham (2004) have suggested that teacher attitude toward technology, their beliefs about computers, as well as their self-efficacy related to integrating it in

their instruction have a significant impact. A second finding in this study was the teachers' desire to integrate iPads in their early childhood classrooms where ($M = 4.34$) on the 5-point scale that was analyzed. The majority of participants in this study felt strongly about integrating iPads in their classrooms and did not align to the concerns that Miller (2005) and Laffey (2004) articulated. These authors revealed the controversial issues that opponents of early childhood technology espouse including how technology may distract children from activities that are more natural, healthy, and developmentally appropriate. One participant in the survey identified the value of the iPad in the preschool classroom related to widening a child's world view as well as attending to the visual learning style,

I have found that preschoolers learn through their senses, and a majority of young children are strong visual learners. Using the iPad allows more visuals to take place in the classroom. It also helps to broaden the children's view of cultures." Another suggested that young children were more willing to take risks, "When I have used the class set of iPads, all of the children used them for their writer's workshop. They loved the ability to stretch through and write words without worrying about forming the letters. They were more willing to take risks with their writing.

There were a minimal number of participants who did cite concerns regarding iPad use as it relates to social-skill development. When asked to identify barriers that exist when implementing technology in the early childhood classroom, one survey participant commented, "Social skills and learning how to get along with others." Through the semistructured interview process, one teacher emphasized

the importance of technology not replacing certain beneficial experiences or activities in the early childhood classroom with real or natural materials.

This is one I actually struggle with. I think it's good that the kids- I mean, technology is here to stay. It's stuff that they're going to need. But, in moderation. Because kids- young kids need all the tactile, hands-on stuff that I don't- you know, I don't ever want to see replaced, obviously. Just like I said with the books. They were much more into the tech- the ebooks- than the real books. And they had to develop that desire to go look at a real book. So, you know, I struggle with that. I think that they need the knowledge because it is here to stay. But, definitely not replace other things. (P1)

This study also revealed that 39% of participants were self-taught in terms of technology training. While 46.3% of the teacher participants indicated they had received in-service training, a number of their colleagues had acquired their technology understanding independently. Survey respondents underscored the need for additional training: "I believe the biggest barrier is my own limited knowledge. There are so many things I know could be done on the iPad or using the interactive display and yet I lack the know how." Another respondent agreed and listed these barriers: "Availability of the technology, lack of in-service training, and time to search out and find apps that will reinforce the necessary skills." One of the teachers who was interviewed provided the context for the urgency that exists regarding the need for training and ongoing, job-embedded support.

Um, in the classroom, I'm getting more and more comfortable. At the beginning of the year, I was quite apprehensive, but excited because I had so many different technologies going on and learning how to juggle everything from audio systems, a Smartboard, one to one devices, my own computer, software...it was a lot all at once even though we had the support system and the training, you don't really pick that up until you are in the fire. (P2)

Another teacher who was interviewed expressed the need for further knowledge related to technology and a concern regarding the quality of resources available for her students.

I think that for my preschoolers, I definitely need more education. I need to know what's out there that's not just so commercial and eye catching, but that actually has research behind it that it's gonna be beneficial for me to use with the children in the classroom and to make an impact on their learning versus just having it there just because the new things to use this year is iPads or whatever the technology might be, so I'm a firm believer in looking into the research first before just jumping and using it and making sure we're prepared to use it in the right manner. (P3)

Reinhart et al. (2011) and Norris et al. (2003) advocate for a *whole teacher* approach to professional development that focuses on both pedagogical change as well as supporting higher-order thinking skills for students. Further, NAEYC (2012) advocates for professional communities of practice accompanied by in-depth, hands-on practice for early childhood educators with regard to technology (p. 12). Considering the large number of participants who have gained their knowledge of technology on their own, it is clear that they have not benefited from in-depth, *whole teacher* training.

Along with the technology training that is largely absent for teachers of young children, participants in this study underscored the reality of what is referred to as the digital divide. The educators who participated in this study highlighted both the lack of resources in some cases and the lack of focus on technology in early childhood as contributing factors to this very apparent digital divide where kids have access to a variety of technology tools in some districts and not at all in others. Their responses underscore the significance of what Judge et al. (2006) propose related to digital equity to ensure “that all students have access to information and communication technologies for learning, regardless of socioeconomic status (SES), disability, language, race, gender, or any characteristics that have been linked with unequal treatment” (p. 52).

Educational Implications and Recommendations

After analyzing the data from the present study and reviewing it alongside other related literature in the field, the following recommendations are offered by this researcher to those who are considering, planning, evaluating, or executing the use of technology in early learning environments:

1. Additional training that is hands-on, intentional, and on-going should be provided to educators at all levels of their professional career. In other words, pre-service teachers should have multiple experiences with integrating technology in their learning and should be expected to evaluate its use in the lessons they create. Practicing teachers should have ongoing training and support that is differentiated according to their needs and is embedded in their daily work. Rather than offering skill-based trainings, the focus should be on how technology can enhance the content being taught.

2. Guidelines for technology use should be provided to teachers. There are standards that exist at both the state and national level. School districts should work to create a curriculum based on these standards so there are clearly articulated outcomes by grade level for students with realistic, age-appropriate experiences provided.
3. Technology training and support should be extended to parents and families. As educators work to integrate technology in their instruction, some districts are moving toward allowing students to take their devices home. It is essential that schools offer support to families regarding the intentional use of the tools for learning.
4. Teachers should be granted permission to not know everything regarding the potential of the technology they are implementing. Rather than feeling the need to instruct at all times, the teacher can see themselves as a facilitator of learning allowing children to create with technology tools.
5. Teachers should critically analyze the quality of the apps available on the iPad in their classrooms. Not all content is created equally and it is the teachers' discretion and expertise in the content they are responsible for that can inform the selection of the apps for student use.
6. Teachers should focus on providing opportunities where students are able to both create and consume material on the iPad. They must evaluate the worthiness of the activity provided and whether the engagement with the electronic assignment is more enriching than providing an alternative that is more traditional in nature.

The use of the technology tool should enhance their practice and be intentionally integrated.

7. Administrators should “facilitate the disposition of openness to change and commitment to teaching improvement” (Vannatta & Fordham, p. 256). By focusing on these dispositions as well as the actual technology skills and their related pedagogy, teachers can be supported in the implementation process.

Recommendations for Future Research

This study examined teacher self-efficacy regarding technology use. Additionally, the beliefs and attitudes teachers held toward the developmental appropriateness of technology were analyzed to determine if the level of integration in their classrooms was impacted by these beliefs and attitudes. Based on the findings of this study, the following recommendations are offered for future research in this area:

1. This study could be replicated in another area to determine if the findings are consistent. The WSESD region is a rural region in western Michigan comprised of smaller districts with relatively high levels of poverty and districts that have chosen to make technology available to their students. This study could be replicated in urban or suburban settings of various socio-economic statuses to determine if the results are similar.
2. This study could be replicated with a larger sample size to determine if the results are similar given the limitations with 41 survey respondents and 6 teacher interviewees.
3. A follow up study with this same population could be conducted following the provision of a professional development series aimed at the *whole teacher*

whereby training was differentiated according to need to determine if attitudes and or levels of implementation were impacted.

4. A study that spans the preschool-12th grade span in the district that has moved forward with a 1:1 iPad initiative could be conducted to analyze the attitudes and beliefs and related technology implementation across the grades.
5. A study that is focused on the students' experience with the iPad in early childhood education could be conducted. Rather than focus on the teachers' beliefs and attitudes, this survey could focus on the students' achievement and engagement.

Recommendations for Policy

Based on the findings of this study as well as the pace at which technology is entering classrooms of all levels, considerations regarding policy should be attended to. School districts that make the investment in technology tools to implement in early childhood settings should consider their related policies. Most districts have Acceptable Use Policies for staff and students in place. These should be revisited to ensure they comprehensively cover all age groups who would have access to technology tools. Since the inclusion of technology in early childhood environments is a relatively new phenomenon with limited research, it would behoove districts to evaluate their use policies to ensure the sensitive needs of their youngest students are addressed.

Chapter Summary

This chapter presented the major findings revealed through the study. These findings were organized around the research questions developed for the study. Quantitative data from the survey coupled with qualitative data from the open ended

questions on the survey as well as the semi-structured teacher interviews revealed teachers' beliefs and attitudes related to technology and their levels of implementation.

The researcher believes this study is significant largely because of the population that was studied. Currently, there are gaps in the literature regarding technology integration at the early childhood level. Concurrently, there are significant resources being expended across the country on technology tools that are entering these same classrooms. The findings of this study can offer guidance to those responsible for the integration highlighting the ways they can best support teachers with implementation. Current professional development related to technology integration could be enhanced to focus on the teacher as learner and offer hands-on, relevant experiences rather than skill-based sessions in order to truly impact pedagogy.

References

- Abbitt, J. T. (2011). An investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among preservice teachers. *Journal of Digital Learning in Teacher Education, 27*(4), 134-143.
- Brinkerhoff, J. (2006). Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. *Journal of Research on Technology in Education, 39*(1), 22-43.
- Burnett, C. (2010). Technology and literacy in early childhood educational settings: A review of research. *Journal of Early Childhood Literacy, 10*, 247-270.
- Casey, J. (2000). *Early literacy. The empowerment of technology*. Englewood, CO: Libraries Unlimited.
- Chen, J.-Q., & Chang, C. (2006a). A comprehensive approach to technology training for early childhood teachers. *Early Education and Development, 17*, 443-465.
- Chen, J.-Q., & Chang, C. (2006b). Testing the whole teacher approach to professional development: A study of enhancing early childhood teachers' technology proficiency. *Early Childhood Research and Practice, 8*(1), 1-19.
- Childhood, A. f. (2001). *Fool's gold: A critical look at computers and childhood*. Retrieved from http://drupal6.allianceforchildhood.org/fools_gold
- Ciftci, M. & Kurt, S. (2012) Barriers to teachers' use of technology. *International Journal of Instructional Media, 39*(3), 225-238.

- Copple, C., & S. Bredekamp, eds. 2009. *Developmentally Appropriate Practice in Early Childhood Programs Serving Children from Birth Through Age 8*. 3rd ed. Washington, DC: NAEYC.
- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.
- Dawson, K., Cavanaugh, C., & Ritzhaupt, A. D. (2006). Florida's EETT leveraging laptops initiative and its impact on teaching practices. *Journal of Research on Technology in Education*, 41(2), 143-159.
- Derscheid, C. (2003). *Early childhood educators' attitudes toward and knowledge about computers in the classroom*. (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses. (Accession Order No. 3102747).
- Dussault, M., Deaudelin, C., & Brodeur, M. (2004). *Teachers' instructional efficacy and teachers' efficacy toward integration of information technologies in the classroom*. Quebec, Canada: Psychological Reports.
- Gimbert, B., & Cristol, D. (2004). Teaching curriculum with technology: Enhancing children's technological competence during early childhood. *Early Childhood Education Journal*, 31, 207-216.
- Hertzog, N., & Klein, M. (2005, Summer). Beyond gaming: A technology explosion in early childhood classrooms. *Gifted Child Today*, 28(3), 24-33.
- Judge, S., Puckett, K., & Bell, S. M. (2006). Closing the digital divide: Update from the early childhood longitudinal study. *The Journal of Educational Research*, 100(1), 52-60.

- Kumar, S. & Vigil, K. (2011) The net generation as preservice teachers: Transferring familiarity with new technologies to educational environments. *Journal of Digital Learning in Teacher Education*, 27(4), 144-153.
- Laffey, J. (2004). Appropriation, mastery, and resistance to technology in early childhood preservice teacher education. *Journal of Research on Technology in Education*, 36, 361-382.
- Lee, Y.-H., Hsieh, Y.-H., & Hsu, C.-N. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employee's intentions to use e-learning systems. *Educational Technology & Society*, 14(4), 124-137.
- Leonard, J., & Guha, S. (2001). Education at the crossroads: Online teaching and students' perspectives on distance learning. *Journal of Research on Technology in Education*, 34(1), 51-57.
- Miller, E. (2005). Fighting technology for toddlers. *Education Digest*, 71(3), 55-58.
- NAEYC and the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College. (2012, January). Technology and interactive media as tools in early childhood programs serving children from birth through age 8.
- Norris, C., Sullivan, T., Poirot, J., & Soloway, E. (2003). No access, no use, no impact: Snapshot surveys of educational technology in K-12. *Journal of Research on Technology in Education*, 36(1), 15-27.
- Parette, H. P., Quesenberry, A. C., & Blum, C. (2010). Missing the boat with technology usage in early childhood settings: A 21st century view of developmentally appropriate practice. *Early Childhood Education Journal*, 37, 335-343.

- Reeves, D. (2010). *Transforming Professional Development into Student Results*. Alexandria, VA: ASCD.
- Reinhart, J. M., Thomas, E., & Toriskie, J. M. (2011, Sep-Dec). K-12 teachers: Technology use and the second level digital divide. *Journal of Instructional Psychology, 38*(3/4), 181-193.
- Rosen, D. B., & Jaruszewicz, C. (2009). Developmentally appropriate technology use and early childhood teacher education. *Journal of Early Childhood Teacher Education, 30*(2), 162-171.
- Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in education and the social sciences* (4th ed.). New York, NY: Teachers College Press.
- Simon, F. & Nemeth, K. (2012). *Digital Decisions: Choosing the right technology tools for early childhood education*. Lewisville, NC: Gryphon House.
- Siu, K. W., & Lam, M. S. (2005). Early childhood technology education: A sociocultural perspective. *Early Childhood Education Journal, 32*, 353-358.
- Stevenson, S. (2009). Digital divide: A discursive move away from the real inequities. *Information Society, 25*(1), 1-22.
- Vannatta, R. A., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education, 36*, 253-271.
- Wang, F., Kinzie, M. B., McGuire, P., & Pan, E. (2010). Applying technology to inquiry-based learning in early childhood education. *Early Childhood Education Journal, 37*, 381-389.

Zevenbergen, R. (2007). Digital natives come to preschool: implications for early childhood practice. *Contemporary Issues in Early Childhood*, 8(1), 19-29.

Zimmerman, B., Bandura, A., & M. Martinez-Pons, (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal*, 29(3), 663-676.

Appendix A: Survey

Strongly Disagree (SD) Disagree (D) Neutral (N) Agree (A) Strongly Agree (SA)	SD	D	N	A	SA
1. iPads should be introduced to 0-2 year olds.					
2. iPads make learning fun for preschool children.					
3. Preschool children should learn to use iPads.					
4. Integrating computer experiences and learning opportunities is an important part of the preschool classroom.					
5. Computer instruction should have high priority in the school's/center's budget.					
6. I am knowledgeable about the extent to which iPads should be used as learning tools in preschool classrooms.					
7. I am knowledgeable about the extent to which preschool teachers should learn to use iPads.					
8. I know how iPads can promote children's learning through play.					
9. I am knowledgeable about the extent to which iPads can be used to promote the preschoolers' creativity.					
10. iPads should be introduced at the preschool level.					
11. I know how iPads can be used to teach preschoolers oral language skills.					
12. I know how iPads can be used to teach social skills.					
13. A computer learning center should be part of preschool classroom.					

14. I know how to identify developmentally appropriate software.					
15. iPads should be first introduced in the primary grades.					
16. I know the extent to which iPads can support preschool teachers in their professional work.					
17. Preschooler's computer use should be primarily without teacher assistance.					
18. I know how iPads can be used to teach reading skills.					
19. If new computer technology was available at my school/center, I would be interested in learning to use it.					
20. I have a desire to include iPads in my classroom.					
21. I know how iPads can be used to teach writing skills.					
22. I feel I need more training in the use of iPads.					
23. I feel I need more training on choosing what is developmentally appropriate software.					
24. I feel comfortable working with iPads.					
25. Developmentally appropriate practice can occur using iPads in preschool.					
26. Children benefit from their experiences with technology beginning in preschool.					

Note: This survey was created in an electronic survey tool to ease administration as well as data collection.

1. I am a male female.
2. I am the director/principal a preschool teacher assistant teacher
3. I currently teach 3 year olds 4 year olds
 Kindergarten GSRP Head Start Special Education
4. I have been teaching early childhood (preschool-second grade) for years.
(include current year)
5. My age is 20-29 30-39 40-49 50-59 60-69
6. Have your students used iPads in your classroom? Yes No
7. Have you used an iPad in your classroom? Yes No
8. Please indicate your educational level. High School Diploma
 Associate's Degree CDA Credential Bachelor's Degree
 Master's Degree Other (please specify)
9. Have you taken computer training? Yes No (If "No," skip to Item 11)
10. How did you receive computer training? 4 year college/university
 community college inservice training computer store
 self-taught other (please specify)
11. Do you own a personal computer? Yes No
12. Do you have an iPad available for personal and/or professional use?
 Yes No
13. If you own a personal computer or have an iPad available, how do you use it?
 word processing spreadsheets educational games/apps
 searching the internet presentations social media
 other (please specify)
14. Does your school/center have iPads in classroom setting lab setting
 mobile cart with checkout available 1:1 with every child having a device
15. How many iPads do you have in your classroom? 0 1 2
 3 or more every child has a device

16. How many students are in your classroom? _____
17. How do you integrate technology? _____ drill & practice _____ simulations _____
 _____ rewards _____ educational games/apps _____ remediation _____ direct
 instruction _____ presentation _____ small group _____ partner
 work _____ individual use _____ assessment
18. My students use the computer or iPads _____ 5-10 minutes daily _____ 11-15
 minutes daily _____ 16-20 minutes daily _____ 20-30 minutes daily
 _____ more than 30 minutes daily
19. My students use computers or iPads _____ 1 day per week _____ 2 days per
 week
 _____ 3 days per week _____ 4 days per week _____ 5 days per week
20. If I were to take more technology training, I would want to receive the training
 _____ online _____ with an instructor in my classroom _____ at an inservice
 _____ other (please specify) _____
21. Does your school have technology guidelines for your use in planning computer
 instruction in your classroom? _____ Yes _____ No _____ Not Sure
22. I am familiar with the standards and expectations for technology that apply to the
 grade level I teach. _____ Yes _____ No
23. At what age should children start using computers or iPads in the classroom?

Open Ended Questions

1. Please share your thoughts regarding technology in early childhood.
2. Please explain how you utilize developmentally appropriate practice in your classroom when you integrate technology.
3. Has the iPad impacted the way you teach? If so, how?
4. Has the iPad impacted the way your children learn? If so, how?
5. Please share the success you have had implementing technology in your classroom.
6. Please share your concerns regarding technology in early childhood classrooms.
7. What barriers exist when implementing technology in early childhood settings?

Appendix B: Interview Protocol

General Interview Guide

How is technology used in early childhood classrooms?

Time of Interview	
Date	
Place	
Interviewee(s)	

Introductory Questions

1. Please describe your current role. What grade do you teach? How many students do you have?
2. Please describe your previous classroom experience? What grades have you taught? How long have you been teaching?
3. How would you describe your level of comfort with technology for personal use?
4. How would you describe your level of comfort with technology in the classroom?
5. How much training have you had regarding the implementation of technology in the classroom?
6. Describe your experiences with using technology in the classroom.

Central Research Questions

1. Please describe how you decide whether or not to integrate technology in your classroom.
2. Considering Rogers' continuum related to the diffusion of innovation, how would you classify yourself with regard to your technology use? (Innovator, Early Adopter, Early Majority, Late Majority, or Laggard)
3. Considering the stages Rogers identified related to the adoption of an innovation, which stage do you currently find yourself in? (Knowledge, Persuasion, Decision, Implementation, Confirmation)
4. When you use technology, how do you plan for its use?
5. Please share some specific examples of how you have used technology in your classroom this year.
6. In your opinion, how developmentally appropriate is the ipad?
7. How has your teaching pedagogy been influenced or not influenced by technology?
8. Describe the ways in which your students react when using technology.
9. Describe any interactions you witness between your students when they are using iPads.
10. Describe your beliefs about the impact or lack of impact technology has on your students.

11. Describe any support that exists in your building regarding technology implementation.
12. Is there anything more you'd like to share regarding the use of iPads in the early childhood classroom?

Appendix C: Participant Informed Consent Agreement for Interviews

Dear Participant,

You have been selected to participate in a semistructured interview regarding the integration of technology in early childhood environments. Although there is no direct benefit in your participation, your input is valued and is needed due to the limited research available on this topic. Data collected from this project will be aggregated to advise educators as they make informed decisions regarding the use of technology in preschool-kindergarten settings.

Your participation in the interview is voluntary and will take approximately 30 minutes – 1 hour to complete. Please be assured that your responses will be anonymous and no individual responses will be identified in any report. Instead, pseudonyms will be used to protect your identity. There is no known risk to your participation in the interview. The interview will be audio taped for transcription purposes to aid in the analysis of data and that recording will be destroyed at the conclusion of the study to protect your identity.

Participation in this study is voluntary. You may choose not to participate. If you do decide to participate, you can change your mind at any time and withdraw from the study without negative consequences. Your decision to withdraw would incur no penalty or loss of benefit.

Upon completion of the study, results will be presented in aggregate form only. No names or individually identifying information will be revealed. Results may be presented at research meetings and conferences, in scientific publications, and as part of a doctoral dissertation being conducted by the principal investigator.

Should you have any questions about the study or have interest in the results, please contact Brandi-Lyn Mendham at (231) 233-2048 or bmendham@wsesd.org or Dr. James Berry, Dissertation Chair & Program Advisor, Eastern Michigan University Department of Leadership and Counseling at (734) 487-0255 or jberry@emich.edu.

Thank you in advance for your input.

Sincerely,

Brandi-Lyn Mendham
Ed.D. Student, Eastern Michigan University

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Research Review Committee for use from _____ to _____. If you have any questions about the approval process, please contact the Director of the Graduate School (734) 487-0042 or human.subjects@emich.edu.

Appendix D: Participant Informed Consent Agreement for Survey

Dear Participant,

You have been selected to participate in a research survey about integrating technology in early childhood environments. Although there is no direct benefit in your participation, your input is valued and is needed due to the limited research available on this topic. Data collected from this project will be aggregated to advise educators as they make informed decisions regarding the use of technology in preschool-kindergarten settings.

The web-based survey will take approximately 25-30 minutes to complete. Please be assured that your answers are anonymous and no individual responses will be identified in any report. The data are maintained in a password protected site to ensure confidentiality. Any identifying data will be subsequently destroyed upon the completion of this study. Confidentiality will be maintained to the degree permitted by the technology used. Participation in the online survey involves risks similar to a person's everyday use of the internet. The online survey tool being used requires a username and password to access the data collected by the researcher. The tool uses advanced data encryption as a security measure as well.

Participation in this study is voluntary. You may choose not to participate. If you do decide to participate, you can change your mind at any time and withdraw from the study without negative consequences. Your decision to withdraw would incur no penalty or loss of benefit.

Upon completion of the study, results will be presented in aggregate form only. No names or individually identifying information will be revealed. Results may be presented at research meetings and conferences, in scientific publications, and as part of a doctoral dissertation being conducted by the principal investigator.

By clicking on the link below, you are indicating your consent to participate in this study. Should you have any questions about the study or have interest in the results, please contact Brandi-Lyn Mendham at (231) 233-2048 or bmendham@wsesd.org or Dr. James Berry, Dissertation Chair & Program Advisor, Eastern Michigan University Department of Leadership and Counseling at (734) 487-0255 or jberry@emich.edu.

Thank you in advance for your input.

Sincerely,

Brandi-Lyn Mendham
Ed.D. Student, Eastern Michigan University

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Research Review Committee for use beginning December 18, 2013. If you have any questions about the approval process, please contact the Director of the Graduate School (734) 487-0042 or human.subjects@emich.edu.

Appendix E: Qualitative Interview Transcripts

Participant 1

Okay, so describe your current role, what grade you teach, and how many students do you have?

I'm currently lead GSRP- Grade Start Readiness Preschool teacher, and we have sixteen children full day now. And, preschool. I said that.

Great. How about your previous classroom experience? What grades have you taught and how long have you been teaching?

Mostly I've done preschool- fifteen years now of preschool. Ten years here at GSRP and five years Head Start. Before that, and when I first got out of school, I did K-5 at LAC for their extras- art and gym and-

Okay.

That kind of stuff. So, preschool's the only classroom that I've done.

When you were at LAC, which is the Catholic school, did you have computers at all, then? Is that one of the offerings for them?

No.

Okay.

Cause that was- that was early nineties.

Okay. Wonderful. That helps. Time flies when you're having fun.

Yeah.

Alright. So, how would you describe your level of comfort with technology for your own personal use?

Very comfortable. I don't- I don't know the ins and outs of it. Like, my computer died. I didn't know how to make it- how to fix it. And- but I have my own personal techie and I just call him up and he told me how to reboot it and start it. But as far as, like using programs and using ipads and laptops, and ipods, I'm very comfortable.

Okay. So you've got your resources and you knew that you needed it fixed. [laughter]
How about your level of comfort with technology in your classroom?

Very comfortable as well. We have the ipad lab here. We have the teacher ipads from the ESD that I use daily, so I say I'm very comfortable.

Good. How much training have you had regarding the implementation of technology in your classroom?

Um, fair. You know, we did the different trainings through the ESD. Yeah, a fair amount.

Okay. How about your experiences with actually using it in the classroom? Can you talk a little bit about that?

Yep. We have the ipad lab. We have six ipads that rotate- we get them one day a week- that the children get to use. They like that. It reinforces some of their skills that we're working on. The one that is from the ISD for the teachers is in the room every day, and we use that for a variety of things. Creative curriculum, mostly. And I absolutely love it for Creative Curriculum. Use that app- it was my lifesaver.

Absolutely.

[laughs] So I use that every day. But then we also will look up things that the children are asking about if I don't know it. Or, just to show them like a video of something that we're talking about, or the kids bring up. So.

So a great resource just to have at your fingertips for a variety of reasons. So when you think about using technology in your classroom, describe how you decide whether or not to integrate it.

Whether or not to have it in the classroom?

Mm-hm.

That is really my supervisor's decision.

Okay.

Which she's on board with so we get to have it, but if she wasn't then it would be kind of taken out of my hands. I think how much and how I use it is more my decisions. Like, when the kids ask a question- we sing a song called 'Kookaburra' and one day the kids said, "What is a kookaburra?" And we talked about it being a bird. We looked it up on the ipads so they got to see it. On you tube I found some pictures of what- or video of what they sound like. And then we found out that they were- live exclusively in Australia. So then we looked up where Australia was. It actually was like twenty minutes. But it was all their questions and where they wanted to go. And it was kind of neat.

Yeah, to model it as a resource to find things out that they're interested in.

Yeah.

Good. So, you kind of take their lead, then, in terms of implementing it? Like, kinda spur of the moment, you have that resource available. But do you also plan for it and have it intentionally in your plans?

Yes. I plan for it like we do the zoophonics. So when we do some of the other- like, they all know what an alligator is. But maybe they don't really know what an octopus really looks like. So when we're doing octopus, or some of the other animals that they might not be familiar with, I find live shots of the animals so the kids can see it. I found this one of an octopus crawling across the deck of a boat.

Oh, cool.

Oh yeah. They were just like fascinated with it.

Great. The real, live experiences that they wouldn't have locally.

Right. Cause we're not close to an ocean by any means.

That's cool. Alright. So this continuum of innovation- when you think about Rogers' Continuum- innovator being on the one end all the way to the laggards on the other end- where do you see yourself on that continuum with regard to your technology use?

I think with technology- I'm not this way with all areas- but with technology I would have to say the early adopter.

Okay. Can you talk a little bit more about that?

Just, I like technology, so I'm willing to try it out and see what happens and, you know, experience it. I have a son who's very techie. And so he's always bringing me up to speed with different things that I may not have known without him, and-

Sure.

So I try to- I try to stay as much on top of that game as I can.

That's great. That's great to model for your students. How about when you think about adopting a specific technology or innovation, what stage do you find yourself in? The knowledge all the way to the confirmation? Where do you feel like you're at with that?

This one was harder for me. I'm not sure- what was knowledge again?

So you're kind of trying to figure it out. You're not really sure what it is. So when you think about ipads or technology in the preschool classroom for instance- which is the real focus behind the study that I'm doing- when you think about that particular idea of having ipads in your classroom environment, where are you? Knowledge is kind of finding

things out about it, like how's it going, what might it look like, lots of questioning. And confirmation is at the other end. You've already put it into place, and you know how it's working, and you know why it's working and you really think it's a solid piece of your program.

Okay.

So in between there, you have people that are maybe persuading you to kind of think about it, or-

No.

You've seen other things that are persuading you to try it out.

Probably the implem-

Implementation?

Yes, thank you. Because I would like to find out more ways to use it with the kids to increase their skills.

Okay.

And I don't think that's firmed up yet, you know-

Okay.

For myself. I would like to find ways of using it, maybe with just those kids that are lagging behind. And find those programs that would help them with their skills, and that kind of stuff. So.

Great. And those- I mean, it's kind of a fluid thing. You can go back and forth so you want more knowledge in different areas. The more you use it, the more questions you have.

Yeah.

Alright. So when you use technology, how do you plan for it? We talked about that a little bit earlier, but how do you plan for its use?

Well, they- in our classroom, it's- they get one day a week. We get- Thursday is our day. So during center time, they are out for them to use whenever they choose during center choice- free choice time. The one that's in our classroom all the time, like I said, I plan for it around the curriculum that we're working on. Or I like to have it available for their questions when they ask something that I can't answer or would be enhanced by them actually getting to see something.

Great. So as a tool for you and for them.

Right.

Wonderful. How about some specif- see, now I can't- specific examples of how you have used technology in your classroom this year? You talked a little bit about the zoophonics piece already, but other examples of how- maybe some 'aha' moments with the kids, or some times when you thought, "Ooh, we shouldn't have used it that- there might have been something better to use instead?"

Um, it was really interesting. In the beginning of the school year, the kids weren't real focused when it was time to read a story. And their attention would wander. And we had- something that we had to be quiet for. I don't- it wasn't a lock-down, but something that we needed to be quiet. So I did a book on the ipad for the kids and they were like glued to it. So I don't know if that is good or bad yet. I haven't decided. But yeah, they were so in-glued to it, and they were interested in the story. And I hadn't gotten that interest when I was just reading a story before.

Okay. So was it you reading the story on the screen, or was it a voice within the ipad app reading the story?

Yes. It was the- the ipad- was reading it to them. I was just holding it up and turning the pages when needed.

Okay. Interesting.

It was very interesting.

And so was that something that you continued through the year with them?

I- just now and then. Because I- I'm such a book lover that it was important for me- and I think it's important for them to develop that- I wanted them to learn to read books. Technology is great, but I think they need the real books too.

Absolutely.

And they did. They learned to- to appreciate the books. They spent more time in the library. So I don't know if- if some- parents are getting away from reading actual books to them, and doing more on their phones and ipads and stuff. Cause it took time for them to develop that interest.

Sure. But you gave them some of both.

Right.

So a balance. Wonderful. In your opinion, how developmentally appropriate is the ipad?

This is one I actually struggle with. I think it's good that the kids- I mean, technology is here to stay. It's stuff that they're going to need. But, in moderation. Because kids- young kids need all the tactile, hands-on stuff that I don't- you know, I don't ever want to see replaced, obviously. Just like I said with the books. They were much more into the tech- the ebooks- than the real books. And they had to develop that desire to go look at a real book. So, you know, I struggle with that. I think that they need the knowledge because it is here to stay. But, definitely not replace other things.

Okay. How has your teaching pedagogy been influenced or not influenced by technology? How has it changed your practice?

I think it's very much influenced it, just with the Creative Curriculum, and taking the observations right on the ipad. I had a little girl one time ask me who I was texting.

[laughs]

And I showed her what I was doing. And I read to her- I said, "I'm typing in what you guys are saying so-" I read it to her. She was- she was actually impressed. [laughter] She was like, "Whoa." You know. So, I think it- you know, I would have never seen that in my classroom when I was in school. Even- like I said, this is fifteen years now preschool- even ten years ago when I was at Head Start, this wasn't- it was all hand written notes, and it has really made my job easier.

Good.

I think.

Good. How about ways that your students react when you're using technology? You talked about the ebook experience. But what else are you seeing from them when you actually implement the technology in the classroom?

They like it. They gravitate to it. For the most part. You have a few ones that hold back and they want you to go over it step by step with them. But a lot of them are willing to just try, and punch, and touch, and see what happens kind of thing. That's the majority of the kids that are wanting to do it. And they'll ask to sh- once they realize that I start showing them videos of different animals, they'll say, "Oh, can we see a shark?" They want to see a shark on the you tube. Or they'll ask for other things on the you tube. And they enjoy it a lot.

When you have it out for choice time, do you see it's used pretty much often? Or is it a station that sometimes sits and kids don't go there? What does that look like?

No, it's usually we have to say, "You've been here for ten or fifteen minutes. Now you gotta let somebody else have a turn." Cause we only have six.

Right.

You know? And there's sixteen children. So.

So setting those limits for them.

Yep. Yep.

Okay.

They need- have to be told to go somewhere else. For the most part. You always have a few that will play with it for a while and go, "I'm done," and go on. But a lot of them you have to say, "Okay. Time's up." You know?

Okay.

"Let's let another friend have a turn." [laughs]

Sure. So this one's related to that. When you have the students using the ipads, can you describe any interactions you witnessed between the students when they're using them?

Yeah, actually, a lot of times they'll be watching the person sitting next to them and they'll go, "I want to play what you're playing." And so that person will show them what- what app it was that they got onto. And-

So you are seeing some communication between them, even though they're-

Yeah. It's still limited, because obviously they're focused. But, yeah. They are- there is some sharing back and forth.

Okay.

But yeah. Conversation is very limited. So it's another reason that at four years old, they need to have moderation on the ipads.

Right. How about your beliefs? Describe your beliefs about the impact or lack of impact technology has on your students.

Well like I said before, with the- it's here to stay- it's not going away. So they need it. They need to know that- how to use it, and that it's going to be a part of their life from here on out. You know? But again, definitely in moderation, because at this age they need to learn the communication skills. It's amazing how- you don't realize that children don't know how to say, "Will you play with me?" You know? And not that that's technology's fault or anything-

Right.

But they need to learn those skills. Cause if they don't learn it now, when they get older it's going to be even worse.

Mm-hm. Definitely. How about specifically in your building? Describe any support that exists in your building regarding technology implementation. We talked about how your supervisor is an advocate for it, so you have those things available to you. What other supports do you have in terms of implementing it?

I think sharing among colleagues of different apps. Because I don't have young children. So some of the other colleagues do. And they'll say, "Oh, over the summer we found this app and it's really fun."

Okay.

You know? So that has been really helpful. Not having young kids, I would have to go in and try to find those on my own. And it's really nice to have somebody that does have young kids and-

They've already been field tested. [laughs]

Yeah. You know that- cause we've purchased some that we go, "Oh, that's not a good one." You know? [laughs]

Right. There def- the quality is different for sure.

Yes.

Well, the last one is specifically about ipads in preschool and kindergarten, so when you think about them being in those classroom grades specifically, anything else that you want to share regarding the use of ipads at that level?

I think they're necessary, but definitely moderation. You know? I think the kids need it. But not to be the primary focus. Definitely can't take away from teaching by any means. [laughs]

Okay. Thank you.

Participant 2

We'll just kind of go right from the beginning.

Alright

And we can just kind of think back to the class you just ended with in regards to the students we talk about or your role, okay

Okay, that's not a problem. That will be easy

Okay, so if you want to describe your role and the grade you teach.

I taught K this year with 24 students. It was kind of nice because I was able to have the same 24 at the beginning of the year as I did at the end, so they kind of grew with me this year and that major transition and roll out to the one to one devices.

I can't believe you didn't lose any in the process. That's great.

I did not lose a student. I did not gain a student. That's the first year in probably 8 that that has happened.

That is really rare. That's fantastic. What about your previous classroom experience?

What grades have you taught previously and how long have you been teaching?

I'll be at my 14th year next school year and 11 of those have been in K. The first two years I taught, I taught in 1st grade. There really isn't a whole lot of difference between the first year I started and where I'm at now since all these objectives have been pushed down and the demands of what kindergarten is now.

So, it's feeling like kindergarten is the new 1st grade or 1st grade is the new kindergarten.

Kindergarten is the new first grade

I would agree having come out of first grade. I can definitely see the parallels. How would you describe your level of comfort with technology for your own personal use?

I'm very comfortable with it. Um, whether it's ipad, Mac book. I jump back and forth to Windows on a PC, phones. I moved into the smart phone era. I drug my feet on that for a long time, but I'm finally there (laughs).

Can you imagine not having one now?

Um, no I could really go back just as easy.

Wow, I'm really surprised!

I always have my ipad with me so...

Well, that's just as good in most ways and how many people actually use the phone any more really?

Not as many as they should

Yeah, no kidding. Well how about

Personal adept

Yeah definitely

How would you describe your level of comfort with technology in the classroom?

Um, in the classroom, I'm getting more and more comfortable. At the beginning of the year, I was quite apprehensive, but excited because I had so many different technologies going on and learning how to juggle everything from audio systems, a Smartboard, one to one devices, my own computer, software...it was a lot all at once even though we had the support system and the training, you don't really pick that up until you are in the fire. That's so true and we'll talk about that in the next one. How much training have you had regarding the implementation of technology in the classroom?

Um, I was fortunate enough to go to MACUL (Michigan Association of Computer Users in Learning) two years in a row through a grant that we got. Um, and I've been trained down at CBD (a consulting firm working with the district through the technology bond) with their people. Also, I have had several different trainings within our building and district. I would probably say altogether, probably 15-20 days.

Okay, over the course of this current school year?

Over the course of three school years

Okay, and just a clarification for the gal who will do the transcription, MACUL is the state level computer users in learning conference for the state of Michigan and CBD is a consulting group that worked with the school district he works for in carrying out their one to one technology bond. Um, okay, so this will be the sixth one. I'm excited to hear your experiences with using technology in the classroom.

Um, (laughing), at the beginning, it was extremely apprehensive because of the fact that kindergartners are still so hands-on and manipulative-based. You go to a flat surface and try to manipulate those things, it's hard to let go of, but once you start to let go of some of it, which you still have to have that common balance...there still has to be the hands on, tactile, but yet they learn through electronics. That's the way their brains are wired

nowadays. I started by using the ipads in the classroom, I want to say, about three years ago, we had our first set of traveling ipads in the building that we shared and I'd get em in for about an hour...an hour to two hours a week and it was very, very app based and still app centered the first year. The second year, a little bit more I knew what I was doing. I was a little more comfortable and we were able to do some create things or create activities on the ipad using Educreations where they could work out math problems for me and record them if they were working them out so you could get the math language still in there so it would be like an addition problem. It would be as simple as $2+2$ and they were drawing 2 circles, adding putting the addition sign, drawing 2 more circles = sign and then writing the number sentence underneath which was really fun to see and they actually let me in to a couple of my ESL (English as a second language) student's lives understanding they knew what they were doing much deeper than what I hadn't previously known...er, I did know, but I didn't know if they had the mastery of it, but when they can apply it, you know they have the mastery.

Absolutely. When you said earlier Alan about letting go, were you talking about yourself as the teacher letting go of some of the practices you had before and allowing them to do them with a different tool or the student?

Yes, letting go of the tool, the tool you used before, the manipulative base like the bears or the blocks, unifix cubes, pattern blocks, those kinds of things. Now they can do it right on their device or on the interactive board which I tend to use more at the beginning of the year than I do at the end of the year.

And you talked about the balance as well, so did you still utilize those manipulatives um alongside the technology?

Yes, um writing center...classroom centers where there's manipulatives and then they might go to a center where their devices are and then they move to a center that has manipulatives to one that is a device based or even smartboard based or we don't have the smartboards, but interactive whiteboards.

Okay, alright, well some of these...the next set of questions...are really getting at the gist of the research I was doing to see if teacher's attitudes regarding technology make a difference regarding the implementation in the classroom and so, the first one is please describe how you decide whether or not to integrate instruction in your classroom.

Um, it really isn't a decision now...

Okay, say a little more about that since you are really in a unique situation.

It's kind of more..it's pushed in even though I had the buy-in, I have to use it. It's there and taxpayer dollars have paid for it, so there's an accountability from the taxpayers that it's being utilized. But, that being said, it's very important that the teachers have the buy in, the teachers decide to learn and experiment. I had to integrate it slowly because some of these children are coming from homes that have never had an ipad in there or a

computer. They may have a smart phone. You kind of figure out what they have first and then slowly introduce the ipads. You introduce apps that take them along and teach them as well about how to use the technology, right from the get go, I did use the interactive white board by getting them to come up with the baton and click on a number or drag a word across the board or a letter. Um, my calendar is completely on the whiteboard now. I don't have a calendar station in my room.

Okay

Sometimes that's hard on me to have to refer back to my phone or my computer to see what the date is but, the kids have their routine and it's right from the first couple days of school and we just add to their calendar as we go through the year.

Okay, you kind of led into this next question when you talked about your own feelings and beliefs regardless of whether or not it was the bond you were working under but there's this continuum and I'm not sure if you've hear of it. It's basically about the diffusion of innovation and there's a researcher who believed there's a continuum that folks would fall on in terms of how they use technology themselves and if you have the notes, or the questions, there in front of you, you can see the categories where the far extreme on one end is the innovator followed by someone who is an early adopter and then it kind of progresses on up to those who really drag their feet and are last to adopt. So, as you look at those categories, innovator, early adopter, early majority, late majority, or the laggards, which do you kind of align yourself with in terms of technology use? I would say I am starting to move between early majority and early adopter.

Okay

Because of my different...um...my feelings about the technology how I integrate it to where I'm getting the students to start to move at their own pace and there's a lot more to prep the instruction going on through the use of things like Moby Max which is an online resource that we have the district has purchased. The kids use that for math and I'm able to go through and set every student at their ability and then I can go back and see how they are doing and then where I need to take them from there. Um, we got more create um processes on the ipad where they are creating stories, creating all kinds of things.

So as opposed to the consumption and kind of the app based and consumption environment you talked about early on?

Right, in kindergarten is heavily app based even though there's Moby Max is an online piece. With that, to make it easy on myself and the students, I make that into one of the little apps on their ipads. You know, you can do that and add it to their home screen. They just touch it, boom, it takes them out there on the internet right to where they belong and you don't have to have them searching and stumbling across something they shouldn't.

Good idea

Because I mean, it's easy to make a mistake

Absolutely, and scary too

Okay, so the same researcher talked about um different stages along that continuum so what people are kind of engaged in relative to them making a decision about whether or not to implement. So, on the initial stage is this knowledge stage where you are working to learn just as much as you can about what the innovation is and that goes all the way up the continuum to confirmation...you know what it is and you implemented it and you feel like it's the right thing to do so you continue to do that. So that continuum, where do you see yourself currently...the knowledge, the persuasion stage making a decision about whether to implement, implementing it or the confirmation of having implemented it?

I'm solidly in implementation. I don't know, it's going to take a long time to get to confirmation because you're always second guessing yourself still in the stage that you're in. You know, you're implementing so many new things and it's hard to get that confirmation, but What sorts of things have you gotten so far that kind of lead you in that direction? As a result of implementation so far, have you had things happen that maybe wouldn't have happened before in your previous experience without the technology?

Um, with as easy as it is to differentiate instruction, again through Moby Max, Raz Kids, you can have those students working at their level all the time instead of teaching to the mass and have your high kids, your low kids differentiation fall apart when you can't meet with this group or you know what I'm saying there?

Um-hm, definitely.

It's hard to describe.

Well differentiation, it's hard to do, so that device, that tool has helped you to do that better?

Yeah, more efficiently.

Good, okay, how about in your planning? So we know you use it, you use it for a variety of reasons. How do you plan for its use?

The initial stages of planning to use it to reinforce what has already been taught and get that baseline for the children, make sure that they're solidly on good ground and then figure out where they are um...academically, okay this child knows all of these, so I need to move them into a different category. It makes planning, at times, a little more difficult I would say because you begin...you have a lot more information and it's instantaneous information. I don't know if having too much information is always the best thing because you are deciphering it all and deciphering it all, you start to question yourself and then is this child missing something here, but not here? How do I go back and reteach this even though they have the next three stages?

Right

If they are missing one intricate piece but... It's made planning a little more difficult that it may be at times, but at the end of the day, your end project is always more complete.

That's interesting

A child's education is more complete, I feel. I have kids reading better than I thought they would've. The gains they made, I didn't think they'd make it as far as they did, but when I look back at Raz Kids, I saw how much time they were putting into their reading independently where they may have logged in at home or at a restaurant...I don't know where they've logged in at, but you're seeing how these reading minutes go up and it's like, oh I can make that connection of why they're doing so well.

So you're attributing that growth to their time with technology that they may not have otherwise had that same growth if they didn't have that resource?

Right

And it's available to them outside of school as well?

And also knowing where some of these children come from...books are at a premium. They don't have them. Interactions sometimes with mom and dad aren't there, but they're into their device and reading, so they're gaining.

That's good news. Um, you mentioned several of these examples already for the fifth question...some specific examples of how you've used technology in the classroom. Are there other things that you want to add to that question or..

Um, I've used Raz Kids, Moby Max, Pocket Phonics...those are huge ones. The app that inspires software for our interactive whiteboard. My lesson plan books are now online with planbook edu

Okay

Which I can have those flip charts right into there, into my lesson plan book to where my administrator can pull them up if he wants to see them. I can store them there, so the next year I can download that plan book and then you tweak it accordingly with where you are

That's great

And you can link it right to the standards. I have all my standards in my lesson plans and it's really changed the way you lesson plan now?

So, it's changed your instruction and your planning?

We can actually share our plan books with each other where the three teachers at my grade level, we can be planning with each other to know where each other are at so, its' kind of innovated what we do

Absolutely. Now, the sixth one is specific to the ipad. In your opinion, how developmentally appropriate is it?

It has to be balanced because again, kindergartners are so tactile. They have to have those objects in their hands as opposed to junior high/high school where the device is probably more captivating than the teacher. (laughs) The kids need that human component at such a young age and sometimes I think the device starts to turn children...um...into not really social misfits, but they miss social skills that they need and I think our world sees that today. How many people do you see walking down the street with their head into their phone?

Right

Are they aware of their surroundings? Do they say, hey how are you doing today or do they just smile and nod? You know, that goes so far if we can teach these kids even at kindergarten and first grade those simple social skills and they also learn the device and can balance both of them, I think our world would be a lot better.

I've heard you say balance several times through the interview, so that is important. How about your own teaching pedagogy? How has it been influenced or not influenced by technology? You've talked already about how your planning has changed and your actual teaching has changed. What about your thoughts around your pedagogy?

Um...it's enlightened me a lot on a lot of different levels. I am understanding and recall of the standards a lot faster to me now and oh, that's in that strand...you can almost say the numbers and letters to it because you have worked with it so much. Um, just mapping an outline of what you are going to do for the week is already pretty set by Friday because I know where I'm going and where I've been and I can look back at my plans and say yep, I've done that, we've done that...oh, gotta move that to next week we didn't quite get there...oh wait, I've already gotten through this and added to my lesson plans stuff that I was gonna do next week this week so we are moving on

So, really responsive to your students based on what you're seeing from them...lots of formative assessment as you're going through your week?

There's constant assessment going on.

How about the ways your students react when using this technology? How do they react knowing it's a one to one district that starts in kindergarten. What are their reactions? They absolutely LOVE getting their ipads. The day you hand them their ipads, oh my goodness, sometimes it's hard to keep them on the floor and you know those little guys, they are very excited. They jump right up to want to participate and coming up to the

board, they want the microphone, they want you to put the microphone around their neck. They want to share with their friends what they have written. Um, like during writing time, I'll walk around with my ipad and take snapshots of their work and then I reflect them up on our screen and I'm able to pass the microphone around to those kids and everyone can see it. They're not just holding up the 8x11 sheet of paper and reading it. They can look at their paper, they don't have to be in front of the class. They can be in the back of the room reading their paper off of the screen and they have much more confidence in their voice and the kids are like, oh look at! They did this or they did that in their writing and you can, depending on how you reflect it with what app you use, you can actually make corrections, show them, highlight what they've done really well, what they need to work on and really have changed how you teach. When I came to the district, it was use the overhead projector and that was the technology

What a difference, huh?

To one to one devices, smart boards, sound amplification, double screens...I never thought I'd use 2 screens at once and now I am constantly using both screens for different things..different images on each screen and the kids have really taken to it.

Now what about the interactions between the students when they've engaged in ipad time or when it's part of your lesson, what do you witness between the students?

They're...one child will learn something and it's like the old telephone game, they're tapping their neighbor and teaching that neighbor, then that neighbor is teaching the next neighbor and it goes right on down the line except they don't get lost in translation. (laughs)

That's great. I know there are a lot of things...a lot of people who were concerned about as you mentioned before the social nature of our world and how that's changing with devices and how people don't necessarily engage in conversation/communication in the same ways and so do you see when the kids have the devices in hand, do you see them doing anything differently communication-wise? Do you worry about them not communicating? Do you see them doing more of it because they are sharing in their learning? What does that look like?

It's kind of a 50/50 split. Either you have the really social kids that want to share every single thing they are doing on their ipads and then you have the other children that are too self engulfed in the technology that they are just sitting there tapping away in their own little world and not real...I mean a bomb could go off next to them and they wouldn't even know because they are so into what they are doing. Now, which one's right and which one's wrong? I can't tell you that (laughs)

Something tells me with your style that you are still going up to those kids that are so into it and nudging, that you recognize the importance since we've talked about this balance through the conversation tonight that you still want them to be social and to know etiquette and to be involved with their peers sharing and that sort of thing.

Right..

Okay, just a couple more...this next one, describe your beliefs about the impact or lack of impact technology has on your students.

It is really impacting them at a high level. I think it's taking them up that Bloom's taxonomy, that scale so much faster because they're able to...they're not just watching the teacher do it. You are handing them their device and saying okay, it's your turn. They get to that mastery a lot faster because they are able to experience it. It's not one person doing everything.

Okay,

Um, the kids are learning how to reflect their ipads up. They're able to show their work. They take that ownership which is nice.

At the kindergarten level?

Yeah, at the kindergarten level! That's why I think it has to be working well. It's critical that the wifi is working well.

This one might go hand in hand with that. Describe any support that exists in your building regarding technology implementation.

We're a team so well. Um, people don't feel dumb by asking questions which is nice. You know, we're constantly knocking on each other's doors...hey, have you done this? I tried this and it didn't work or you should've saw what happened when I did this. The kids loved it or don't try this because that's not going to work...just the way we share...um, you know ... and she is really excited about all this.

That's great. That is wonderful.

And that coming from the personal part here...just knowing our staff, you really didn't expect her to be one who just jumps in and takes it and runs with it. Obviously, there's still the pieces that she's rejecting but for the most part, shares everything out and nobody feels bad about I didn't do this right, it's just hey, this didn't work and you see that a lot in staff meetings, lounge, 5 minutes before the kids come in, playground, taking the kids to lunch, right after school 5-10 minute impromptu meetings at the end of the day. It's a good staff that we have going on right now.

That's wonderful! Sounds like the culture of your building has really embraced this and you guys are really supporting each other which is so important with all of the changes and the new, the one to one was just this year for everybody for the 2013-14 school year, correct?

Yes

Okay, alright so last question, anything more you'd like to share about ipads specifically in the early childhood classroom. The interviews and the focus of my research is just on preschool and kindergarten, so anything that we missed or anything that you think would be important to share or to include?

My biggest thing and I've preached this to everybody in the building get good at one thing before you add the next thing. Get good at one app, get comfortable with teaching that app or get comfortable with Educreations because you can use it for so many pieces of your instruction whether it be math, reading, science...just get good at one thing before you try to take on too much. You can't conquer the world in one day!

Though it feels like you guys have though right, after this year? (laughs) You've taken on the world?

Oh, it's been a crazy year, but my goal for next year is to get more comfortable with Edmodo, but again I don't know in my head, I'm trying to figure out the best time to teach the kids. You've got to teach them the device. You've got to teach them digital citizenship right on down the line. So, when is the best time to use that Edmodo part and how do you go about teaching that?

Well, it sounds like you're being very intentional with everything. You're not just introducing it for the sake of technology which is a big piece of the research I did. It's really planning with intention and you talked a lot about using devices to enhance your instruction. You said something earlier about using the technology to reteach once a student has something solidly that you are using the device to reinforce that, so it sounds like you are really planning with a lot of intention in mind.

You know, we're trying. You struggle at times and you pick yourself back up again and go again, so...

But you're putting yourself out there as a learner and modeling that for your kids that it's okay to take risks and it's okay to make mistakes, you learn from them and putting yourself in front of them in a way that maybe you wouldn't have without the device

Right

Participant 3

Alright, so please describe your current role. What grade do you teach and how many students do you have and you can think about last year's class.

Okay, my current role right now is the director of ... preschool programs as well as the lead teacher for their program as I was last year and I have 16 students of my own in my classroom, 32 students total that I direct.

If you can describe your previous classroom experience including the grades that you have taught and how long you have been teaching.

As soon as I graduated from college, I was a substitute teacher in elementary schools for 6 months. I then was hired by a Head Start in the area and I taught for them for 8 years where I had 20 children between the ages of 3 and 5 in my classroom. I then was hired by another district, where I was just solely their Director for approximately 6 months and then transferred out here where I'm not the director and teacher for their preschool programs, so all of my teaching experience has basically been in early childhood and I have also taught summer school for K-2nd.

Wonderful! So a mix of both classroom and administrative experience that you have?

Yes

Okay, how would you describe your level of comfort with technology for your own personal use?

Um, my personal use, I am very aware of technology just because my husband and my son are very technology driven. They do wonderful things and they try to teach me, but I feel that I would gain a lot more by taking classes and such, so I would say I am moderate. I feel comfortable around it. I'm very interested in learning more about it, but I'm just not as quick as others to pick up on it so...

Is that the same or how would you describe your level of comfort with technology in your classroom?

It would be... I guess personally on my own, I have devices. I have an iphone, an ipad, laptops, computers, and in the classroom, we've been talking about getting smartboards and such and it's just basically research I have done on my own. The ipads that we use in early childhood are more for supplement than direct instruction, so um..I feel comfortable with that piece, um but ah, I guess I would be near the beginner part of it for implementing it within the classroom because I haven't had a lot of opportunities to do that.

Well and that's the next question related to that. How much training have you had related to implementing technology in the classroom?

None in Head Start. We actually were not even allowed to have email and the children did actually have computers but they were all um, cd, dvd-rom um...disks that were not developmentally appropriate and they were very cartoon like um didn't really serve as a supplement to help with learning, but more it was just an area that wasn't really a focus for us, but um...I have done a little bit of training on my own just through a couple conferences I have been at and just looking online and then through the ESD (West Shore Educational Service District), we've had a few things, but really our district has not offered training for preschool and I am part of a technology team and we've met once to kind of talk about what our ideas are for the future, but we have not met since.

And so, the team is a district level team? Prek-12?

It is. It is prek-12, yes.

And you have a voice on that? That's great!

Yes

Describe your experiences with using technology in the classroom. You talked a little bit about your Head Start experience. What beyond that in terms of technology?

We do use ipads right now within the classrooms and those um...are really interesting. The children really enjoy taking videos and photos so if they complete something for part of their discussion, they can go and take a photo of it because we share at the end of our free play what we've been doing, what our plan was, and how we finished up that so they can show pictures and they also really enjoy taking video of one another if they're talking about something special that happened or we've done kind of like reports for the family. We talk about...we send home a note saying that relate to a theme and the family would talk to the child about it and then the child would come back and talk about what they talked with their family about and then we would record that so they could watch it over. We had like a community helper day where they each dressed up and we took videos of those. We've done slideshows with the kids over things that they've done throughout the year. Um, we've used it as a tool for kind of virtual field trip. We did things for outer space and we actually went on the space shuttle and watched a tour of that and we've also um, looked up things culturally. We're in a very rural district and so if we want to bring culture in, we use our ipads to show different things and different cultures and different celebrations. So really it's been a tool just to kind of supplement our learning and children do have some apps, but to be honest, I haven't really taken classes on real developmentally appropriate apps for kids our age, so um, it's basically the research I've done personally to look at what those apps are and I've got some recommendations from others, mainly kindergarten teachers of what they use and so we've downloaded a few of those, but right now, um, we're looking at trying to get some of our budget to go toward buying more extensive apps that could be of supplementation for the kids so...

Wonderful and your answer to that will probably be a piece of some of the questions coming up here. The next one is describe how you decide whether or not to integrate technology in the classroom.

Really a lot of it comes down to budget and with us, we just are doing huge moves (classroom and program was relocated over to the elementary building) and so um, we had to and we did an expansion, so a lot our budget went to that but we are looking for next year of placing some of that aside to possibly um, purchase some more ipads for the classroom cuz right now, we have two and then um, we also want to maybe incorporate maybe a smartboard and we have been working with another district that's close and their choices and what they found was beneficial and not and what they purchased and so um, another thing is training. Um, I am in my early 30's and I am the youngest of my team and so it's been also a lot of teaching on our part um, to kind of teach those that haven't used technology before that we're starting to implement that in the classroom so we look at how much training in addition to knowing what the device does and how it can help kids. What about the people who will be using it and how are we best going to teach them? Another thing that we really think about out here is that we are so rural that a lot of our families do not have internet and so for us to make contact via email or what not, families, some families have smart phones and they'll tell you they don't use them and I don't know if that's truthful or not, but we thought about setting up a webpage for our preschool that would be solely locked in for our families and they said they'd rather have paper copies weekly of the newsletter, so um, it just depends a lot on budget and training and making sure that we reach the needs of our whole staff... some of them are...two...there's 4 of us...2 of us are beginning to moderate and 2 of us are very beginning. So, um, we look at time and all of that stuff too.

And in your role as both teacher and director, you're aware of the needs of the team and not just your own comfort, so that's important.

Yes

Okay, so in the research that's related to the study that I'm doing, there's a researcher named Rogers who has developed this continuum related to the implementation of an innovation... It's called the diffusion of innovation. He talks about how people fall somewhere on this continuum from innovator, those people that are you know, thinking about what should come next and what's out there to people that are the laggards that are really slow to implement and so there's this continuum with innovator at the one end followed by the early adopters, the early majority, the late majority, and finally those laggards. Where do you see yourself on that scale in terms of technology use being an innovator, early adopter, early majority, late majority, or the laggard?

Um, well in a perfect world (laughs)

Be totally honest...there are no wrong answers

Okay good. In a perfect world, of course you would want make sure that you're implementing and keeping up and supplying the best technology that's *developmentally appropriate* for the kids and not just what the new item is, but actually there's research behind it that shows that it is helping children in their learning and they are using more technology at home, so of course you want to incorporate that at home. Within this district and within my education and the education of my team, I kind of feel like we're in the middle toward the end just because we ourselves are learning about this technology and to be honest, sometimes the kids know more about it than we do coming in and I had a couple of preschoolers coming in this year that could navigate the ipad quicker than one of our associate teachers and so um, it's..in a perfect world, I would love to always have the training and the budget to be the early innovators, but I feel like we're kind of that majority towards..I don't think we're a laggard because of course we want to incorporate it, but I think we're more towards that end of the spectrum.

Okay, in the next one is kind of when you think about the adoption of a specific innovation, maybe it's ipads, maybe it's just a different form of technology in general, but when you think about the adoption of one, um, what stage do you currently find yourself in? The knowledge stage is at this far end where you're learning about it, trying to figure things out and confirmation is at the other end...

We are definitely knowledge (laughs) We are all knowledge. Um, I feel like, ah, I'm hoping that um, and I've kind of pushed that ah, we're very fortunate out here where we're a prek-12 district so I feel like our district really takes care of us at the very early level and has included us in the committee and I feel that we do have a voice in that so hopefully, when they do plan the trainings since they do plan to implement a tablet throughout the district as well and it was hopefully going to happen this year, but I'm not sure if that's true and they have been talking about switching around some of the Elmo devices and the Promethean Boards and those sorts of things, but I feel like finally prek has a voice in that and so they will provide training, but hopefully if we attend that training, it will also be geared toward us, that they'll remember that we do have 4 year olds in the classrooms that can't necessarily reach as tall as a 12 year old, so we buy the kind that can tilt down or we look at the different devices like the Oscar, I think it was called, that will project on the floor versus going with what everyone else is getting so we're definitely at the knowledge stage...very much so.

Okay, that's great that you guys have representation on that team though. That's important. So, when you do use technology in your classroom, you have 2 ipads you said. Other technologies in your classroom that you make use of?

Um, well we do all of our anecdotal note taking on line, so the lead teacher and the associate are also using the ipad. I bring in my personal ipad from home, the associate has one, and the children have one that they use. They um...we do not have any type of computer right now at this point, but the district since we did do our big move to the other building, there are some that are available that if there are any quote unquote left, preschool will be awarded some of those or we may have time in the computer lab. We of course use...when I think early childhood and technology, I think calculators, like a

typewriter type system, we've had the adding machines...just those are all also everyday objects that are kind of prehistoric technology are still used within our classroom.

And how do you...when you use technology in your room, how do you plan for its use?

Um, well we take the child's lead a lot on the focus of...we're very intentional about meeting our standards we have, but it's kind of the child led way, so I would think about kind of what the children are interested in that time and try to incorporate it in that. For say, if they are in dramatic play and they are at a restaurant, you could add an adding machine in there, a cash register so they could use those types of things or you could put the ipad in so they could look at different menus for restaurants so or they like to video each other and they look back on those. Um, so really, um, it's more of a, I guess, a supplement to help, but I've never left them alone just to sit on the ipad and play you know. It's more usually a teacher is around or we're helping with instruction or it's not...cuz sometimes at this level, if you get non-developmentally appropriate apps, it's more like watching a tv screen and it's not so much um, what do I want to say? Ah, it's not

Beneficial?

Yeah, beneficial. Exactly.

Alright, so um, from your classroom from last year, any specific examples of how you've used technology in the classroom?

Sure! We um, even though we're very rural, we still went to a farm and watched some chickens hatch online. It was kind of everybody kind of hooked up at the same time. It was online...we had to sign up through the school, so that was fun. We had winter Olympics this year and so we videoed and took some photos of that. Um, we've had cultural celebrations so we've watched um, for example, the children this year were very much into New Year's so we watched different New Year's in different time zones all over the world. We watched videos of those happening. Um, the children didn't really know what the winter Olympics were so we talked a little about figure skating since they weren't really sure exactly what that was so we were able to link into um figure skating that was occurring right then for the Olympics and so we watched some of those and um, we talked about different countries and we were able to open up the opening ceremony to use. Um, just calculators, just identifying numbers...we've used those. So really just...

You're used it to really open up the world to your kids in a very rural setting?

Yes, yes very much so

In your opinion, this is specifically ipad, in your opinion, how developmentally appropriate is the ipad?

It depends on how it's used. If you are knowledgeable and know the apps that should be purchased and be used for the age of the children that you're working with, um, I think it's a wonderful tool and I don't have anything against an ipad except for when I go to a place and see children sitting um and just playing on an app that looks like a cartoon that doesn't really have any kind of substance behind it. It's not intentional for knowledge. That kind of drives me crazy, but what I'm looking into for the fall is doing all of my books on tape, but through Estoria and Scholastic and you can buy an adapter where you can plug in all of the different earbuds and so that one ipad becomes like 6 books and so to me, that's a huge gain as to where my tape player broke last year, the headphones weren't working right. We had to worry more about some head lice things so um, I see it as a huge gain if it's developmentally appropriate and the person that is in lead of it is knowledgeable about what it's intention should be using it with the kids.

The next one is how has your teaching pedagogy been influenced or not influenced by technology?

I think it is influenced. I think technology influences you just overall, but I am a firm believer in a teacher being a guide and I guess I look at technology in the same way... it's a guide, a supplementer, really um, with early childhood, children take the lead in their own learning and we're here to assist them and guide them and I look at technology in that same way. It's here to assist me in my guiding and teaching of the children and it's a tool and um, kind of like how we look at the environment that we intentionally teach in as a tool, it's part of the environment and I've just always been one that I'm not aa teacher that stands in front of children and dictates what they learn, it's more about real experiences and kind of trial and error and inquiry and um, me guiding them through their practices and so, um I look at technology in that same way.

Great. How about when your students use technology. Can you describe the ways in which they react when they are using technology?

Um, well...if you were to just place technology in front of preschoolers, a lot of times, they just press buttons and they kind of scroll through the screens and unless they've seen some things at home, it's a lot of um, just kind of them discovering it just as they do anything else in the classroom so we have to be very intentional and direct. If there's a certain thing, a certain application we want them to use or if we have the counting machine out or the cash register or something in an area, we don't necessarily tell them what it's there for but we're being very intentional about what it's there for and eventually, they see us kind of using it and then um, but we don't say why we're using it, but we just start adding things up and they usually take the lead on that and then they start doing those same things. With the ipads, we've shown them how you can start and stop a video. Of course, we've got to get online to find those videos and that's something that I'm not okay with them just getting on Google and they don't even know how to do that sort of thing, but um...we've just had it at one time, just propped up and um...I can think of one thing we had again, it comes back to the Olympics...we froze a tray of water into ice and they had the little figure skaters and we propped the ipad next to that on the same table and they would just start and stop the video as they were using that area or

um...when we were looking at the space station, um, there was actually a woman astronaut that was giving the tour, so some of the girls ran over and got more girls to come over and watch that and they would stop and start that. We also had one of our um...ah...she was a consultant for the ESD (West Shore Educational Service District)...she showed us how to vote on an astronaut suit for...they had this huge poll going on so we got to take part in that but again, that was all kind of we had to show them those direct things, but it would be nice if we incorporate different technologies where it would be more trial and error and they could explore it themselves without damaging the equipment is the big thing since it's so costly.

Sure, so you mentioned one piece of this when we talked about the girls and the astronauts and how they went over and got other girls to come and see the video. Can you describe any other interactions with your students when they're actually using the ipads?

Oh, they LOVE to watch each other when they are doing videos and they will laugh and say do you remember when you said this? We've had too where they've quote unquote wrote in their journal and then read back what they wrote. They love to hear their voices on the ipad as well or when we're doing recall at the end of our free choice play time, um, and somebody takes a picture of a structure before they either put it away or change it, they really kind of build each other up when they use those types of things. They get really excited about how maybe they made the zoo out of the blocks this one day, but then this next day they turned it into a cabin and they'll actually go back and say yesterday when Noah showed us this picture it was the zoo and now it's so and so's cabin. It's really good for us as teachers as note takers for the anecdotal evidence but um, the kids they get really excited and um, it's all in the moment and it helps them go back to that moment or the time when they were learning certain things or the experiences and so, it's been really positive. The only negative thing I can say is they get upset since we only have 2 ipads within the classroom. It's hard to share a video with 16 children on a small screen, um, so I have had some that get a little frustrated, but we just had an ipad sign up and we actually had a timer for a while when there's things that are really popular like the astronaut video and so they would go over and set the egg timer for 5 minutes and of course, if there 5 minutes were up and they were engaged, they stayed but it also was um, a good tool for them to practice writing their names and signing up and they would actually go get the next person, or they would count down and say okay, I'm third on the list and you're after me and so, but it's usually really positive, self-building along with like collaboration and that with their classmates and that's exciting.

I love to listen to how you built those other teaching opportunities into just the sign up piece and the sign up wasn't just for sign up. At your level, you are able to teach them the name writing skills, the counting, and the ordinal numbers as you said. Um, this one is about your own beliefs and how...describe your beliefs about the impact or lack of impact technology has on your students.

Um, it has...it could...potentially it could have a great impact on our students, but I am just fearful that our district might purchase things that as a district, we as teaching staff are not ready ourselves to use and then to try to teach with those things with the children

and...and they may see us fail at it and then not be as interested so I know that technology has wonderful, wonderful things to offer but I feel like we are so limited in our, in the professional development that they give us that we may only use a tiny piece of it and so and personally, I have a child who is in a district that uses technology, but he told me this last semester, that he was really disappointed in how much he used it and that he felt that he carried it more than he used it so um, I think that for my preschoolers, I definitely need more education. I need to know what's out there that's not just so commercial and eye catching, but that actually has research behind it that it's gonna be beneficial for me to use with the children in the classroom and to make an impact on their learning versus just having it there just because the new things to use this year is ipads or whatever the technology might be, so I'm a firm believer in looking into the research first before just jumping and using it and making sure we're prepared to use it in the right manner.

Good. It's good that you're on that committee with that voice. Um, this one is specifically about the support that exists within your building, so if you can discuss any support that you have in your building regarding technology implementation.

We are just starting, our district is just starting to implement more technology within the students throughout the whole district. So, they're looking into tablets and right now, they're having the debate, is it an ipad or more towards Windows? What is gonna be best for the kids? We are installing Google Drive throughout the district now, so all of our laptops have been taken for some time to have some work done on those and so I feel like, we're in a very positive movement and I am supported in that movement and have been asked to be on that committee. It's been open invitation for everyone. Um, but our voice is being heard and our superintendent is very conscious of things that are going on around us in those positive and negative things and he's kind of looking over and deciding what's going to be best for us out here in this area where we don't always necessarily have internet connection or families don't have the opportunity, a lot of our families go to the library to read their email or they'll actually come to school and ask if they can get on a computer. Our school staff, a lot of them don't have internet at home, so they don't check their email until they come in in the morning because um, they're...the staff out here has been here for quite some time and so they don't have smart phones or um, I just taught one of our associate teachers how to take a text the latter part of last year when we were texting each other, she wasn't sure how to respond back, so it's just kind of interesting um, being in this area and um, but I feel like we are very supported in the decisions that are being made and we also have a technology person on staff that if we have any issues, we can call him and he is available to come and assist us with some troubleshooting we may have or kind of helping us in that direction of what he feels would benefit us most out here.

Good. When you call on him for support, is it mainly technical support to get things to work or do you have him in terms of instructional technology, does he help you with the implementation and thinking through those things too?

Right now he's part-time, so it is basically just tech support so for example, I dropped my laptop and it quit working and I had something due and so he came over and fixed it right away, but he has offered to do a session on Google Drive in the fall and so all of us plan on attending that so he is trying to make himself more available for the actual applications that come along with it, not just when there's a breakdown somewhere and a lot of preventative measure too. He'll try to tell us next time try this first so he's trying to teach us along the path, but right now it's just kind of when a crisis happens.

Okay, and the last question is if there's anything else when you think specifically about ipads in early childhood, anything less that you'd like to share regarding the use of them in preschool and kindergarten environments?

I sometimes feel like people are scared of them at this level. It's just another thing in the classroom, but really it's a wonderful tool that I think is, I feel like our PD (professional development) should be geared more toward learning how to incorporate these especially if our children are going into districts where they use them on a one on one basis. We could be teaching them the basics at this level so when they move on, they are ready to just kind of jump in and especially if our assessment testing is all occurring on the ipads, unfortunately it's not very developmentally appropriate when you get up into that level, but we can start exposing them to just the general on/off, how to move from one screen to the next, how to turn up the volume, just those how to even handle and care for it...and so, I think about all those things too that maybe aren't necessarily addressed when they first start using them one on one. I'm sure they do later in the elementary, but if we're really going to this one on one thing, that's something we could focus on here in preschool too, but we'd just have to have a budget to get enough of those devices. That will happen... (laughs)

Participant 4

So when you think about the initial questions, just think about your class from last year, if you would. And the first is-

Okay.

Describe your current role, and what grade do you teach, and how many students do you have?

Okay. I currently teach kindergarten. And I have twenty-one students in the classroom.

Okay. Kindergarten and with twenty-one students. Can you describe your previous experience, and what grades you've taught, and how long you've been teaching?

I have taught kindergarten and first grade at my school. I have taught kindergarten for nine years- I think I'm going into my tenth year of teaching kindergarten, and I taught first grade for two years.

Great. And how would you describe your level of comfort with technology for your own personal use?

I would say, for my own personal use, I am very comfortable using technology.

Okay. And what about your level of comfort with technology in the classroom?

Pretty much about the same. I'm pretty familiar with lots of different types of things and try to use a lot of things in my room.

Okay. And how much training have you had regarding the implementation of technology in the classroom?

I would say about a medium level of training. We have more technology in our kindergarten classroom than the other, so we get trained a little more often.

And when you get the training, is it there in-house with the tech director? Do you have outside companies come in? How does that training work?

Usually in-house through our technology director. [?] the only outside training we've had was people came in when we learned about the tech pieces that went along with our math areas.

Okay, great. And if you could- maybe briefly in this question because it'll come back again later in a different way- describe your experiences with using technology in the classroom.

It kind of varies. I've used an iPad just on my own. And then we have the ELMO and the projector that's hooked up to my laptop. And then I use the smartboard in my classroom and we have the touchscreen computers in our classroom that we use.

Okay. And can you describe how you decide whether or not to integrate technology in your room?

It kind of depends on what lesson, and if it's actually going to be beneficial to the student learning at that point.

And how do you make that decision in your mind when you're making your plans? How do you determine in your mind if it's going to be beneficial to them?

I guess I look at what topic I'm using. I don't know. In math I use it more often than in others because there can be more apps out there. And it's just kind of a group planning to determine what we're actually going to do- if it's going to add to the lesson and [?] of what we're working on.

Okay. So in the research that I've had to do leading up to the interviews and the surveys, there's a researcher named Rogers who has this continuum that he created about the diffusion of innovation. And on one end are those innovators that are out there kind of thinking of things that could happen- kind of the early thinkers. And at the other end are the laggards, who really res-

I'm sorry. Hang on just one second.

Kay.

I have a meltdown going on.

That's okay.

Part II

It's recording now. So, where do you see yourself along that continuum related to the diffusion of information?

I would see myself both at home and at home at that early adopter, even toward the innovator stage. At our school, I am normally one of the first ones that they bring the technology into. They hook it up and then kind of beginning bank that- kinda test and see if it works using it with my students. I have other teachers that will come in while I'm using it. So, and same thing kind of at home. I like to have the most current software. I just bought a brand new laptop because I thought my other one was too outdated. So I definitely think I'm in that early adopter even into that innovator stage.

Great. Alright. And the stages that are related to that- when you consider adopting a specific innovation for yourself, or you think about the potential adoption of ipads in early childhood, what stage do you find currently in with regard to either of those?

Again, I'm kind of in between the decision and the implementation stage. I definitely think it is important to make informed decision about what type of technology and see how it's going to affect either my personal life at home, and you know, my ability to do work at home, or how it's going to affect my students. I'm not afraid to implement anything that's new. And any of the stuff that they do bring in my classroom, I'm not afraid to jump right in and use it and see how it's going to change kind of the day-to-day running of my classroom.

Great. And the fourth question is related to that in terms of planning. When you do use technology in your classroom, how do you plan for its use?

I am fortunate to work with a team- or at least one other strong person that is also very up to date on technology. And we will sit down together and talk about how we are using it in our classrooms. And if they're doing something that I'm not doing and we kind of run our student data and see what different types of strategies and technology we can incorporate to kind of increase their engagement into- you know, just how to make our lesson plans more engaging.

Great. Can you share some specific examples of how you used technology with your kindergarteners last year?

Yep, absolutely. I have an interactive whiteboard in my classroom. And that's kind of the biggest piece of technology that I've used every day in my classroom. We use it to experience the online components of our reading and math programs. And the kids are able to operate it independently so that I integrated the whole software that had purchased for the smartboard. And they can use that for math stations and for literacy stations to work kind of in partners and work through- and work on some skills that they may need help with. I also have the ELMO and the projector that are on all of the time. And I have two student computers that they use for math programs and the literacy stations, as well as I have a touchscreen computer in my room that just full of early level software that I can tailor right to individual students' needs and pick which software programs kids can go on to kind of strengthen them. And then I got some new software from a speech pathologist this year that was really helpful in teaching some of my low language learners and kind of increasing their vocabulary development. So they got special time on those computers during the day to kind of increase their language abilities.

So you will use technology across all of your content areas, then, in the classroom?

I do. Yes.

Okay, great. Specifically related to the ipad, what is your opinion about how developmentally appropriate it is?

Um, I think it is definitely developmentally appropriate if it's used effectively. Our kids now have [?] use to that type of technology, whether they have it at home, or their parents have it on their phone, or- there's so many well-developed apps out there that can definitely enhance their learning. Again, it's just a balance of, is the program correct? And you really have to take the time to research the program and make sure it's addressing the skill that you want and it's not just kind of busywork for that student. Same thing, developmentally appropriate balance as far as time. You don't ever want them to spend too much time, you know, just engaging on a technology thing. You want to be able to teach them on their different strategies as well.

Okay. In regards to your teaching pedagogy, Heather, how has it been influenced or not influenced by technology?

It's certainly been influenced for sure. My whole approach to teaching has changed, just in the ten or eleven years that I have taught, just as new or better technology comes across and is brought into our classroom. It definitely changes the way that I plan my lessons. It changes the way that I present different materials to different students. So there's really- I mean, it's definitely a heavy influence on changing it.

Okay. Great. And can you describe the ways your students react when you use technology in the classroom?

They seem to be more actively engaged. I definitely don't have a problem, especially when we are using the smartboard and the kids are able to come up and manipulate the answers and the materials by themselves. They are always raising their hand, always very intensive- even my students who are maybe a little more shy or reserved. Or we have a lot of kids who don't have a lot of language so they might not be able to verbally answer a question, but they can come up and show us what they know by using the smartboard. So it definitely seems to reach more of my students that way. And yes, they're normally very excited and very engaged. They'll ask, "Oh, are we going to use the smartboard today? Are we going to do this today?" And when the light bulb goes out on our projector, they about panic because they're so used to seeing me do it on my ELMO. Or they see the thing, "Oh my gosh-" it takes them a while. So it's just kind of part of them, and they definitely expect it and look forward to it.

It's part of your classroom for sure. How about interactions that you witness between your students? I know that you don't have the ipads, necessarily, in your classroom. But any interactions that you can speak about when your students are engaged with technology?

Again, I definitely see that they are more engaged. I do think- you know, it depends. It's definitely neat to see them work when they're using it. Usually not when [audio breaks up] or they're at the smartboard together, it's kind of interesting to watch them talk back and forth to each other. And it's really- you know, probably three or four years ago, I wouldn't have thought that a five-year-old would be capable of maneuvering my smartboard independently. But that's something that they just know how to do. They're comfortable, and familiar with it. And the same thing with the computers. They're able to navigate through the different programs and stuff. So it's definitely, you know, neat to see them interacting with it.

Wonderful. Next question is about your specific beliefs. Can you describe your beliefs about the impact or lack of impact that technology has on your students?

It's surprising. I think that it has more of an impact than we maybe even have the knowledge of currently. I think I shared with you- I had a headphone system installed in my classroom, gosh, right at the very end of the year. Then I was beginning to even try that out for the first time and I was very hesitant. I didn't really want to wear this microphone around my neck and I had a student that sat kind of at one of my back tables and she was a very quiet kid but she's very intelligent and very on grade level, and she's a fabulous reader. And I used it, on the very first day she went, "Hey, I can hear you so much better!" And it was really a shock to me because I didn't realize- cause she's always participating, always engaged- her learning was on track. She just couldn't hear me that well sometimes. So just that little adding of the microphone made a huge impact on just what she was able to pick up from what I was saying. So I'm assuming that if it made such a difference for an on-grade-level, attentive student, just what a difference it'll have when I'm able to use it this whole school year with kids that maybe aren't picking up on- or wouldn't necessarily pick up on everything. Now the same way, I've seen my lower language students, they used that software this year, and it did- slowly- but it did start to bring up their vocabulary and the intensity and talking little bit more in class. So I think it maybe has even more of an impact than we realize it has or think that it could have.

That's wonderful. Those are great success stories to share, for sure. Regarding the support that exists in your building, can you talk a little bit more about that, in regards to supporting technology implementation?

Sure. We have one technology director that we share, preschool to twelfth grade. And he is fantastic, and he- we have a good working relationship, so he normally comes and helps me out whenever he can. But again, he is one person. So if there is something in technology that goes astray, or something's not working, he comes and gets to it as quick as he can, but he has a lot of people and buildings to watch over. So as far as fixing it, there's just that one person. Otherwise there's a couple staff members that we try to piece together and fix what we can. But there's not really anyone who comes in and supports instruction- or how to use technology in my instruction.

It's just more technical-

[crosstalk] We have had-

The technical support.

Just more technical support, yeah. Not instruction.

Okay. Gotcha. And the final question- as you consider ipads, specifically in preschool and kindergarten, anything that you'd like to share regarding the thought of having those available to students?

I think I would love to have some. I'm not necessarily sure if I'd like to have a whole class set of them, but I wouldn't mind having a few in my classroom to use to individualize- for my struggling learners, or for my literacy station type component. Again, I definitely think they have their place. I think that there's a lot of useful stuff out there that my students could grab from them. And I think they'd be engaged and excited to have that experience. I would like to do it in a manner so that they're not socially isolated and just, you know, hanging out by themselves. It would be fun to do it more as a group, or a whole-group activity, just so that they experience some of the different things that were out there. I know when I was at [?] training, they- we learned some really cool apps on making classroom books and stuff like that. So, I think having that technology would be a different way of engaging the students, and just looking at things in a new way.

Great. Thank you.

Participant 5

Let's start with the first one. Can you describe your current role, what grade you teach, and how many students you have?

Sure. So I am the director and teacher for [?] and we have preschool. So we had sixteen students last year.

Great. And can you describe your previous classroom experience, including what grades you've taught and how long you've been teaching?

I've been teaching in early childhood- this is my eleventh year. And this is the only grade I've taught.

Great. Eleven years. Wow.

Yeah. [laughs]

Wonderful. [laughs] Alright. How would you describe your level of comfort with technology for your own personal use?

Oh, I'm so comfortable. Probably too comfortable. [laughs]

That's a good thing. That's great.

[laughs] Cause it's on, like, near me.

That's right. You're surrounded by it. How would you describe your level of comfort with technology in the classroom?

Very comfortable.

Okay.

Very much so.

And what technology do you have available in your classroom currently?

We have the ipad. We have two computers. And we- like, my smartphone. I have an iphone.

Okay. And how much training have you had regarding the implementation of technology in the classroom?

I think we had some through the ESC. And then I just took some computer classes through college. But that's pretty much it.

Okay. And can you describe your experiences regarding using technology in the classroom? We'll come back to this later on with some of the other questions, but just kind of your overall experiences with using it in the classroom.

I have really enjoyed using it in the classroom. But then I like having different levels of technology. I think having the computer with the mouse- especially now when the kids use everything that you can touch- has been nice because it's reinforced hand/eye coordination. And you know, maybe history of what dinosaur computers looked like. [laughter] I've been- you know, kids, it's all around them. So, you know, they learn so much differently than what we did as kids.

So true.

So it's been nice to have that in the room.

Good. Can you describe, Jenny, how you decide whether or not to integrate technology in your classroom?

Um, sorry. My daughter just sent me a text message. [laughs]

That's okay. You're using technology as we speak.

Exactly. Right? I'm trying to multitask and it's not working.

[laughter] That's okay.

I'm sorry, I lost the question that we were on.

That's okay. Describe how you make decisions about whether or not to integrate technology in your classroom.

I basically- I mean, I kinda let the kids choose that. Which typically, they all choose technology. I mean, sometimes even if we're doing things related to that and they see it out, especially the ipads, it's like a moth to a flame. I mean, that is what they wanna do. They want to play on the ipad. [laughs]

Okay

So it's just available to them whenever.

Wonderful. So the next question is just a continuum that, as I've done this research for the dissertation, there's a man named Rogers who's created this continuum that when people consider some sort of an innovation, and when it's being diffused, they kinda find themselves somewhere along this continuum, from one end being those innovators that they're kind of always looking for the next thing and what else is out there, and at the

other extreme are the laggards that kinda go along finally, sort of not real willingly. And there's all those areas in between. Where do you see yourself with regard to technology use along that continuum?

I would say probably an early adopter.

Okay. And you s-

I don't think I'm like, the newest and greatest thing I have to have it. But I mean, I'm probably right under that.

Okay. Great. So he has a similar continuum around when a person decides to take on an innovation, or to adopt it for their own use. And the stage at the beginning is knowledge, where you're trying to figure things out about that particular innovation. And the other end is that confirmation. You've already implemented it, it's making sense that you've implemented it, and you're continuing to do so. As you think about technology in your classroom, Where do you feel that you are along that continuum?

Probably say confirmation. Definitely. We use it all the time.

Okay, good.

I mean, it's like your go-to guy.

Wonderful. Okay, so the next one kinda gets to the first question we started with, around how do you decide whether or not to integrate it. How do you actively plan for its use?

Well, with the kids, we have so many apps that they have, either it's an open-ended- like a house thing that they love to do, or it's got some sort of skill attached to it. So typically, whatever the lesson plan is, that can tie into that. But often, I mean, the kids have free choice often, and they choose what they want to do.

Okay. So you really follow their lead with it, and you said that all of them kind of gravitate toward it.

Yes. I think we need more ipads. [laughs]

Yeah, definitely. How about some specific examples from how you've used technology in your classroom this year?

I think this year we had a little bit of a struggle, just because we as teachers really relied on ipads for assessment purposes. And the other teacher in the room, she brought her ipad from home. And so we use those often during the year, and those were the only two ipads in the room, so that was the hard struggle of trying to determine when kids could use it and when we needed to use it and we're often trying to go between that. And then we would use our cell phones. And so we used it daily, but it was difficult to try to stretch it so everybody could use it. [laughs] Cause we need it a lot too. So.

That's great. I mean, it's a good problem to have. But definitely more would be great in your classroom.

Yeah.

So, specifically related to the ipad, in your opinion, how developmentally appropriate is it?

I think it's pretty developmentally appropriate. I mean, especially if the kids are choosing what they want. But again, it has to be monitored. Because I used it at one point for a project-based learning lesson. We were doing trains. We were using them- we used the ipads for research so the kids could figure out- they had questions that they wanted to learn. And they used the ipads to find the answers to those questions. And I had looked over- I had probably four kiddos at my table- and I looked over at the student and they turned back, and somebody was playing Angry Birds. So. [laughs] I mean, they know how to maneuver around the ipad. So it really- they kind of- they do need a little bit of a guide. Because I think when we're getting into that, it depends on what they're using the ipads for where the developmental appropriateness kind of falls into place.

Okay. And so you used it app-based and you also used it for research and those sorts of things

Yes.

Other ways that you've used it in the classroom?

Assessment. Even for the kids sometimes just want to type letters. You know? Just kind of have the notebook open and they're typing on it. They- I mean, there's so many things you can do. But yeah.

Okay. Great. The next one is about your teaching pedagogy, and how has it been influenced or not influenced by technology? When you reflect back on over your eleven years of teaching, how has it been influenced, or not?

Well, when I started- I mean, we had computer games that the kids used. And actually, it's funny, but when I first started, my youngest daughter was in preschool. She was three. And that was my own role. When I was student teaching, I was the computer girl. Like, I sat there next to the kids, and watched them play the game, and made sure they didn't click anything they weren't supposed to. And throughout the years, I mean, I think we've just really evolved. Now, I mean, they are in charge of the computer. If they want a game, they know how to do it. I don't- we don't need to helicopter them. They figure it out. And they do click things and that's okay. And now, with the addition of the ipads, I mean, it's a huge part of our day. I mean, it's a huge part of their life. So it should be. They need to be familiar with all of that.

Okay. So how about your students react. Describe the ways in which your students react when using technology.

Oh my gosh, they love it. I mean, I could honestly have an ipad for every student, because we've had to set timers because they don't want to stop. You know? It's like, "Okay. We only have the one to use today."

Right.

And it's never long enough.

So we do have-

I mean, and then they hover [laughs] over the next person's turn. I mean, there's like a group of them.

They're ready. So we do-

They are.

So we have- in the West Shore region, there are some classrooms and districts that have one-to-one devices happening, not necessarily at the preschool level, but definitely at the kindergarten level. What are your thoughts about that? One-to-one and developmentally appropriateness for kindergarten students?

I think again, as long as it's used in a manner that helps with development and that kind of thing, I think it's okay. But I wonder with the one-to-one how closely supervised they are? I mean, I'm sure you might have a couple Angry Birds guys somewhere

[laughs]

So I think it might be kind of hard to supervise it all at once. But as long as they're using it in an acceptable manner. You know, exploring but within realms that are appropriate for their age level.

Sure.

I think it's okay.

Okay. So the next one's about interactions. Can you describe any interactions you've witnessed between your students when they're using ipads. You said you just had the two in the classroom that were accessible to them. What interactions do you see when the kids are on those? Or not?

Well, totally- the kid that is on it is totally engaged. I mean, the fire alarm could go off and they'll probably still be playing. [laughs] But, you know, then there's always

somebody yammering in their ear, "You've been on there long enough! I want my turn!" So, I mean, those kind of interactions happen often, but as a collaborative interaction, sometimes not so much.

Not so much. Okay. So I've heard from other teachers, they're concerned socially about what these devices could do-

Exactly.

With the interactions. Okay. And how about your beliefs about the impact or lack of impact that technology has on your students?

Well, I think that we're in this really cool part of our, you know, life where it affects everything. And I think that if they aren't seeing that, and being able to touch it and experience it and use it, that they're at a huge disadvantage. I mean, what in- their world is going to be coming as they're older. I mean, if we're able to do the things we are now at this point, imagine by the time these kids are in high school what's going to be available. So I think that they have to foster that learning and be comfortable with it. Because even like, I mean, my parents are terrified of technology. My mother was just saying that she left for a week and my dad deleted every number out of the phone.

Oh no.

He was just randomly pushing buttons. He had no idea. He didn't change the channel on the TV because he didn't know how to do it.

Isn't that something?

It is. So I mean, if you look at that realm, I mean, it's amazing. So they have to be comfortable and not afraid of technology.

Great. And you set the foundation for that at three and four years old in your programs.

Exactly.

So how about any support that exists in your building regarding technology implementation?

Well, we're in that unique situation where we're not part of a school. So there's a TON of awesome things happening in our building. And we have absolutely no way to know how to do it. Even our wifi in our classroom's a little spotty at times. But, the school itself is doing one-to-one. They're all getting Chromebooks and laptops and all that kind of great stuff. But- and again, there's a cart for ipads. But because the grant was written for kindergarten through twelfth, we're not allowed to utilize those. And they're not even going to be using those this year, so-

Oh.

Kind of a bummer. So it's like, available, but not to us.

Wow. But they are going to make those accessible for students as young as kindergarten in your district?

Yep. And actually now, beginnergarten. Our beginnertenteners- cause we'll have those next year in our preschool room. They're going to have their own tablet with a detachable keyboard.

Wow. That's-

Yeah.

Exciting and sad all at the same time that-

It is. I feel a little, you know, a little left out. But-

Right.

So it is important that we're teaching them appropriately to use them, because they will be a part of their life next year.

Absolutely. So the last question is, just kind of as you think broadly about the use of ipads in the early childhood classroom, specifically in preschool and kindergarten, anything more that you'd like to share about that as a concept in education going forward?

I think, you know, there's good parts and there's bad parts to it. I think mostly they're great. But there are times when I see children who have- maybe their turn is over- and trying to get them to engage somewhere else is difficult because they're so wanting just to use ipads. I had a student last year, he was doing a puzzle and he could not concentrate because the ipad was near him. [laughter] And I was like trying to get his attention, you know, "Okay, your turn is over." I mean, it's such a draw that it's hard to maybe choose other activities that are just as appropriate for them too.

Sure. And you guys do a good job of providing those other choices, so that-

Exactly. There's lots of fun stuff! [laughs]
Absolutely.

He's just wanting his ipad.

Right.

Participant 6

It's started. So if you could describe your current role, what grade do you teach, and how many students do you have?

I teach kindergarten- all subject areas. And I had twenty-one students at the most. Part way through the year I did a math group with twenty-two students. And they were not necessarily part of my original classroom.

But still all kindergarten.

Yes, still all kindergarten.

Okay, and if you could describe your previous classroom experience, including the grades you've taught and how long you've been teaching?

I've been teaching for nineteen years. One year in a private school setting- kindergarten. Other than just one year in first grade, it's all been kindergarten experience.

Wow. Nineteen years. That goes by fast, doesn't it?

I know. I had to really think about how long that was.

[laughter] How would you describe your own level of comfort with technology for your own personal use?

I'm very comfortable using technology. I've used it since it's been available.

Of course. And how about your comfort level with technology in your classroom?

That maybe not as much, but the technology that we have, I'm very comfortable using. I- you know, we only have certain technology available in our classroom, but I use all of it that I can every day. So.

Can you describe what that is? What do you have available in your classroom?

I have an interactive smartboard. We have an ELMO. And we have classroom computers.

Great. And the classroom computers are for students. How many do you have accessible to them?

I have two regular classroom computers that are just a regular desktop computer for the kids. And then one [phone] that is a computer system that is called a AW [?] system. It's a specialized computer that has probably about- it's got six different subject areas, and probably about three hundred different learning- games, I guess you'd call them on it. And I can personalize that per student and per classroom, so that they can go to what I

want them to go to. So I can have them do just a reading exercise with like, Reader Rabbit is on there. So if I wanted them to do that I could have them do that. Or if I wanted them to focus on math, or if I wanted them to focus on social studies.

And is that a touch-

One of those.

Is that a touch screen device, or is that a-

Yes. That is a touch screen. It also- I mean, it does have a mouse too. And I think the kids are more comfortable using the mouse because of their computer class, but some of them really like the touch screen.

Okay.

But they can use either/or.

Okay. And your students do have a computer class outside of your class time as well, right?

Yes. Two days a week for forty minutes. And then they get to use the interactive smartboard too.

Okay. Great. How much training have you had regarding the implementation of technology in the classroom?

Not a lot.

That's pretty a traditional answer.

Yeah. If we get something new, we might get training on it. Like I think we were shown how to turn the ELMO on. But other than that- the smartboard we taught ourselves.

Okay. And how about your experiences using technology in the classroom? Can you describe some of those?

Um, it's kind of the same thing I've been talking about. The interactive smartboard- the kids get to use that during [?] time. And during other times. Sometimes we use it during instruction time- small group instruction time. And then the classroom computers for the kids are sometimes used at the end of the day. If we have extra time, they can get on that. Or during stations.

Okay. And can you describe how you decide whether or not to integrate technology?

It depends on what I'm teaching and what we're doing at the time. I don't use it for every single lesson, but I try and use it- I try to get the kids on the computer to do specific things at least once or twice a week. We don't have a lot of time for individuals to get on it because there's only two classroom computers, and then the [?] system. So that's kind of hard. But, the interactive smartboard is probably the one I use the most with the kids. And I use that just about every day. Not necessarily during every subject. Mostly during literacy activity.

Okay.

Sometimes during math.

So there's a couple of researchers who've done some research who've done some work in the field of innovation, specifically. And one of them is this man named Rogers. And he talks about this continuum that everybody's on in terms of diffusion of innovation and when new ideas are deployed. And he's got this continuum where there's people on one end that are the innovators that are kind of out there with the ideas and pushing things forward. And at the far opposite end are these laggards who really resist the change and take a long time to adopt it or accept it. So if you think about that continuum with innovator at one end, early adopter, early majority, late majority, and then the laggard at the far end, where do you see yourself with regard to technology use on that continuum?

Um, probably between early adopter and early majority.

[crosstalk] Can you say a little more about that?

Huh?

Can you say just a little bit more about that?

Well, as soon as it became available for us, any kind of technology, we've always jumped right in. But kindergarten is the only grade in our school that has the interactive smartboards. And we asked for those. We had been using the old smartboards before hand, and then found out this new technology was available for us. And so we jumped-jumped at that chance to use it. But I've not gone out and said, you know, written grants for anything and said, "Ooh, get the ipad," or anything like that. So I don't want to say that I'm like, innovator. You know. But yeah. If it becomes available, I'm like, "I've been wanting to use this in the classroom."

Great. Okay. So he's got a couple different stages- the same researcher- related to the adoption of an innovation. And so, as you think about where you're at currently, the knowledge stage is the person seeking information, trying to learn more about it, on one end. Where the opposite end of the continuum is someone who's at confirmation stage- and they're beyond implementation and they know why they're doing what they're doing. And so, knowledge, persuasion, decision, implementation, and confirmation- kind of where do you find yourself within those stages with the adoption of innovation?

Wow. Probably closer to the implementation part of it, I guess.

Okay. I mean, you've got a variety of things that you're using, and they're in use in your classroom and you do some thinking around how to integrate it so you don't use it all the time. You make decisions about when it's more appropriate than others.

Yeah.

Alright. When do you- and this is similar to the initial question, but when you use the technology, when do you plan for its use?

Um, well I know what programs I have. And I know what kinds of things the kids like to do. So if I can- if I know of something, then I can build it into the lesson. But I don't want to get them always using them. It's kind of like a hook sometimes. Like if I know something new is coming that I really want the kids to buy into a lot, I'll try to do it on the smartboard. They seem to be a lot more interested that way, with certain areas. Plus, it- with my math group- it gave me a way to get them one more way of learning something. I was always looking for an extra way for them to practice what they knew- or a different way for them to practice what they knew or to learn something new. I was looking for ways to teach them the same topic but in different ways. So that was nice to be able to incorporate any technology with that too, because it was just one more way.

Okay. And it sounds like you're willing to use it not just to introduce something, but definitely some practice and follow-up as well. I've talked to some teachers who say that they would never use it to introduce a topic- that they only use it to reinforce. But you see value in doing it either way. Is that accurate?

Oh yeah.

Okay.

In our- it's nice because in our reading program and our math program, they have a technology component to help introduce a topic. So that's kind of nice too, cause it's right there if I want to use it.

Great. This one again, it may feel a little redundant, but if there's any specific examples that come to mind about how you've used technology in your classroom- maybe examples that were - that went over really well that you were pleased with, or maybe there were some times that you, you know, really rethought it after the kids used the technology and it didn't go the way you had hoped, any specific examples that you'd want to share?

Um, the part that I have problems with with the technology in my classroom, like when we do stations- especially in our reading stations- I have so many kids that have to be independent, because I'm working with a different group of kids so I can't be right there

with them. And even though I show them how to do it and they know how to do it, and they understand what they're supposed to do, they don't always do what they're supposed to do. [laughter] They find a- you know, so sometimes I wonder if they're getting anything out of it. And so it's hard to monitor it. Like, for example, one of the things that they can do on the smartboard is a matching kind of a game where they have to match a beginning sound- or I put a rhyming one on there. So they have to match the rhyming pictures. And instead of actually trying to do it, they just guess.

Okay.

Because it's more fun to click and drag and drop, instead of actually looking at- because they give you three pictures. And then they have to pick one of the other ones and match it to the three pictures. There is nine choices. And then they'll just, you know, drag it to a circle and see if it stays there-

Okay.

Instead of actually saying what the pictures are. So I guess the monitoring part for me is the hardest part.

Okay.

Some kids really do it like they're supposed to. But then you got those that don't. And that's hard to monitor that and get them to do exactly what they're supposed to do on their own. I mean, but they're only kindergarteners. So-

Right. And you're teaching skills of how to use it right along with the content at your grade level. So.

Right. And, you know, they understand how to do it. It's just whether they want to or not.

Mm-hm.

And so, I can't be there with them the whole entire time when they're usually on their own. So that's tough. That's probably my biggest challenge is getting them to use it like they're supposed to.

Okay.

And that's true with other techno- even listening stations. I mean, if you can't- you know. Sometimes it's hard because they don't- they don't do what they're supposed to do. I mean, I can't monitor everything all at the same time.

Sure.

So independently is tough. Now, when I'm with them, and they're doing it in a small group- like if it's my small group's time to be at the smartboard, that works great. That's when I have the most success, is when there's a monitor with them. Now some of the computer programs are fine, cause they're very self-directed. But the smartboard's a little bit different.

Now with- you said you have the most success when you have the monitor there with them. Do you think that the success is also related to the group size, or do you have that same success if it's whole-group and you're right there with them? Do you feel like the number that are in the group impact your success?

Well, it's always nicer if it's a small group- around four. Because then everybody kind of gets a chance, and they're not all competing to get up there to do, you know, activities on the smartboard. But we have success as a whole group too. I just- you know, smaller groups are always nicer to have-

Absolutely.

[laughs] And to work with. You know? So.

Sure. So the next one- you didn't mention that you have ipads readily available in your classroom. Do you have access to some within the building to use?

No.

Okay. And this is something that maybe it's not impacting your own classroom right now, but you're certainly familiar with the ipad and the device and that system that you have with the touchscreen in your classroom may be similar. So in your opinion, how developmentally appropriate is the ipad when you think about your kindergarten students.

I have mixed feelings about using an ipad in a kindergarten classroom. I think that they can have their place, as long as it doesn't replace a lot of things. An ipad is an individual thing. And the kids have to look at the ipad individually. And they don't have to work together. They can use it on their own. And the same way it is with the computers in the classroom. And that's okay. It can have its place. I think an ipad is nicer for kindergartens because it is touchscreen. And you can lock it so it does only certain apps. But a lot of kids will just jump from one thing to another too fast, sometimes on an ipad, unless you've got it locked on just one app. But it's also very isolating. Like, at least with the smartboard, they have to work together and they have to do it together. An ipad is very isolating. It's a one-person kind of a deal. And I think that too much use of something that isolates kids, it hurts them because they don't get to work together. And there's a huge push with reader's workshop, and writer's workshop- you know, all these of workshop things- is because they need to work together. And they need to learn to work together. And you know, and that's a huge part of those workshops. And when you throw an ipad at them, Boom! They don't have to work with anybody. They can- heads down. And they

can look at their ipad. We've become so focused on, you know, looking down at this ipad and only doing ipad, we forget that we need to make eye contact with each other. And I think that's the biggest problem with technology that's individualized like that. I think that it's got its place. But I think that for the most part, kindergarteners need so much interaction that there's just- I mean, there's some development in appropriate things that you can do, as long as it's not for a long time.

Okay, good. I appreciate your thoughts, and that there has to be a balance. How has the ipad- and when you think about the technology that you have available to you in your classroom- how has your teaching pedagogy been influenced or not influenced by technology?

Um, I don't know. That one's kind of a tough one.

And you can think on that. We can move on to the next one. If something pops up, feel free to share. Some of these don't really-

I guess technology's been so integrated, it just kinda- it just kinda flows along now.

So when you think back to your initial days in the classroom, you know, obviously things have changed a bit since then in terms of what you have available to you. But it sounds like, from what you said earlier in terms of being the early adopter and being willing to use what's there, that that's your personality to utilize it, or make use of it. So when you reflect back to what you didn't have, and what you have now, has that changed your teaching style, or your thoughts about using it at all?

Well, gosh, it's been such a gradual thing that it's just kinda- just kinda has gone from every time something comes up, it's great. It's changed how I present things. It's really nice, especially with an ELMO to be able to present things to the kids as it looks like, instead of having the overhead projectors. [laughter] Holy cow. And I thought I could never live without an overhead projector, and then we got an ELMO and it's just- amazing. It just- I don't know. It's tough. Because every time something new comes in, I just kind of incorporate it. It's just another step up.

That says a lot about your teaching style. You're adaptable, and you've been flexible. And for you to feel like it's been a gradual integration is interesting, you know, when you think about- because I did this research and how the classrooms have changed even in the last five or ten years- that it's felt gradual to you is an interesting point that you've just be willing to embrace it and move forward.

Yeah, I can't say that any one thing has been like, "Holy cow!" Because everything has been like that.

Right.

From going from the overhead to the ELMO, and then having the computer being able to be hooked up to a projector, that was way cool. And then just- every time something came up, I just kinda did it because it was something new. I guess I just like that part of it.

Great.

Something new comes up and it's nice to be able to use it.

Wonderful. You mentioned a few minutes ago about your students' reaction, and sometimes using technology as a hook, and the next questions just says, "Describe the ways in which your students react when using technology." Other thoughts besides using it as a hook, or seeing them being more engaged sometimes using it as opposed to other methods?

You know, it's kind of funny. Because at the beginning of the year, they think that it's just the coolest thing ever. And they just- you know, when you can manipulate things on your whiteboard, "Whoa that's cool!" And then by the end of the year it's so natural for them to be able to do it themselves. And it's not- you know, it's kind of funny cause you go from the one extreme to, it's normal, with them. You know, it's just nice to have a different way for them to do it. Their reaction is, they want to do it. They like to be able to do things on the big whiteboard themselves. So it just is- it's kind of fun for them, I guess. I don't know. It's hard to explain. Because they do. They go from this awe and wonder to, "Hey, it's my turn. Move over. I want to do it now."

It's just what we do in this classroom. That's great. You mentioned- you have some strong feelings about ipads and how they really isolate kids. So maybe this next question, there won't be as much to say, especially since you guys don't have them in the classroom. But this one talks about any interactions that you've witnessed when your students are using ipads. So maybe instead of ipads, thinking about that system that you have in your classroom. And again, you talked about differentiating that according to a student's needs. So, is there just one student on that system at a time, or can a couple be there, on the-

On the [?] system? No. It's just a one-person kind of thing.

Okay.

And they all want to do it. And so that's the tough part. They all wanna get on that system and do that one, because it's pretty [?] and it's just on a little screen. And I mean, it was made specifically for early ed. So they all want that one instead of the personal computer when it's their turn to be on the computers. So, you know, and the other kids are always looking and watching, but it is hard to put two people on it, because it is a one-person kind of a thing.

So as other kids are watching the child that's on that system at the time, and they're observing what's happening, do you see them interacting at all? Or is the kid who's on the

system so engrossed that they're aware that kids are there but they're not really interacting at all?

No, they're not interacting because we put headphones on them, so it's just them listening.

Okay.

And then, you know, touching the screen. And I've tried to have them share, and it just is- they just want to do it themselves.

Okay.

So it just is kind of-

It is a personal experience then.

Yeah, it's a very-

Just a couple other questions. This one's about your beliefs. Describe your beliefs on the impact or lack of impact technology has on your students.

Um, well, especially the area that I teach in, I believe any kind of exposure we can give them is a good thing. And I think that they need to learn how to use technology. Because that's all there is out there in the world today. They need to understand it. And they need to understand its place. And they need to understand how to use it. But they also need to understand that they don't have to use it if they don't want to. There are other things that they could do. But it's there, and so- I don't know. It's hard to explain.

That's okay.

They need to embrace it, but they also need to understand that it's not going to- it's not the end all/be all. But yeah, it can be such an eye-opening, and it can take you so many places. There are so many things that technology can do that we didn't have before. And the world is full of technology so they have to understand it, and not be afraid of it.

Great. [phone buzzes] Now this one is specifically about your building. Any supports that exist in your building regarding the implementation of technology?

Well, our IT guy is awesome.

Yeah.

He's real great when I have a problem. [laughs]

That's important.

He fixes just about everything. Other than that, there's really- he's just my go-to guy. So- and if something new comes up, he comes to us a lot, in kindergarten, and says, "Try this." We're like, "Okay." [laughs] So- oh, I forgot, we did just get the new speaker system, but I haven't implemented that in my class yet.

The voice amplifier that you wear on you-

Yeah. Yeah.

The kids are-

The one in our classroom echos, so it drives them crazy. But-

Yeah.

Hopefully he'll fix that.

It's an interesting thing to get used to, but the kids seem really appreciate that. And then your voice doesn't have to be so strained either.

Yeah, we just got it at the end of the year last year, so I haven't had a chance to use it.

Okay. The final question is specifically about the use of ipads again, and it's, "Is there anything you'd like to share regarding the use of ipads in the early childhood classroom?" And I know that they're not living in your room currently, but just as you think about that as a concept, any other feelings that you'd like to share, or any other ideas that you'd like to share, regarding that?

It's hard to say because we don't have them. So- and I know that the preschool class have some, and they use them, but since I don't have them available to me, and you know, it's not like- I don't know.

If you did have them-

[crosstalk] Well you know, it would be nice with some of my kids. Especially my special ed kids, I think, could get a lot of use out of them. And if I did have them, I'd find a way to use them. I just don't think I'd use them all day. [laughs] You know?

Yeah, for sure.

I mean, they have- it would be- it would be nice to be able to introduce them to those so they could get used to them, because I think that's the wave of the future, is that they're going to have to be able to use them. And I want them to be able to be ready for that.

Great.

So, but it's hard to answer when you don't have them- don't use them.

Of course.

When you don't use them.

Well, I'm going to turn this recording piece off.

Appendix F: Human Subjects Approval

EASTERN MICHIGAN UNIVERSITY Education First

December 18, 2013

UHSRC INITIAL

APPROVAL: EXEMPT

To: Brandi-Lyn Mendham
Eastern Michigan University – College of Education: Leadership & Counseling

Re: UHSRC # 131023
Category: Exempt
Approval Date: December 18, 2013

Title: A Mixed Methods Study of the Beliefs and Attitudes of Teachers and Administrators Regarding the Developmental Appropriateness of Technology in Early Childhood

The Eastern Michigan University Human Subjects Review Committee (UHSRC) has completed their review of your project. I am pleased to advise you that your research has been deemed as exempt in accordance with federal regulations.

The UHSRC has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. **Under our exempt policy the Principal Investigator assumes the responsibility for the protection of human subjects** in this project as outlined in the assurance letter and exempt educational material.

Renewals: Exempt protocols do not need to be renewed. If the project is completed, please submit the **Human Subjects Study Completion Form** (found on the UHSRC website).

Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a **Human Subjects Minor Modification Form** or new **Human Subjects Approval Request Form** (if major changes) will be required (see UHSRC website for forms).

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the UHSRC office within 24 hours. Any complaints from participants regarding the risk and benefits of the project must be reported to the UHSRC.

Follow-up: If your exempt project is not completed and closed after three years, the UHSRC office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-

487-0042 or via e-mail at gs_human_subjects@emich.edu. Thank you for your cooperation.

Sincerely,



Dr. Kristine Ajrouch
Faculty Co-chair
University Human Subjects Review Committee

University Human Subjects Review Committee · Eastern Michigan University
· 200 Boone Hall Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail:
human.subjects@emich.edu
www.ord.emich.edu
(see Federal
Compliance)

The EMU UHSRC complies with the Title 45 Code of Federal Regulations part 46 (45 CFR 46) under FWA00000050.