

Lindenwood University

Digital Commons@Lindenwood University

Dissertations

Theses & Dissertations

Spring 3-2016

Improving Teacher Comfort Levels and Self-Efficacy with Technology Integration and Application of Technology into the Elementary Education Curriculum through the Tech Buddy Program

Susan Christine Adams
Lindenwood University

Follow this and additional works at: <https://digitalcommons.lindenwood.edu/dissertations>



Part of the [Educational Assessment, Evaluation, and Research Commons](#)

Recommended Citation

Adams, Susan Christine, "Improving Teacher Comfort Levels and Self-Efficacy with Technology Integration and Application of Technology into the Elementary Education Curriculum through the Tech Buddy Program" (2016). *Dissertations*. 257.

<https://digitalcommons.lindenwood.edu/dissertations/257>

This Dissertation is brought to you for free and open access by the Theses & Dissertations at Digital Commons@Lindenwood University. It has been accepted for inclusion in Dissertations by an authorized administrator of Digital Commons@Lindenwood University. For more information, please contact phuffman@lindenwood.edu.

Improving Teacher Comfort Levels and Self-Efficacy with Technology Integration and
Application of Technology into the Elementary Education Curriculum through the
Tech Buddy Program

by

Susan Christine Adams

A Dissertation submitted to the Education Faculty of Lindenwood University

in partial fulfillment of the requirements for the

degree of

Doctor of Education

School of Education

Improving Teacher Comfort Levels and Self-Efficacy with Technology Integration and
Application of Technology into the Elementary Education Curriculum through the Tech

Buddy Program

by

Susan Christine Adams

This dissertation has been approved in partial fulfillment of the requirements for the

degree of

Doctor of Education

at Lindenwood University by the School of Education



Dr. John D. Long, Dissertation Chair

3. 11. 16
Date



Dr. Kevin Winslow, Committee Member

3/11/16
Date



Dr. Jill Hutcheson, Committee Member

3/11/16
Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Full Legal Name: Susan Christine Adams

Signature: Susan Christine Adams Date: 3-11-16

Acknowledgements

I would like to thank my amazing committee members Dr. John Long, Dr. Kevin Winslow, and Dr. Jill Hutcheson, who have been with me through this whole process. Without their support, encouragement, and guidance this would have never come to fruition. Thank you also to Dr. Linda Leavitt for starting me on this journey of self-discovery and belief. You were right when you said I would be a different person on the other side. I would also like to thank my unofficial Lindenwood cohort, Sarah Parmeley, Laura Conley and Dave Schall. The three of you made the journey so much more! Also, thank you is extended to my colleagues and participants at work. Your understanding of my crazy idea and passion to implement it for the betterment of our teachers and students made my dream a reality. To Becca Lewis, the original “Tech Buddy” partner: no one could ask for a better co-pioneer. To the Chief Information Officer, Chief Academic Officer and Director of Adult Learning in my district, a humble and grateful thank you. Without the support this received from you, this program would have been nigh impossible. To my parents, Richard and Jean French, for giving me undying support, love and encouragement through the ups and downs of my whole education experience. You never gave up on me! To my sons, Jacob and Zachary, for being patient, encouraging, and understanding even when I couldn’t spend time with you. To my husband, Bryan, you are my better half. Thank you for helping me realize my dream! And finally, to my Lord; to say “It’s a God thing!” sums up this whole experience. Thank You for taking me through this journey that only You could orchestrate!

Abstract

Professional Development for technology integration into the elementary curriculum has been a costly and frequently ineffective endeavor. The idea for the Tech Buddy model came from this frustration. Teaming a teacher who had high comfort and self-efficacy levels with technology, however who still had much to learn, together with a teacher who was willing to learn, but had low comfort and self-efficacy levels seemed natural.

The study consisted of 13 educators and one Administrative Intern from the school of study. The study paired a mentor who had a high level of comfort and self-efficacy with ICT integration with a mentee who had a low level of comfort and self-efficacy with ICT integration as measured by a pre-study self-assessment. The pairs were formed using three types; two were same grade level pairs, two were adjacent grade level pairs, and two were nonadjacent grade level pairs. All participants attended one half-day release time per quarter, one two-hour planning time per quarter and one evening stipend time per semester. Three of the six pairs began the study using iPads. Three of the six pairs began the study using Chromebooks. Midway through the study, the pairs all switched in order to use the other devices. The researcher also conducted interviews of each participant midway and at the end of the study. At the conclusion of the study, each participant again took the self-assessment in an effort to determine if the study was affective in increasing comfort and self-efficacy levels with ICT integration into the curriculum. The conclusion of the self-assessment indicated an increase in comfort level and self-efficacy in all participants except one pairing. The results were mostly positive

and expected, however, one of the pairing did not show anticipated growth in all areas of self-assessment.

The conclusion of the study indicated the Tech Buddy program is a viable option for increasing comfort and self-efficacy levels of ICT integration into the elementary curriculum. The use of one particular device over another did not seem of concern. Application of the model should pay particular attention to how each mentor perceives his or her role as mentor.

Table of Contents

Acknowledgements.....	i
Abstract.....	ii
List of Tables	vii
Chapter One: Introduction	1
Purpose of the Dissertation.....	5
Rationale	6
Research Questions.....	7
Limitations	8
Definition of Terms.....	9
Conclusion	11
Chapter Two: The Literature Review	12
The World Call for Action.....	12
The Student Call for Action.....	15
The Role of ICT	17
The Role of Administration	18
The Barriers to ICT Integration	20
The Necessity of Comfort Level and Self-Efficacy.....	23
The Integration of ICT	25
The Role of Professional Development	26
The Role of Collaboration	32
Conclusion	35
Chapter Three: Methodology.....	37
Introduction.....	37

Purpose.....	44
Research Questions.....	44
Research Context	45
Research Participants	47
Sample Size and Selection Criteria.....	47
Devices Used	48
Relationship to Participants	48
Data Gathering Measures.....	49
Timeline and Order of Procedures	49
Conclusion	52
Chapter Four: Results	54
General Qualitative Feedback.....	54
RQ1: What effect does the Tech Buddy approach to professional development have on integration of technology into the curriculum?.....	54
RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been effected by this program?	66
RQ3: Is the Tech Buddy program more effective on teacher comfort and self- efficacy levels when implemented with the same grade level or mixed grade level teachers?.....	76
RQ4: How has student engagement been affected with this program?	86
RQ5: How has technology integration vs technology use been affected in the classrooms of the program?	95
Survey Results	106

Conclusion	112
Chapter Five: Introduction.....	114
RQ1: What effect does the Tech Buddy approach to Professional Development have on integration of technology into the curriculum?.....	115
RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been effected by this program?	117
RQ3: Is the Tech Buddy program more effective on teacher comfort and self-efficacy levels when implemented with the same grade level or mixed grade level teachers?.....	119
RQ4: How has student engagement been affected with this program?	122
RQ5: How has technology integration vs technology use been affected in the classrooms of the program?	123
Relation to Current Literature:	124
Implications for Future Research:.....	127
Conclusion:	128
References.....	130
Vitae.....	130

List of Tables

Table 1. Ethnicity breakdown of student population in district.....	45
Table 2. Ethnicity breakdown of student population in building.....	46
Table 3. Tech Buddy Pairs.....	47
Table 4. Survey Question 1 Results.....	106
Table 5. Survey Question 2 Results.....	107
Table 6. Survey Question 3 Results.....	108
Table 7. Survey Question 4 Results.....	109
Table 8. Survey Question 5 Results.....	110
Table 9. Survey Question 6 Results.....	111
Table 10. Survey Question 7 Results.....	112

Chapter One:

Introduction

Technology integration in education must be a priority in our schools (Szabo & Hotch, 1993). The researcher believed this statement to be as true in 2013 when this study began as it was in 1993. In her over 20 years of experience in education, she saw little to no movement toward technology integration in education. This chapter contains the purpose of this dissertation and rationale for the study. The research questions, expected limitations and definition of terms follow. Finally, a brief conclusion as to why the researcher conducted this study to improve teacher comfort level and self-efficacy in relation to integration of technology into the curriculum wraps-up the chapter.

Education's role in developing students who were college and career ready not only meant the students needed to have academic skills, but also technological skills (Olele, 2013). Addressing ICT integration in education was vital. As Carrasco and Torrecilla (2012) discovered "those [students] that have a computer at home obtain significantly better results in both disciplines [reading and math] than their peers that do not have this resource" (p. 1123). Research had shown there was an increase in access to and training in technology (Ertmer & Ottenbreit-Leftwich, 2010), however integration into teaching resulting in learning had been limited (Buabeng-Andoh, 2012). The researcher experienced this as a teacher in the school of study. Her district had offered training in various forms off and on for the three to five years before this study, but with little to no lasting results in her building. As a result, the year before this dissertation she began working with a colleague using the Tech Buddy program to integrate technology into their second grade curriculum. Because of the outcomes from working with her

colleague, she used the Tech Buddy program to conduct a multi grade-level study to explore the extent it would offer toward integrating technology into the curriculum.

As Szabo and Hotch, in 1993, had begun the call for technology integration into education, others continued the push. Strudler (2010) went so far as to say, “A new definition of good teaching should include the use of appropriate learning technologies as meaningful pedagogical tools” (p. 226). It had become a societal demand:

Not surprisingly, most citizens expect their medical and law enforcement professionals, and even their mechanics, to be up to date regarding the latest technologies that enable them to perform their jobs efficiently and effectively. However, this expectation is rarely applied to classroom teachers. (Ertmer & Ottenbreit-Leftwich, 2010, pp. 255-256)

As Pan and Franklin (2011) observed, most teachers and students used technology much more readily in their personal use than in their school use (p. 29). In order to bring the school use of technology up to par or exceed the personal use of technology, education must be intentional in their efforts. However, what should those efforts look like? “Building the capacity of teachers in the utilization of ICT for education requires long-term continuous development” (Afshari, Bakar, Luan, Samah, & Fooi, 2009. p. 97) should have been the focus of the efforts.

Researchers had shown there had been an increase in access to and training in technology (Ertmer & Ottenbreit-Leftwich, 2010), however integration into teaching resulting in learning had been limited (Buabeng-Andoh, 2012). The question of readiness of schools and teachers for implementation had been a focus (du Plessis & Webb, 2012). Addressing this question had been the goal of many studies (Afshari, et al., 2009;

Buabeng-Andoh, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Moore-Hayes, 2011; Olele, 2013; Pan & Franklin, 2011; du Plessis & Webb, 2012).

In this world of information, education must embrace the role of technology (Olele, 2013). Chen, Looi, and Chen (2009) reported a strong correlation between a teacher's beliefs and their teaching practices, particularly in reference to technology use in the classroom. Their study rang true in the researcher's experience. There seemed to be many barriers preventing teachers from using technology in their classrooms. Interest in helping to bridge this gap for colleagues was a driving force and it was while keeping this thought in mind that the Tech Buddy program was born.

At the start of the 2013-2014 school year, the researcher had an idea to increase the integration of technology into her classroom. She had been serving on the District Technology Committee the previous year and had been witness to the barriers mentioned in technology integration in the elementary curriculum. Because she was very comfortable with technology integration into her curriculum, she approached a colleague who was not comfortable with technology integration into the curriculum with the idea, and together they began the original Tech Buddy journey.

The researcher and colleague started the school year working with an Educational Technology Specialist (ETS) from the district. The ETS met with the pair and together they planned the first step of their integration. Because of working with the ETS and the partnership of the pair, they met the first expected goal of technology integration for their students set by the district within the first two weeks of the school year.

By the end of the first quarter, the researcher and her colleague were seeing notable results from the students, as well as themselves. They ended the first quarter with

a showcase of achievements and invited a few district level administrators, (Superintendent, Chief Information Officer, Director of Student Learning, and Director of Adult Learning, among others) to their building in order for the students to share their learning and experiences. This garnered excitement and interest from many associated with the school and district. The researcher met with the district Chief Information Officer (CIO) and Director of Adult Learning at the request of the CIO to begin planning for a pilot implementation the following year.

Throughout the year, the researcher, colleague, and ETS continued with the plan. During this time, they kept the mentioned district personnel abreast of their progress; however, they did not demonstrate or highlight any results. Toward the end of the school year, the Chief Information Officer of the district approached the researcher to develop a pilot program based on the perceived success. The possible plan was for the researcher, along with an Educational Technology Specialist from the district, to use the 2013-2014 experience as a model to develop the program used for this study in 2014-2015 if the rest of the school year produced similar positive outcomes.

The last quarter of the 2013-2014 school year, the researcher and colleague scheduled another showcase designed to highlight student learning and outcomes. Again, they invited the Superintendent, Chief Information Officer, Chief Academic Officer, Director of Student Learning, Director of Adult Learning, Chief Financial Officer and other district personnel, as well as parents from the two classrooms and other grade levels. Everyone in attendance received the showcase extremely well.

At this time, the researcher again met with the CIO to discuss the possibility of submitting a pilot program proposal to the district. Of considerable concern as to

whether or not the proposal would move forward to the Board of Education was faculty buy-in. The researcher approached the faculty of her building to see if there was any interest in members of the certified staff volunteering to participate in the Tech Buddy program for the following year (2014-2015). The researcher and her colleague shared their experience from the year, showed student examples, and discussed how the general experience was for them. They discussed expectations, timeline, and known parameters for the potential Tech Buddy pilot program. The staff and administration directed questions and concerns to the researcher and colleague. After allowing the certified staff sufficient time to listen and ask any questions, they took an anonymous poll in the form of an exit slip asking certified staff if they were willing to volunteer to be a part of this program. Out of 65 certified staff, 62 indicated on their exit slip they were interested in volunteering for the Tech Buddy pilot program for the 2014-2015 school year.

Over the summer of 2014, the researcher and the ETS met frequently to begin creating an outline for implementation. They met with the building principal, Chief Information Officer and Chief Academic Officer to get final advice and approval of the plan. In July of 2014, the Board of Education met and approved the pilot program and the official Tech Buddy program began.

Purpose of the Dissertation

As with other professionals, we expect teachers to use technology in ways that extend and increase their effectiveness. It is no longer appropriate to suggest that teachers' low-level uses of technology are adequate to meet the needs of the 21st-century learner. (Ertmer & Ottenbreit-Leftwich, 2010, p. 257)

One of the reasons there are low-level uses of technology was due to teacher comfort level with technology (Strudler, 2010). This was a school wide pilot in a district with 21 schools. The purpose of this study was to try the Tech Buddy program to see if it would increase teacher comfort level and self-efficacy in integrating technology within the elementary curriculum. The researcher had worked the year before the study with a colleague to integrate technology in their respective classrooms using this basic model. Building and district level administration observed them during the year. The Chief Information Officer approached the researcher at the end of the school year to develop a plan to pilot at her school of employment. The intention was to use the plan district wide if the data supported it as a sustainable method to increase teacher comfort level and self-efficacy with technology integration into the elementary curriculum.

Rationale

The reality of low teacher comfort levels with technology integration within the curriculum in all content areas has been a global concern (Buabeng-Andoh, 2012) and the researcher had witnessed the same in the school of study. Through this “Tech Buddy” program, all participating teachers had received sustainable professional development, collaboration with peers, administrative support, and an increase in comfort level with technology integration in the curriculum of all content areas. As research indicated “Among practicing teachers, a significant factor in assuring success in the classroom and sustainability in the profession is a teacher’s personal perception of preparedness” (Moore-Hayes, 2011, p. 2). This program’s design focused on increasing the comfort level and self-efficacy of teachers in their effort to integrate technology into the curriculum.

Technology should not be an addition or supplement to education, rather an integral part, which was essential to achieve desired outcomes (Ertmer & Ottenbreit-Leftwich, 2010). Unfortunately, due to low teacher comfort levels this has not happened enough.

The “Tech Buddy” program modeled Professional Learning Communities. By creating a pair (mentor and mentee), the two could work together, with other pairs, the Program Lead, and/or the ETS to collaborate on technology integration. The teacher was no longer isolated in their own classroom to deal with any issues that may arise. It was similar to having access to a Technology Coach; however, it did not require having a Technology Coach position. The Program Lead and ETS acted as coach to the mentor, and the mentor acted as the coach to the mentee.

The study sustained accountability through the learning community of the pairs and mentor/mentee groups. The study also sustained accountability when the pairs completed a project with the students due to the expectation they were required to share out their experience with their traditional Professional Learning Community. The PLCs and Project Lead kept the building principal informed regarding the data. The building Administrative Intern was a participant in the program.

Research Questions

RQ1: What effect does the Tech Buddy approach to professional development have on integration of technology into the curriculum?

RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been affected by this program?

RQ3: Is the Tech Buddy program more effective on teacher comfort level and self-efficacy levels when implemented with same grade level teachers or mixed grade level teachers?

RQ4: How has student engagement been affected with the students in the program?

RQ5: How has technology integration vs. technology use in the classrooms of the study been affected?

Limitations

Recognized limitations with this study include a small sample size. The number of participants was limited due to financial constraints with the feasibility of the program. The percentage of teacher participants from the school used in the study was 18%.

Another limitation of the study expected by the researcher was difficulty of logistics with mentor and mentee in unlike grade levels. The researcher expected to find the pairings of mentor and mentee in different grade levels to be the least successful due to each having different schedules. The crux of this study was to have the mentor available to the mentee when needed. Differing schedules was an anticipated limitation.

A different curriculum for each grade level was also an anticipated limitation. The result of this study was an anticipated increase in comfort level and self-efficacy for teachers when integrating ICT within the elementary curriculum. If the mentor and the mentee each had different curriculum objectives, the researcher expected to see those as barriers to ICT integration within the elementary curriculum.

Definition of Terms

Comfort Level; the confidence one has within themselves in carrying out a particular task (Maigo & Mei-yan, 2010).

EETT (Enhancing Education through Technology); a state grant program of which 25% of the funds are earmarked for professional development for teachers on the best uses of technology in education (Miners, 2009).

eMINTS (enhancing Missouri's Instructional Networked Teaching Strategies); "eMINTS professional development is designed to help teachers learn how to integrate technology into their teaching using instructional strategies that promote inquiry-based learning and encourage collaboration and community building among students and teachers." (Martin, Strother, Weatherholt, & Dechaume, 2008, p.1).

ETS (Education Technology Specialist); this was a position in the district in which the researcher was employer. There were two positions in the district, one for elementary and one for secondary. Only the elementary position was involved in this study.

Gradual Release of Responsibility (GRR); a teaching model which guides the teacher "Moving from your responsibility to prepare students for the task to their responsibility to carry it out" (Clark, 2014, p.28).

ICT (Information and Communication Technologies); using technology resources and practices with the intent of enhancing learning and improving student performance, an educational definition (Januszewski & Molenda, 2009).

ISTE (International Society for Technology in Education); a nonprofit organization committed to serving educators and leaders in education. They focused on connecting learning in a connected world (ISTE, 2014).

Mentee; an active participant in the learning relationship with a mentor (Ambrosetti & Dekkers, 2010).

Mentor; a role of peer coaching one takes to help improve the performance of another (Alderfer, 2014).

NETS (National Educational Technology Standards); a set of standards developed by the International Society for Technology in Education (ISTE) for effective teaching and learning in a digital age (ISTE, 2014).

Professional Development; educators learning so students can benefit (Mizell, 2007).

PLC (Professional Learning Communities); staff working together as communities of inquiry for student improvement (Hord, 1998).

Self-Efficacy in teachers; the belief one has about themselves and their own capacity as a teacher (Moore-Hayes, 2011).

SMART Board; an interactive whiteboard that combines the power and abilities of a computer with the ease of a whiteboard (SMART Tech, 2015).

T3 (Transforming Teaching with Technology program); this was a discontinued program in the district in which the researcher was employed, which was focused on teacher professional development in the implementation of technology into teaching.

Barrier; in reference to technology use in the classroom; it was defined as anything which prevents or restricts usage (Eartmer, 1999).

Technology Coach; teachers hired to be trainers of other teachers in how to use technology in various forms (Miners, 2009) .

Technology Integration; the use of technology for education based on multiple factors in curriculum in an inquiry-based fashion (Brunner, 1992).

Conclusion

The ever-changing world of technology presented itself with an inherent difficulty for many educators to embrace integration of ICT within an elementary curriculum (Moore-Hayes, 2011). Nationally the call had been “Technology has become a focal point of educational reform” (Berrett, Murphy, & Sullivan, 2012, p.200). The barriers to achieving this goal were numerous and real (du Plessis & Webb, 2012). With the current necessity for teachers to be able to learn and use technologies of all types in their teaching (Jung, 2005), the need for affective professional development to increase comfort levels and self-efficacy with technology integration into the curriculum had been in high demand.

Many other researchers had conducted studies on the barriers to ICT integration into the curriculum (Afshari, et al., 2009; du Plessis & Webb, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Olele, 2013; Slagter van Tyron & Schwartz, 2012; Sugar & Slagter van Tyron, 2014). One of the reoccurring barriers was teacher comfort level with ICT integration within the elementary curriculum (Strudler, 2010) . Another barrier to ICT integration within the elementary curriculum was teacher self-efficacy (Moore-Hayes, 2011). As both of these barriers effected one another, this study aimed at finding authentic ways to increase teacher comfort level and self-efficacy with ICT integration into the elementary curriculum.

Chapter Two: The Literature Review

Introduction

This review of literature indicated a call for action from a global aspect as well as a student aspect. It also indicated the recommended role of ICT in education, as well as the role school administration should take to support ICT in education. The literature review exposed barriers to ICT integration focusing on comfort level and self-efficacy of teachers in their attempt to integrate ICT in their curriculum. Finally, the literature review showed the role of professional development and collaboration to improve ICT integration into curriculum.

The World Call for Action

The world of education had been changing in many ways. The importance of students being technologically literate in order to live in a technological society was one of the ways education was changing (Chikasanda, Otrell-Cas, Williams, & Jones, 2013). According to Noveanu (2010) “The concept of literate has evolved from writing one’s name, to read a survey/study, up till now when, in order to be successful, one must be efficient in accessing, understanding, using and creating information through technology” (p. 82). Technology integration in education was an ever-expanding goal in many countries (Cavas, Cavas, Karaoglan, & Kislal, 2009) with the long-term objective of creating students who were life-long learners (Maigo & Mei-yan, 2010). According to Carrasco and Torrecilla (2012) when a student had access to a computer, a positive effect resulted on their academic performance. Olele (2013) noted an individual’s [student’s] thinking patterns, when exposed to technology, changed and as educators of students in the 21st century; we needed to change as well. These studies, among others, brought the

spotlight to education; “In terms of societies’ future, one of the most important fields, where technology is used, is education” (Bektas, 2013, p. 552).

Ally and Samaka (2013) maintained it was the right of all citizens, no matter the country, to have the learning opportunity technology offered beyond one’s local resources. Carrasco and Torrecilla (2012) wrote, “Access to knowledge, its construction, appropriation, and diffusion inevitably appear associated with technological resources and virtual networks” (p. 1107). Due to the demands of the 21st century learner, it was no longer acceptable to allow teachers to be inadequate in their implementation of ICT within education (Ertmer & Ottenbreit-Leftwich, 2010). However, according to Noveanu (2010) and others “digital literacy is [was] still a problem for teachers” (p. 79) that needed to be rectified. Education could not shy away from the reality of ICT integration being valuable because as Ally and Samaka (2013) noted, even the world’s libraries were beginning to be networked together giving students free access in their efforts to maximize their learning.

The importance of “a better and more powerful future for countries depend on the quality of the training they provide for their young individuals” (Eristi, Kurt, & Dindar, 2012, p. 30) signified the correlation between education and a country’s success. Chen, Looi, and Chen (2009) noted the governmental entities of ministries or departments of education throughout the world were pushing for integration of ICT through teaching for learning. This global call also came with a global concern for children who lived in rural areas as “in all countries, a larger number of children that live in urban areas have computers” (Carrasco & Torrecilla, 2012, p. 1119). In the report given by Bhavnani, Chiu, Janakiram, and Silarszky (as cited in Ally and Samaka, 2013) the notion that in

some parts of the world where poverty was at its highest the cost and logistics of the availability of technology and ICT integration in learning was even more important. Wang (2013) explained that our educational system needed to prepare all students to compete in a globally complex and connected world driven by technology. Olele (2013) stated the goal of technology integration would be tied to “educational goals, needs and careful economic balance” (p. 143) in its aim and its importance could not have been overestimated for all students as we moved further into the 21st century. In this world of information, education needed to embrace the role of technology (Olele, 2013) and the effects it would have on pedagogy.

The art and science of pedagogy may have found teachers in a position with the integration of ICT for which they were woefully unprepared (Moore-Hayes, 2011). In what was an ever constant goal for higher student achievement and as countries searched for ways to increase student achievement “technology makes an open learning environment, thus, learning is no longer confined within the four walls of a classroom” (Maigo & Mei-yan, 2010, p. 1). Therefore, the impact of technology on education had never been more crucial. It was the call for what could be in terms of ICT integration into education rather than what was (Strudler, 2010). Across the globe “pertinent access and use of... technological means in schools become key variables for students’ learning, aspects that are favored and strengthened if, additionally, teachers, children and youth have access to... resources in their homes” (Carrasco & Torrecilla, 2012, p. 1109). But how could this have been addressed in such a way that teachers felt a sense of trust and ownership in developing into educators who integrated ICT (Ham, 2010)?

The Student Call for Action

The call for technology integration was also coming from students (JISC, June 2014). In Wang's observations (2013), students expressed a high demand for ICT integration in their school experiences. This was true as Ally and Samaka (2013) noted when they mentioned today's students wanted to learn more efficiently using ICT. The students recognized "even if they don't become computer scientists, it is important for... [them] to be technology literate" (Wang, 2013). Students wanted their use of ICT in learning to be as individual to them as a learner as possible (Ally & Samaka, 2013).

The difference between the teacher and the student in their personal use of ICT in their daily lives was becoming problematic. Pan and Franklin (2011), among others, noted specifically the alarming gap between student and teacher use of ICT in their everyday lives. It was noted by Carrasco and Torrecilla (2012) that students who had access to technology at home achieved greater academic success than those who did not which initiated an even greater call for education to close the gap. Kim et al., (2011) explained that technology offered students the ability to enhance their learning through "exploring, identifying, practicing, building new ideas, acquiring new skills, making mistakes, reflecting, recording, documenting" (p. 482). The students who were able to access technology at home had a distinct advantage over those who did not (Ally & Samaka, 2013).

The question became how to address this phenomenon. The divide between the generation of students who were born in a technologically rich time and the teachers who were not was becoming more and more obvious (Smith, 2013). Professionals in the field of education knew students were using technology outside of school to communicate

(Ally & Samaka, 2013). Therefore, teachers needed training on how to integrate technology into the curriculum in order to “fill in the gap between traditional education practices in schools and the use of technology for teaching and learning” (Olele, 2013, p. 147).

Using ICT in education had a place in student learning. Technology for students was the key to become self-directed, motivated, collaborative learners who communicated effectively and discovered through inquiry (Kim, et al., 2011). In the case of students in low socioeconomic situations, studies had shown it positively affected their achievement as well as their self-esteem (Page, 2002). As Hokanson and Hooper (2004) stated in their culmination of research, “the future of technology is not to make education easier, but rather to make learning more effective” (p. 250). Technology offered the ability to open a student’s world to learning like no other medium before (Hew & Brush, 2007). As Nemcek (2013) noted, “the collaboration and the sharing of new ideas does not end with the teachers. Students... [were] encouraged to collaborate, provide input, and share ideas, as well” (p. 35). This in turn prepared them for their workforce futures, which would have more technological demands (Szabo & Hotch, 1993). Wang (2013) argued it was important for students, before graduating, to be literate in ICT and that required actual time using and learning technology.

Technology integration could transform teaching and learning (Hennessy, Ruthven, & Brindley, 2005). Teachers needed to address the pedagogical aspects of technology integration as well as its use as a teaching and learning tool (Moore-Hayes, 2011). As a result, “schools must have teachers who understand and are comfortable with the uses and integration of technology in their curriculum” (Medcalf-Davenport,

1998, p. 2). The ultimate goal was to use technology “as a medium for learning, discovering, sharing, and creating knowledge” (Cavas, Cavas, Karaoglan, & Kisla, 2009, p. 10). As Fullerton (2013) explained, technology integration must be “a shared responsibility for learning” (p. 445) among all stakeholders to effect systematic change.

The Role of ICT

The caution from Carrasco and Torrecilla (2012) that merely having access to ICT would attribute to improved student performance was valid; looking at how ICT was used in the teaching and learning process was more important. Morueta, Igado and Gomez (2010) spoke of technology being as invisible in the classroom as the [chalk] board; no one specifically looks for the board so no one should specifically look for technology. Technology could not be an addition or supplement to education, rather an integral part, which was essential to achieve desired outcomes (Ertmer & Ottenbreit-Leftwich, 2010). According to Olele (2013) it should have been thought of as a tool which offered the user the ability to reach full potential in the capacities of cognitive and creative abilities. Ally and Samaka (2013) advocated ICT integration as a natural contact to communities of learners.

Knowing how to use both the hardware and software did not equate to using ICT technology effectively in the classroom (Ertmer & Ottenbreit-Leftwich, 2010). To make the jump to effective use of technology in the classroom, educators needed to address more than just basic skills (Afshari et al., 2009). If it was as Hokanson and Hooper (2004) believed, that “computers have the potential to transform educational practice” (p. 247), then it was in the best interest of our students to do everything possible in order to

ensure technology integration. Educators had to prepare students for the work force; the educational system knew that changes had to happen (Brunner, 1992).

This paradigm shift demanded a major overhaul of the way today's education looked at ICT integration (Noveanu, 2010). Larry Cuban (2001) wrote a historical perspective of technology use in the classroom commenting on its use saying, "the quantities of money and time have yet to yield even modest returns or to approach what has been promised in academic achievement, creative classroom integration of technologies, and transformations in teaching and learning" (p. 189). Resistance to ICT integration into the educational system in general was not new (Berrett et al., 2012,). While there may have been some resistance to technology integration from some teachers, what was surprising was that there was also resistance from those in charge [administrators] who did not impose sanctions on teachers who resisted (Kiper & Tercan, 2012).

The Role of Administration

As administrators led the school their support and understanding was critical to make ICT integration successful (Berrett, Murphy, & Sullivan, 2012). "The overarching goal of each campus administrator must be to invest in students by investing in teachers" (Templeton & Tremont, 2014, p. 58). As Cviko, McKenney and Voogt (2012) mentioned, how a teacher perceived their administrator's support of ICT integration into the curriculum within the context of time pressures influenced their actions with ICT in the classroom. Administrators needed to understand "technology integration takes time; time to learn about the innovation, time to be adequately prepared to use it" (Afshari et al., 2009, p. 96). If an administrator or school leader lacked the skill and knowledge to

make informed decisions for their school, the teachers may have become ambivalent to the integration of ICT (Anthony, 2012). This brought up the point from Templeton and Tremont (2014) that administrators also may have needed professional development on ICT integration into the curriculum.

Research was clear: “How principals perceive their role and their ability to listen to the teachers needs frequently impacts the implementation process” (Berrett, Murphy, & Sullivan, 2012, p. 201). Administrators at the district and building level had to educate themselves and implement practices that emphasized a commitment to technology: specifically “the type and amount of technology-related professional development available to teachers” (O'Dwyer, Russell, & Bebell, 2004, p. 2). In order for professional development for teachers in ICT to be successful, administrators must be sure to supply the access to technology in question (Pan & Franklin, 2011). When a principal, or other school leader, exhibited a sense that they were not the only leader of change it gave the teachers a freedom “to implement new ideas in [a] supportive and enhancing culture” (Buabeng-Andoh, 2012, p. 145). Chikasanda et al. (2013), advised administrators to encourage and support teachers in their collaborative learning, planning, and sharing as well as teachers keeping current on scholarly readings on the topic. In order to keep implementation of ICT in education from being reactive instead of proactive “administrators must begin to have forward-thinking dialogue about improving practice through relevant job-embedded professional development” (Templeton & Tremont, 2014, p. 56).

The Barriers to ICT Integration

There had been numerous studies regarding barriers involving ICT integration into education (Afshari et al., 2009; du Plessis & Webb, 2012; Ertmer & Ottenbreit-Leftwich, 2010; Olele, 2013; Slagter van Tryon & Schwartz, 2012; Sugar & Slagter van Tryon, 2014). The barriers to ICT integration into education had been researched extensively and technology integration into education would happen when barriers were addressed (Owens, 2009). The barriers ranged from lack of teacher skills in using technology, to lack of access to technology, to rigid structure within the education system not allowing for integration (Buabeng-Andoh, 2012). Hsu and Kuan (2013) found a correlation between resistance and slower achievement in ICT integration and a teacher's years of experience. They noted the longer a teacher taught, the less ICT integration. Added pressure in education from the increase of expectations for practicing teachers to be competent in ICT integration continued to grow (Moore-Hayes, 2011) which put added pressure on teachers who were already working in high stakes situations (Templeton & Tremont, 2014). Hsu and Kuan (2013) mentioned, "teachers' attitudes, beliefs, and perceptions are regarded as important factors that influence adoption of technology in teaching" (p. 30) as well as school culture. School culture refers to policy, support and expectations for integration of ICT, availability of tech, and teacher professional development among others (Hsu & Kuan, 2013). School culture affected the integration of ICT in education. Further, it "dramatically impact[ed] the success and failures of the technology implementation" (Berrett et al., 2012, p. 215). Interestingly, Hsu and Kuan (2013) noted educators with graduate degrees tended to have a more positive attitude toward technology. No matter the barrier, teachers must understand that

due to the nature of continual change in technology successful integration of ICT was an ongoing journey, which would produce success and failures (Templeton & Tremont, 2014).

Brinkerhoff's study (2006) grouped barriers that kept teachers from integrating ICT into education into four groups: "Resources, institutional and administrative support, training and experience, and attitudinal or personality factors" (p. 22). In the results of their empirical study on barriers to technology integration Hew and Brush (2006) "classified them into six main categories: (a) resources, (b) knowledge and skills, (c) institution, (d) attitudes and beliefs, (e) assessment, and (f) subject culture" (p. 226). If there was a perceived need for change, innovation in technology integration would be achieved (Brunner, 1992) despite barriers.

One of the reoccurring barriers was teacher comfort level with the integration (Strudler, 2010).

As with other professionals, we expect teachers to use technology in ways that extend and increase their effectiveness. It is no longer appropriate to suggest that teachers' low-level uses of technology are adequate to meet the needs of the 21st-century learner. (Ertmer & Ottenbreit-Leftwich, 2010, p. 257)

With in-service teachers, the personal perception [or comfort level] of how prepared the teacher was for their job was a major factor in determining success and sustainability (Moore-Hayes, 2011). If their perception of themselves as an integrator of ICT was low, they tended to avoid being a self-directed learner in ICT integration (Maigo & Mei-yan, 2010). If a teacher was not technologically comfortable their personal perception of how prepared they were to integrate technology was low (Afshari et al., 2009). If they did not

know how to develop lesson plans, which appropriately threaded ICT integration, they avoided it all together (Ertmer & Ottenbreit-Leftwich, 2010). Cviko, McKenney and Voogt (2012) noted a discrepancy between integration of ICT to support learning and a teacher's choice of pedagogy in implementation of ICT.

Three of four key areas needed addressing to ensure high levels of comfort were knowledge of technology, self-efficacy of integration, and pedagogical beliefs regarding technology in education (Strudler, 2010). Strudler (2010) listed school culture as the fourth, which could also have an effect on comfort level (p.226) although not as directly.

As teachers were the catalyst for change (Fisher, 2006), it was up to school districts to supply organized professional development (Olele, 2013) to help increase comfort level. Traditional forms of professional development identified as inadequate deserved abandoning for alternate forms (Jones & Dexter, 2014). Ensuring professional development was continual was more effective in supporting teachers as they integrated ICT into their classrooms (Sugar & Slagter van Tyron, 2014). The process was a slow development (Templeton & Tremont, 2014). By creating a shared vision of technology implementation, a starting point was established (Creighton, 2003). It could not be a reactive plan rather, "building the capacity of teachers in the utilization of ICT for education requires long-term continuous development..." (Afshari et al., 2009, p. 97). As Owens (2009) stated, when they "brainstorm ways to enrich the lesson by identifying available resources, technologies, and instructional strategies" (p.14) it was a win-win situation for everyone.

The Necessity of Comfort Level and Self-Efficacy

Comfort level and self-efficacy, for the purposes of this study, referred to teacher perceptions regarding their preparedness for using technology in their job and their effectiveness in their job using technology. Pan and Franklin (2011) confirmed through their study that these two attitudes, when positive, were reliable predictors as to whether teachers would integrate ICT into their curriculum. Many factors affected comfort level and self-efficacy attitudes toward ICT integration. Ownership was not the only correlation; “[a] teacher’s computer experience relates positively to their computer attitudes” (Buabeng-Andoh, 2012, p. 138). Cavas et al., (2009) noted a correlation between teachers who owned personal computers and used them on a regular basis to a more positive attitude toward ICT integration. If teachers interpreted prior experiences with technology as positive ones, it affected their self-efficacy (Al-Awidi & Alghazo, 2012). Prior experience was just the beginning, teachers have also felt uncomfortable going to building experts for help due to their workload (Brinkerhoff, 2006). The promise of improving the efficiency of instruction has not always been enough to encourage teachers to integrate ICT (Hsu & Kuan, 2013), teachers have still tended to be reluctant.

Another effect on comfort level and self-efficacy can come from veteran teachers. If their attitude toward ICT integration was a negative attitude, they could discourage novice teachers from pursuing ICT integration in their classrooms (Brinkerhoff, 2006). A basic attitude toward change, whether an openness or not, has also been noted as a contributing factor toward ICT integration (Hsu & Kuan, 2013). As Afshari et al. (2009) wrote, “personal characteristics of teachers are an important influence on how easily they

[teachers] take up an innovation” (p. 81). The need for teachers to learn ICT integration into their curriculum in an ever-changing world of technology added to the already high-pressure experience of teaching (Jones & Dexter, 2014).

In education “faculty often find it extremely difficult to accept a non-expert role” (Brunner, 1992, p. 4). As Christensen (2002) stated, “increased computer experience reduces computer anxiety in many teachers” (p. 412). Addressing teacher goals in learning new technology and pedagogy can help to increase integration of technology (MacDonald, 2008). “A teacher should not assume that what is learned in a college-level technology education program will be all that he or she needs to know about the content to be taught over the next thirty years” (Loveland, 2012, p. 26). The rate of change in technology caused that mind-set to be unrealistic.

If a teacher felt they were “innovative and adept at overcoming obstacles” (Afshari et al., 2009, p. 81), they were more likely to have a stronger comfort level and self-efficacy with integration of technology. However, for the teachers who were not as described above, they needed support in learning “potential implementation blocks and developing ‘block-busting’ strategies that enable them to eliminate or circumvent the changing barriers they face” (Ertmer P. , 1999, p. 2).

Once a teacher’s comfort level and self-efficacy increased, the training and support should not have stopped there. Since technology was a field that changed constantly, it was advisable for teachers to engage in regular cycles of continual professional development (Dawson, 2012).

Research indicated the need for many changes in order for the comfort level and self-efficacy of teachers to improve. According to Potter and Rockinson-Szapkiw

(2012), “Professional development to support teachers’ effective technology integration needs to be restructured” (p. 23).

The Integration of ICT

Hokanson and Hooper (2004) compared the term integration, in reference to technology to the use of the word integration in the Civil Rights Movement of the late 20th Century. They suggested:

The goal of an integrated society builds on the notion that all races freely interact, and the values, cultures, and creations of each is shared and cherished. So too, we envision a curriculum where technology use is determined by its capability to support learning. In such an environment, computers would be used as an active part of the classroom; where technology is not a special event, but rather as a normal part of the classroom and curriculum. (Hoakanson & Hooper, 2004, p. 249)

Most agreed ICT integration had the potential to meet the various needs of different learning styles as well as the rate at which students learn and was a need for all students (Okojie, Olinzock, Adams & Okojie-Boulder, 2008). Educators agreed that 21st century students needed to be able to learn and apply more and more complex skills and be able to analyze their situations and problems effectively as they prepared to enter the global workforce (Miners, 2009).

In tandem to the curriculum, technology integration also offered students communication opportunities for worldwide outreach they would normally not have had (Hew & Brush, 2007). In order for true ICT integration to happen, teachers needed “a comprehensive set of best practices for effective use of technology in the classroom”

(CDW-G, 2012). As Wang (2013) advised, learning to use ICT did not happen from just listening to someone talk. Just using technology every day in some form was not integration (Hsu & Kuan, 2013). Research continually indicated the success of technology integration hinged on the teacher.

Integration was more than just the technology itself; it was also the content it carried which was the most important (Safar & AlKhezzi, 2013). Understanding the difference between technology integration in the curriculum and technology use with the curriculum can be challenging. Online learning tools for students and instructional materials for teachers were becoming more and more readily available (Hsu & Kuan, 2013). One defining difference between the two focuses was whether the application of technology was learner-centered or teacher-centered. The learner-centered constructivist approach where the role of the teacher changed from information presenter to learning facilitator, guide, and co-discoverer was the prime model for technology integration (Willis & Cifuentes, 2005).

The Role of Professional Development

The necessity to provide professional development for teachers to integrate ICT was a key. Teacher attitudes toward technology sometimes affected student attitudes toward technology (Christensen, 2002). This made training teachers even more important. The emphasis on convincing and training teachers that technology use was a tool used for developing, creating, and collaborating with knowledge and not just used to deliver knowledge was a key (Hokanson & Hooper, 2004). The discovery that changing teacher's existing [negative] views and practices of ICT integration was directly tied to their amount of knowledge and understanding of technology in education was a key point

(Chikasanda, Otre-Cas, Williams, & Jones, 2013). In order to have changed those negative views “teachers need opportunities to learn to teach in ways that differ from how they were taught and provide a technology rich environment for today’s technology savvy students” (Jones & Dexter, 2014, p. 368).

Maintaining the initial and continual training of teachers was key with the fast-paced changes of technology (Olele, 2013). Frequently the model for teacher training had fallen short of the goal primarily due to the model of delivery (Okojie et. al., 2008). Professional development that was more than just a one-time workshop had been shown to be much more effective (Cifuentes, Maxwell, & Bulu, 2011). As Sugar & Slagter van Tyron (2014) suggested, any effort in professional development should contain the elements of collaboration, discussion, learning and sharing in order to be successful. In professional development the view of:

Improving individual outcomes in education is a dichotomy that must shift from the isolationism of understanding student needs to a more holistic process of responding to adult needs that in turn facilitate the creation of new knowledge structures in students. (Templeton & Tremont, 2014, pp. 54-55)

With one of the goals of effective use of technology in education being to improve instructional processes (Eristi, Kurt, & Dindar, 2012) the field of education must find best practices in professional development to move forward.

Researchers sought the best ways to deliver professional development. One option was to use the Community of Practice model for technology integration (MacDonald, 2008). This model was an informal group of people who shared the same enterprise goal, in this case that of professional development aimed at ICT integration

(Wegner, 1999). Another was to use interactions between students and teachers where the students helped the teachers learn ICT (Eristi, Kurt, & Dindar, 2012). This option not only helped teachers become more proficient, it also helped students. A third was TICKIT (Teacher Institute for Curriculum Knowledge about Integration of Technology) designed as a graduate level two-course plan through Indiana University (Ehman & Bonk, 2002). This idea was:

A program for rural Indiana teachers of all subjects intended to increase their knowledge and proficiency in integrating technology in their classrooms. The emphasis is on thoughtful integration and use of technology that adds value to instruction and learning activities, not simply inserted for its own sake, or to “teach technology.” (Ehman & Bonk, 2002, p. 4)

These were just a few of the numerous plans tried over the years. Whatever the method used for professional development for teachers in technology integration, understanding how adults learn was important as well (Okojie et al., 2008).

According to Cviko, McKenney and Voogt (2012) the complex relationship between how the teacher perceived their role, the implementation of curriculum and ICT integration, and student learning were crucial. Thus, much study and thought on how to improve ICT integration in education were a focus. One source stated in order to implement technology integration with fidelity “it is necessary that the objectives of an innovation are perceived as clear and relevant by educational practitioners who are involved in its implementation” (Pelgrum, Reinen, & Plomp, 1993, p. 2). Another researcher advocated a progressive approach in order for integration to be successful (Nemcek, 2013). Willis & Cifuentes (2005) compared two types of teacher professional

development training, online, and face-to-face. The conclusion of their study noted the experience for the teacher must be one of both student and teacher. They recommended any training be as close to the teacher's classroom experience as possible (Willis & Cifuentes, 2005).

Professional development with ICT integration, according to Stein, Ginns and McDonald (2007), should have begun with teachers questioning their knowledge, reflecting on their practice, and reviewing their assumptions all in reference to their beliefs about ICT integration. Teachers needed to buy in to the idea of becoming ICT integrators (Ham, 2010). Put another way, teachers needed to re-examine their own views and understandings of the role ICT had in the learning of their students as well as their own learning (Sugar & Slagter van Tyron, 2014). Davis, Preston and Sahin (2009) maintained that if the teacher training [professional development] were effective, it would then be the pillar for which ICT integration would stand.

Many researchers investigated the barriers to successful technology integration into education (Afshari et al., 2009; Bauer & Kenton, 2005; Ertmer, 1999; Ertmer & Ottenbreit-Leftwich, 2010; Pan & Franklin, 2011). Researchers identified various results. In one study the researcher wrote, "In particular, teachers vary in their technology integration knowledge, as well as in their ability to design pedagogically sound activities" (Walker et al., 2012). Jones and Dexter (2014) maintained the disconnect between traditional professional development and ICT integration was due to the failure of bringing the training the teachers received from the training setting to the classroom. Maigo and Mei-yan (2010) blamed the lack of ICT integration on two aspects: lack of support and the individual's attitude. Davis, Preston and Sahin's (2009) suggested

method of professional development followed the Community of Practice (CoP) model that they liken to an organic approach. Ertmer (1999) wrote:

These barriers range from personal fears (What will I do if the technology fails and my lesson can't proceed? How will I gain the confidence I need?) to technical and logistical issues (How does this software package work? Where or when should I use computers?) to organizational and pedagogical concerns (How can I ensure that students obtain adequate computer time without missing other important content? How do I weave computers into current curricular demands? (Ertmer P. , 1999, pp. 1-2)

These meant teachers may have had to address their personal construct regarding ICT integration in education (Stein, Ginns, & McDonald, 2007).

The task of providing professional development that was effective for ICT integration fell on the districts. Research had shown traditional models of professional development where the format was lecture were inadequate (Jones & Dexter, 2014). One suggestion was that teachers participate in “regular cycles of technology integration” (Dawson, 2012, p. 123) as to continuously address barriers. Another researcher suggested schools employ technology coaches whose job was to provide continual professional development (Sugar & Slagter van Tyron, 2014). Owens (2009) advocated for a ‘personal trainer’ for ICT integration where they would support the teachers in ways such as searching for resources, assisting with new pieces of technology, helping to create a management plan, and ultimately assist during the lesson. Chikasanda et al., (2013) felt “a model that incorporates social cultural frameworks and is situated in the context in which it will be implemented” (p. 598) was advisable. The various forms of

professional development had all shown some successes and some challenges (Jones & Dexter, 2014). Professional development, according to Templeton and Tremont (2014), should focus on holistic processes with the needs of the adult [teacher] in mind rather than the needs of the student. Whatever the model, the point was that professional development was the key to addressing barriers to integration of technology in education. Owens (2009) summarized the point when she wrote, “Providing ongoing training and support allows the teachers to be successful” (pp. 16-17).

If some of the barriers to technology integration were the comfort level and self-efficacy of teachers, professional development for teachers addressed these barriers (Jones & Dexter, 2014). Maigo and Mei-yan (2010) found if the teachers were confident in their abilities [self-efficacy] and comfortable with technology they would integrate ICT more readily. Comfort level could be addressed by hands-on usage of technology and application to learning through the eyes of a student (Ally & Samaka, 2013), among other ways. Pedagogy should address self-efficacy. Addressing pedagogical change through technology integration may be most challenging for those who did not already have an innovative outlook (Hennessy, Ruthven, & Brindley, 2005). “The teacher’s beliefs have to be addressed adequately first in order to have meaningful technology integration” (Chen, Looi, & Chen, 2009, p. 471). If educators did not see the benefits to ICT integration, they would not integrate (Ally & Samaka, 2013). For the teacher who was not naturally willing and open to innovations, it may be difficult for them to adopt the constructivist approach, which was most desirable to integrating technology into their existing lesson plans (Anthony, 2012).

The link between professional development and pedagogy in integrating technology was a complex factor (An & Reigeluth, 2011-12). As Potter and Rockinson-Szapkiw (2012) write “an effective professional development opportunity model should include three aspects: (a) technology operation, (b) technology application, and (c) technology integration with mentor and community support” (p. 23). Hew and Brush (2006) found three other points of interest when planning professional development for technology integration; “(a) focuses on content (e.g., technology knowledge and skills, technology-supported pedagogy knowledge and skills, and technology-related classroom management knowledge and skills), (b) gives teachers opportunities for “hands-on” work, and (c) is highly consistent with teachers’ needs” (p. 238). Berrett, Murphy and Sullivan (2012) stated the need more simply; “Technology tools must be useful to the participants in a way that enhances what they already do.” (p. 216). Educators must understand and value and the need for the training in order for professional development to be successful. While all of the models mentioned have merit, they did not address a concern Davis, Preston and Sahin (2009) raised in their study directed at the lack of time during the school day for learning and the ineffectiveness of time spent after school hours on learning.

The Role of Collaboration

“Fortunately, wired classrooms lend themselves naturally to peer collaboration.” (Armstrong, 2014, p. 42). In the use of technology in education, collaboration became fluid. This fluidity led to changes within a teacher’s ability to integrate ICT in the curriculum. Understanding the instructional changes offered by the use of ICT in education was central to the pedagogical changes, which occurred (Hokanson & Hooper,

2004). The change in pedagogy called for action. As noted by Olele (2013) “training and re-training of teachers have a crucial role in the success of Information and Communication Technologies in teacher education” (p. 143) and implementation into a curriculum. The same was true for integration in modern workplaces (Olele, 2013) which was where our students would end up. By focusing on collaboration, within a team meeting, as well as between the mentor and mentee, the pedagogy necessary can be addressed (Hew & Brush, 2007).

In a study conducted by Sugar and Slagter van Tryon (2014), it was noted “teachers expressed interest in the ability to discuss and talk with other teachers about technology integration related issues” (p. 56). The professional development that arose from collaboration focused on helping teachers implement technology in their instructional practices (Pan & Franklin, 2011). By pairing the mentor and mentee, it addressed the concern teachers expressed of not having help readily available when problems arose during use (Afshari et al., 2009). A mentor/mentee format offered an opportunity for well-designed professional development, which would ensure collaboration was successful (Larson, 2009). The mentor/mentee format also gave students as well as teachers time to learn (Wang, 2013). Both mentors and mentees noted improvement in ICT integration that came with the experience of working together (Templeton & Tremont, 2014).

Collaboration between teachers resulted in teachers becoming more confident users of technology (Christensen, 2002). Researchers discussed several forms of collaboration. The three noted most frequently were the PLC model, the mentor/mentee model, and the CoP model. The PLC format lent itself to an additional learning

community, beyond the traditional single subject area, focused on technology integration and was an opportunity to extend learning beyond the school walls (Sugar & Slagter van Tyron, 2014). The mentor/mentee model approached collaboration on a smaller scale as it was mostly between two professionals, one a veteran, and one a novice (Alderfer, 2014). The mentor/mentee model helped to tailor the learning to the mentee (Templeton & Tremont, 2014). It gave the mentee a constant source where they were able to receive answers to their questions through a trusted relationship (Sugar & Slagter van Tyron, 2014). Collaborating to create ICT integrated lessons shortened the time spent on lesson planning (Hew & Brush, 2007) and fostered the bond between mentor and mentee. Collaboration provided the connection to practice professional development needs in order to be sustainable (Potter & Rockinson-Szapkiw, 2012). Through collaboration, both the mentor and the mentee had the opportunity to mature in their skill and application development (Alderfer, 2014). The mentor and the mentee became “co-learners in the quest for digital education” (Olele, 2013, p. 147). As teachers collaborated through professional inquiry focused on technology integration, comfort level and self-efficacy were increased (Loveland, 2012).

In order to foster the productive collaborative environment, the development of the relationship between the mentor and the mentee was critical (Alderfer, 2014). Having a personal relationship with their mentor could be a valuable component of the mentor/mentee experience (Larson, 2009). The continual professional development, which was structurally part of the mentor/mentee model, offered the opportunity for continuous discussion between the two (Sugar & Slagter van Tyron, 2014). The pairing

of the mentor/mentee expects “the voluntary cooperation by both parties” (Alderfer, 2014, p. 13).

As noted in Larson’s (2009) study, “Mentees were pleased to note that their mentors were helping them to develop the technology skills they needed to be more independent” and were motivated to persevere because they “wanted to go back [to my mentor] and say, ‘See what I did!’ that was great” (p. 128). This showed the value of the mentor/mentee relationship. The appreciation felt by the mentee for individualized attention and guidance provided by the mentor became a catalyst for growth within a safe environment (Larson, 2009). If any feelings of intimidation, inferiority, or resentment were present in the mentee, the relationship and effectiveness of the relationship was at stake (Alderfer, 2014).

Qualities the mentor may need to be a success began with a demonstration of having “earned the esteem of their associates” (Alderfer, 2014, p. 12). A successful mentor had an attitude of being a lifelong learner and felt at ease tackling an innovative idea (Afshari, Bakar, Luan, Samah, & Fooi, 2009). These belief systems, among others, affected how mentors used technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2010). Their ability to demonstrate the role and importance of technology in their classroom to their mentee was key (Sugar & Slagter van Tyron, 2014). A mentor must be confident within themselves and unafraid the mentee will surpass them (Alderfer, 2014).

Conclusion

As research had shown, addressing ICT integration was critical if the global goal of student achievement was a focus. These findings supported the idea that technology integration in education had to be a priority in our schools with the support of

administration. Strudler (2010) went so far as to say, “A new definition of good teaching should include the use of appropriate learning technologies as meaningful pedagogical tools” (p. 226). It was clear there was a need for increasing the comfort level and self-efficacy of teachers to integrate ICT into the curriculum. The question was how was education going to address the concerns of ICT integration?

The ever-changing world of technology presented itself with an inherent difficulty for many educators to embrace integration of ICT within an elementary curriculum (Moore-Hayes, 2011). History had shown teachers were uncomfortable with not being the most capable user of technology in their classroom, yet professional development was not filling that void. With the current necessity for teachers to be able to learn and use technologies of all types in their teaching, the need for effective professional development to increase comfort levels and self-efficacy with technology integration into the curriculum had been in high demand. This study aimed at finding authentic ways to increase teacher comfort level and self-efficacy with ICT integration into the elementary curriculum as both of these barriers effected one another.

By using a collaborative approach, embedding the training within the teacher’s classroom, and pairing a teacher who, on a self-survey, had a strong comfort-level and self-efficacy with ICT integration with one who did not the barriers were reduced.

Chapter Three: Methodology

Introduction

Integration of technology into the elementary curriculum was a task that had been studied and attempted for years (Hsu, 2010) with the purpose of “increasing the quality of student learning through addition of various forms of technology integration in teaching and learning activities” (Ehman & Bonk, 2002, p. 12). Holding (2011) maintained that the potential “understanding [of] the cognitive implications of technology is essential for teaching the new tribe of digital natives [students]” (p. 200). Of critical importance was the initial and continual training of teachers (Olele, 2013). Frequently the model for teacher training had fallen short of the goal primarily due to the model of delivery (Okojie, Olinzock, Adams & Okojie-Boulder, 2008). Shifting from an approach, which did not allow the learner to transfer their learning into the actual classroom, to embedded training in the classroom was the key (Okojie et. al., 2008). With one of the goals of effective use of technology in education having been to improve instructional processes (Eristi, Kurt, & Dindar, 2012) the field of education needed to find best practices in Professional Development to move forward.

In this age of collaboration, “Fortunately, wired classrooms lend themselves naturally to peer collaboration” (Armstrong, 2014, p. 42). In the use of technology in education, collaboration became fluid. This fluidity led to changes within a teacher’s ability to integrate ICT in the curriculum. Understanding the instructional changes offered by the use of ICT in education was central to the pedagogical changes, which would occur (Hokanson & Hooper, 2004). The change in pedagogy called for action. As noted by Olele (2013) “training and re-training of teachers have a crucial role in the

success of Information and Communication Technologies in teacher education” (p. 143) and implementation into a curriculum. The same was true for integration in modern workplaces (Olele, 2013) which was where students would end up. By focusing on collaboration, within a team meeting, as well as between the mentor and mentee, the pedagogy necessary would be addressed (Hew & Brush, 2007).

There were many possible options available. The three most frequently mentioned in research were the PLC model, the CoP model, and the mentor/mentee model. This study was most similar to the mentor/mentee model, however contained elements from the other two as well.

The PLC format lent itself to an additional learning community, beyond the traditional single subject area, focused on technology integration and was an opportunity to extend learning beyond the school walls (Sugar & Slagter van Tyron, 2014). The collaboration among same subject teachers was effective. When that also included same subject teachers in other locations via video conferencing, blogging, or other ICT forms of communication it became more even more powerful.

Another option was to use the Community of Practice (CoP) model for technology integration (MacDonald, 2008). This model was set up as an informal group of people who shared the same enterprise goal, in this case that of professional development aimed at ICT integration (Wegner, 1999). The CoP model was more informal in nature. It was similar to the PLC model. However, the CoP model had an element of just-in-time support not tied to a specific time or day as was traditional with the PLC model. Jones and Dexter (2014) explained CoP as a relationship formed between teachers who were literally or virtually in contact with one another. This

allowed the teachers to act as learners who would decide what, when and how to accomplish their own learning. Researchers reminded educators that “these choices may not align with organizational learning goals” (Jones & Dexter, 2014, p. 370).

The mentor/mentee model approached collaboration on a smaller scale as it was mostly between two professionals, one a veteran, and one a novice (Alderfer, 2014). The mentor/mentee model helped to tailor the learning to the mentee (Templeton & Tremont, 2014). It gave the mentee a constant source where they were able to receive answers to their questions through a trusted relationship (Sugar & Slagter van Tyron, 2014). Collaborating to create ICT integrated lessons shortened the time spent on lesson planning (Hew & Brush, 2007) and fostered the bond between mentor and mentee. Collaboration provided the connection to practice professional development needed in order to be sustainable (Potter & Rockinson-Szapkiw, 2012). Through collaboration, both the mentor and the mentee had the opportunity to mature in their skill and application development (Alderfer, 2014). The mentor and the mentee become “co-learners in the quest for digital education” (Olele, 2013, p. 147). In order to foster the productive collaborative environment, the development of the relationship between the mentor and the mentee was critical (Alderfer, 2014). Having a personal relationship with their mentor was a valuable component of the mentor/mentee experience (Larson, 2009). The continual professional development, which was structurally part of the mentor/mentee model, offered the opportunity for continuous discussion between the two (Sugar & Slagter van Tyron, 2014). The pairing of the mentor/mentee expected “the voluntary cooperation by both parties” (Alderfer, 2014, p. 13). As teachers collaborated

through professional inquiry focused on technology integration, comfort level and self-efficacy were increased (Loveland, 2012).

As noted in Larson's (2009) study, "Mentees were pleased to note that their mentors were helping them to develop the technology skills they needed to be more independent" and were motivated to persevere because they "wanted to go back [to my mentor] and say, 'See what I did!' that was great" (p. 128). This showed the value of the mentor/mentee relationship. The appreciation felt by the mentee for individualized attention and guidance provided by the mentor became a catalyst for growth within a safe environment (Larson, 2009). If any feelings of intimidation, inferiority, or resentment were present in the mentee, the relationship and effectiveness of the relationship was at stake (Alderfer, 2014).

Qualities the mentor needed to be a success began with a demonstration of having "earned the esteem of their associates" (Alderfer, 2014, p. 12). A successful mentor had an attitude of being a lifelong learner and felt at ease tackling an innovative idea (Afshari, Bakar, Luan, Samah, & Fooi, 2009). These belief systems, among others, affected how mentors used technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2010). Their ability to demonstrate the role and importance of technology in their classroom to their mentee was key (Sugar & Slagter van Tyron, 2014). A mentor needed to be confident within themselves not giving in to the fear the mentee will surpass them (Alderfer, 2014).

A less frequently mentioned model was to use interactions between students and teachers where the students help the teachers (Eristi, Kurt, & Dindar, 2012). This option not only helped teachers become more proficient, it also helped students. Another was the TICKIT (Teacher Institute for Curriculum Knowledge about Integration of

Technology) designed as a graduate level course through Indiana University (Ehman & Bonk, 2002). This idea was:

A program for rural Indiana teachers of all subjects intended to increase their knowledge and proficiency in integrating technology in their classrooms. The emphasis is on thoughtful integration and use of technology that adds value to instruction and learning activities, not simply inserted for its own sake, or to “teach technology.” (Ehman & Bonk, 2002, p. 4)

These were just a few of the numerous plans tried over the years. Whatever the method used for professional development for teachers in technology integration, understanding how adults learn was important as well (Okojie, Olinzock, Adams, & Okojie-Boulder, 2008).

“Most technology integration approaches and ideas require some knowledge related to using computer applications or software” (Ehman & Bonk, 2002, p. 21). This thought was of concern for the researcher. The challenge of how to help teachers who had little to no knowledge relating to technology was the crux. In the building in which she was employed she was routinely confronted with colleagues who had very limited knowledge in using computers. Her peers frequently called upon by for help in using and understanding even the most basic aspects of technology because she was comfortable with ICT. As she would spend countless hours helping, teaching, and encouraging them to begin to become comfortable with ICT on their own, it became evident that for those who were the least comfortable she was asking them to complete an insurmountable and isolating task. More and more the need “to use these tools effectively and efficiently, teachers need[ed] visions of the technologies potential, opportunities to apply them,

training and just-in-time support, and time to experiment” (Jung, 2005, p. 94) became a passion for the researcher.

This Tech Buddy plan was a direct result of the researcher trying a paired down version with a partner the year before. The researcher/mentor had self-directed experience integrating ICT into her second grade curriculum using iPads. The mentee had no experience integrating technology into her second grade curriculum. At the beginning of the year, the researcher/mentor approached the mentee suggesting the idea they work together to help each other learn more about integrating technology into their curriculum. Both teachers were interested in the collaboration, which they knew would be a natural outcome of this venture. The mentee agreed and they contacted the district ETS to set up a meeting looking for guidance on how to begin.

This partnership continued throughout the entire 2013-2014 school year. Toward the end of the school year, the mentor and mentee held a student showcase event in which the students were able to share their final project using ICT as well as share their learning experience throughout the year. The mentor and mentee invited district level personnel including the Superintendent, Chief Academic Officer, Chief Financial Officer, Chief Information Officer, Director of Student Learning, District IT Manager, as well as School Board Members. The invitation was also open to parents and families as well as building colleagues and their students. Unofficially documented but observed results were very positive and the district Chief Information Officer approached the researcher to pilot the plan in the following school year.

At the end of the school year, the researcher had written a proposal for the plan and presented it to her building colleagues asking if there would be teachers interested in

participating. The Researcher explained the expectations and commitment of the program and gave an opportunity for questions from the staff. The program expectations consisted of mandatory attendance at all Tech Buddy meetings, complete sharing of experience in their PLC, and willingness to be encouragers of others in their grade level to begin integrating ICT into their curriculums. Upon completing the presentation, an exit survey revealed over 95% of the teachers were willing to participate in the program.

The proposal focused on the premise of assigning one mentor teacher who was relatively comfortable with being a self-directed learner with technology integration to one mentee teacher who was not comfortable with being a self-directed learner with technology integration. The proposal design included six pair of mentors + mentees, one Library Media Specialist and an Administrative Intern. The researcher was one of the mentors. The proposal also included the purchase of 90 Google Chromebooks and 90 iPad minis for the use of the teachers involved. Part of the proposal included time that the mentor and mentee brought their classes together to use the ICT simultaneously. Either this was when the students were learning ICT together or they were showing their respective Tech Buddy classes what ICT they had learned. Participation in this plan was voluntary. Certain restrictive parameters were set by the Chief Information Officer as to who would be eligible to participate based on who had received previous district funded PD on ICT integration into the curriculum. Those included the T3 program and eMINTS program.

The proposal included three types of release time for the group and pairs to meet. The first type was as a whole group. They met each quarter for a half-day release time. Three-fold planning occurred for these meetings. First, the whole group discussed the

focus of each mentor/mentee pair in ICT and shared anything they had completed with their students. They would freely share their experience in implementing the form of ICT they had shown the group, paying particular attention to detail with planning and implementation of the technology. Second, the whole group discussed any other types of ICT they had learned or were interested in learning about. Third, the whole group broke up into smaller groups of similar grade-levels. These groups spent time discussing their next learning objective with ICT and planned for the implementation.

The second type of release time was a 2 hour planning opportunity in which the mentor + mentee were given time together. This gave them uninterrupted time in which they planned lessons, researched new types of ICT and in which the mentor was able to teach the mentee other types of ICT through using the appropriate device.

Purpose

Education demanded technology be more integrated into the curriculum of today's students. This led to the teachers themselves requiring more training in the use and application of technology. Specifically the researcher saw the need to help colleagues who were not comfortable with using and/or integrating technology into their elementary curriculum become comfortable. The researcher created the Tech Buddy plan with the intent of helping teachers become more comfortable and displaying higher self-efficacy with integrating technology into their curriculum.

Research Questions

RQ1: What effect does the Tech Buddy approach to professional development have on integration of technology into the curriculum?

RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been effected by this program?

RQ3: Is the Tech Buddy program more effective on teacher comfort and self-efficacy levels when implemented with the same grade level or mixed grade level teachers?

RQ4: How has student engagement been affected with this program?

RQ5: How has technology integration vs. technology use been affected in the classrooms of the program?

Research Context

District. The treatment district was a suburban public K-12 school district. This district was located in metropolitan St. Louis, Missouri. At the time of the study, the total district population was approximately 17,000 students. The percentage of students receiving free or reduced priced lunches for the district was approximately 19%. Table 1 shows all subgroups and percentages of the student population at the time of the study.

Table 1

Ethnicity breakdown of student population in district

Ethnicity	Percentage
Asian	3.5
Black	7.5
Hispanic	3.2
Indian	0.1
Multi Race	2.5
Pacific Islander	0.1
White	83.1

School. The treatment facility was a public school in a Midwest suburban school district. The demographics of the school consisted of a total student population of approximately 750. The staff gender breakdown consisted of 94% female educators and 6% male educators. The participants came from 12 classrooms ranging from Kindergarten through 5th grade, the Library Media Specialist (LMS) and one of the building administrators. Thirteen of the participants were female and one was male. One of the district Educational Technology Specialists (ETS) was also involved. In the plan, the district provided specified release time for the participants. Each quarter the participants attended a half-day time to learn new ICT integration tools, collaborate and a 2-hour time to plan with their partner. The participants received 3.5 hours of stipend time once per semester for the same purposes. The percentage of students receiving free or reduced priced lunches for the school was approximately 35%. The percentage of students who were receiving English Language Learner instruction was approximately 17%. The demographic breakdown of the student population in the school indicated a difference from the district (see Table 2).

Table 2

Ethnicity breakdown of student population in building

Ethnicity	Percentage
Asian	11.5
Black	12.5
Hispanic	8.9
Indian	0.1
Multi Race	6.5
Pacific Islander	0.0
White	60.5

Another part of the expectations for participants was to plan and execute a student showcase at the end of the school year for all students involved. This showcase was for the parents and community. It was also open to any other teachers in the building who had ICT student work to show. There were no expectations as to when during the day it would be held.

Research Participants

Of the 65 certified staff in the building, 62 volunteered for the program. This was over 95% of the certified staff in the building. Of the certified staff, only 18% participated in the study due to district-mandated limitations. Specific grade level classes participating: two Kindergarten classes, two First Grade classes, three Second Grade classes, two Third Grade classes, two Fourth Grade classes, and a single Fifth Grade Class. The building Library Media Specialist and Administrative Intern were also involved; however, their role was different from that of the classroom teacher participants. The participants divided into six pair of teachers (see Table 3).

Table 3

Tech Buddy Pairs

	K/1 grade level pair	K/3 grade level pair	1/2 grade level pair	2/2 grade level pair	3/5 grade level pair	4/4 grade level pair
Mentee	Kindergarten	Kindergarten	1st grade	2nd grade	3rd grade	4th grade
Mentor	1st grade	3rd grade	2nd grade	2nd grade	5th grade	4th grade

Sample Size and Selection Criteria

The sample size of this study was limited to six pair of mentor/mentees, one Library Media Specialist and one Administrator. Participant selection was from the

original group of volunteers taken from the school. The staff consisted of 65 certified teachers and 62 volunteered for the program. All of the volunteers completed an initial survey to determine whether they their classification as mentors or mentees. District personnel designed and completed the selection and survey before the researcher began this study. The district Chief Information Officer placed some parameters on the potential participants. Those parameters excluded teachers who had any previous training by the district in eMINTS or T3 programs.

Devices Used

In order to conduct the study the district purchased 90 Chromebooks and 90 iPads for the 6 pair of mentors and mentees. The pairs that began the study with Chromebooks were the K/1, 1/2, and K/3 groups. The pairs that began the study with the iPads were the 2/2, 3/5, and 4/4 groups. All devices were switched midway through the study so that the iPads were used by the K/1, 1/2, and K/3 groups and the Chromebooks were used with the 2/2, 3/5, and 4/4 groups for the remainder of the study.

The district Chief Information Officer made the decision to use two types of devices and switch mid-year. It was his belief that by using various devices teachers were teaching the process of ICT rather than the specifics of the devices.

Relationship to Participants

The researcher was a teacher in the building during the study. She worked closely with those involved in the role of Program Lead to help facilitate the program when the ETS was not in the building. She had no administrative authority over the participants. To reduce bias, she had the final interviews conducted by a separate staff member.

Data Gathering Measures

The researcher gathered data using a pre- and post- survey measuring confidence level and self-efficacy of technology integration into the respective curriculums. Each participant participated in an interview midway and at the end of the study.

Administrators used the student engagement portion of the standard teacher evaluation document used in the school district to document observations. Administrators used data from the teacher evaluation form to measure technology integration vs. technology use.

Timeline and Order of Procedures

This study began with the start of the 2014-2015 school year at an elementary school in a large mid-west metropolitan school district. It began with a pre-assessment survey completed by teachers participating in the study, administered at the end of August. In the first half of September, professional development began with the Educational Technology Specialist leading a ½-day release time for introducing an outline of how the year would progress for the participants. Topics covered were expectations of the participants, having the participants take a self-assessment, learning the learning management system used throughout the study, time to become familiar with the technology devices used in the study, and planning of lessons within the curriculum's Units of Study for the first quarter of the school year. In the middle of September, each mentor/mentee pair received a two-hour block of release time for the use of planning and/or time on devices to practice use.

At the beginning of October one day was used for the researcher (called the Program Lead) to observe a time that each pair had their students together to complete a lesson. The second week of October all employees of the district attended a mandatory

professional development day for the purpose of education and training of various uses of technology within the curriculum used by the district. Toward the end of October, mentors and mentees used another ½-day release to review and reflect on progress of the study thus far. They did not introduce any new technology applications or tools. Rather this time was devoted to reflection and sharing of the experiences from the district technology professional development day, release time from the study and it's perceived value, any comments or observations from building administration, planning for the next Units of Study for second quarter, and general thoughts from the participants. The last week of October, the mentor/mentee pairs were given another two-hour release time with the purpose of planning for the upcoming quarter of the school year, time on devices to become familiar with usage for Unit of Study, and discuss any needs each pair may have.

November only had one event. The Program Lead used release time to observe a lesson or work time when each pair had their students working together. They used this time to observe student engagement, check in with the mentor/mentees, and be an immediate resource for anything pertaining to the study.

In December, the participants retook the assessment survey. The Program Lead had a ½-day release time to review the results with the Education Technology Specialist. They used this time to compare the pre and mid study data in order to determine, future professional development needs of the group and to plan.

Based on data from December, a ½-day release time during the first week back in January occurred for the mentors/mentees. The purpose of the meeting was three fold: First, dissemination of information about a personal learning network. Second, reflecting on the progress of the study and its effect on integration of technology within the Units of

Study. Third, they planned with intention to integration technology within the Units of Study for the up-coming quarter. The last week of January, the participating pairs were given another two-hour release block with the purpose of planning for technology integration into the upcoming Units of Study, time on devices to become familiar with any new tools, and/or discussion of any needs the pair may have with the Program Lead.

In February, the Program Lead had release time with the purpose of observing the study in action with the pairs and their students working together. They observed and recorded student engagement; recorded discussion of the pair on progress of the study, as well as any needs or concerns the pair may have had.

March only had one event as well, a ½-day release professional development time for all participants. The purpose of this time was to revisit and strengthen previous learning on using a Professional Learning Network. Specifically, how it could help the participants grow as connected educators, reflect upon the progress of the study thus far, and plan implementation of technology within the Units of Study for the fourth quarter of the school year.

In April, the Program Lead used another release day to work with the Education Technology Specialist as they met with pairs to observe their classes working together in implementation of technology in the curriculum. The purpose was to use gradual release of responsibility for the Program Lead to become the building resource instead of the Education Technology Specialist. Three weeks into April participants used another two-hour release block for planning, reflecting and researching technology needs for their last Unit of Study.

The participants completed a summative survey in May. The Program Lead, Education Technology Specialist, and District Director of Adult Learning met to review the results from the surveys pre, mid and post program evaluations.

Evaluation

Following the collection of data from the interviews, the researcher transcribed all interviews. The researcher reviewed the transcriptions using an open coding system searching for emerging themes. Multiple themes did emerge which will be described in more detail in Chapter Five. The analysis of each of the five research questions included discussion of these themes.

Conclusion

The study involved six pair of mentor/mentee teachers, one LMS and one building administrator. A survey of self-assessments on their comfort level and self-efficacy level with ICT integration guided the pairing of mentor/mentee teachers. The pairs were chosen with three relationships in mind; two pair who were like grade levels (2nd + 2nd and 4th + 4th), two pair who were adjoining grade levels (K + 1st and 1st + 2nd), and two pair who skipped at least one grade level between them (K + 3rd and 3rd + 5th).

The participants were given release time during the day once each quarter to meet as a group for 3.5 hours and as a pair for 2 hours. The design of both of these release times was to foster collaboration and planning of ICT integration into the curriculum. Additional time spent in collaboration and planning was encouraged, but not required. Participants also received 3.5 hours of stipend time together after school one night each semester to collaborate and research new ways to use ICT integration in their pedagogy.

At the end of the year, the participants hosted a student showcase for the building. They invited any other teachers in the building who had any student work related to ICT integration to participate as well. This was an expectation for participants but not for other teachers. Using comparisons of the pre- and post- self-assessments on comfort and self-efficacy levels, individual interviews mid and post study and any comments by non-participants the researcher analyzed the results. A comprehensive write-up of results is included in Chapter Four.

Chapter Four: Results

Introduction

This research project was qualitative in nature. A brief overview of qualitative feedback follows. The researcher will present the results of the interviews divided by research question and subdivided by mentor/mentee pairs. The participants' answers to the pre and post surveys conclude the chapter.

General Qualitative Feedback

The effect of the Tech Buddy approach to professional development on integration of technology into the curriculum was a positive one as noted by those involved. Teachers, the Library Media Specialist (LMS), as well as the Administrative Intern noted positive effects. As the LMS stated "I do like the fact I have seen growth in teachers doing this and seeing classes work together the way they do to come up with their projects and do their projects." The Administrative Intern noted the application of ICT in the curriculum when she said, "You either know they have just used it or are getting ready to use it so it's more part of their daily routine and not just some special project that they're using." She made her comments as the result of observing in classrooms that were participating in the Tech Buddy program and classrooms that were not participating in the Tech Buddy Program.

RQ1: What effect does the Tech Buddy approach to professional development have on integration of technology into the curriculum?

The Kindergarten (mentee) and 1st grade (mentor) team felt the experience was very valuable in helping to integrate ICT into the curriculum. The mentee explained how

she knew what type of learner she was and what she needed in order to implement anything learned through professional development when she said:

I tend to be a learner that needs to see, not just see it but also hear it and do it.

And, so I was really excited because this was a hands-on approach and I would be with one person who wouldn't just show me and be gone.

The mentor expressed similar feelings when she said:

This is an ongoing process and I think for me the ongoing type of thing works well. I need people to remind me and keep it at the forefront of my mind and not get bogged down with other stuff.

When asked about their planning together for the purpose of ICT integration the mentee teacher stated:

So our classes get together at least once a week, the mentor class and the mentee class. And that has been a great learning experience for me because I get to see it before [in our planning] and then I get to see my mentor show it on the SMART Board to the kids and [then] I'm actually helping students use it.

She mentioned that during their planning time, they both look at their respective curriculums and her mentor would share a couple of options of ICT they could use to accomplish their objective. Once they decided on which ICT tool would be best to use, the mentor would show her the basics of how to use the tool and its use with the students in conjunction with the objective. This gave the mentee a chance to practice using the ICT in a one-on-one setting with the mentor. Once both had some experience using the tool they began writing their lessons plans around how they would implement the tool with their students to meet the learning objective.

The mentor mentioned being specific in the way they looked at integrating ICT with their curriculums when she said:

We work on finding a way for the students to use the technology to go deeper into their learning or be creative with what they have learned. We don't plan for something that she can very easily do on her own, like a phonic app or something like that.

The team typically met once a week before school to plan for the next week's ICT integration.

Although not directed to do so by the researcher, the team built into their weekly schedule one 30 minute block in which they would bring their classes together to the mentor's classroom so their students could learn the ICT tool planned for that particular learning standard. During this time, the mentor taught and demonstrated the tool to both classes and the mentee acted as support for the students. Both mentor and mentee felt this worked very well for their particular age group of students. The LMS observed one of the times the classes were learning a new tool together. She commented on how "proud of her [the mentee]" she felt from what she saw in the observation. The LMS went on to say "the Kindergarten teacher [used] absolutely no tech in the classroom [before the Tech Buddy program] and now she is using tech and talking about it and being excited about what the kids are doing."

The previous planning incorporated time for the mentor and mentee to practice using the tool along with the 30-minute block. Both participants valued this according to comments. The mentee stated, "Now I am actually taking it back to my classroom and

using it” This referred to what happened because of the time their classes spent together each week. She went on to explain:

I have my reading groups and we can do it [ICT] in our groups and refresh and add on to what was learned with my mentor. So then I can make sure they’re knowing what to do [when using the ICT without their mentor class].

The Kindergarten (mentee) and 3rd grade (mentor) team did not have the same experience from the Tech Buddy program. The mentee felt she and her mentor had difficulties because their curriculums did not align. She said, “it’s hard to align because I’m working with a 3rd grade class and our curriculum doesn’t align, so that’s where it has been challenging.” The mentor viewed his role as more of an advisor as evidenced by his comment “she wanted to just take pictures [with iPads] and move to something else. But instead we talked about having her kids create a video to go with it [her learning objective].” He then proceeded to teach her one on one how to use the iMovie app on the iPad. They did not get their students together so she could watch him teach all the students how to use the iMovie app as the Kindergarten and 1st grade team did. As a mentor, he chose to teach his students using his curriculum and then brought his class down to have her students add to his students’ projects. In the opinion of the mentee, this did not work because “they’re [the 3rd grade students] not at the age to TEACH it to Kindergarten they just kind of DO it for them.” The LMS felt this was a concern as well when she said, “I’m not sure they [Kindergarten and 3rd grade classes] always come together and do it together [to teach her kids] so it’s not as strong [as the Kindergarten and 1st grade team].

The mentee felt the fact that the mentor was a teacher of 3rd grade students did not give him an understanding of what her Kindergarteners could do when she said, “They [the 3rd grade students] take over the whole thing so my kids really have not learned what it is I think others have learned.” She felt “the big projects [they did together] are based on what his kids are doing and my kids add to it” instead of a project being focused on what her students needed for their learning objectives. The mentor felt similarly, when he said “we haven’t been able to do a whole lot because of the grade level difference and the ability of the [kindergarten] kids.” He viewed his role in the advisory capacity as evidenced by his comment:

A lot of this [ICT integration] comes from doing things on your own, I can stand here and tell you a million things but it’s not worth anything until you actually do it and live through it in a project or whatever.

The 1st grade (mentee) and 2nd grade (mentor) team both had very positive things to say regarding their participation in the Tech Buddy program and its effect on ICT integration into the elementary curriculum. The mentee said, “I’m able to talk to my mentor about the programs out there that I don’t even know about. My mentor can give me ideas, thoughts, things I have never heard of or tried before.” She mentioned that before being in the Tech Buddy program she “was scared of it, not afraid to use it but thinking of what I didn’t know.” She said that:

To actually have the time to sit down and talk, not just in the few minutes before you go home, but to be able to see it and ask questions and see what they did and how they did it and how you can use it. I think it has been something that has really been big and important. It gives you a chance to hear and see what upper

grades are doing it gives you really great ideas, just that whole collaboration part of it.

She discussed how looking at ICT integration had changed when she specifically said, “I think for me what was good this year was just knowing. Just kind of finding out what I do know, what I don’t know, what I want to know more of, figuring out what I like.” She also said:

Having a mentor helps me to keep thinking of ways to integrate the ICT into my curriculum instead of just going to the quick use of it for something like drill or skill practice. Not that that is bad, it’s just not great integration.

The mentor had similar feeling regarding ICT integration into the curriculum when she said, “One of the best parts of this whole program has been the chance to really talk to and learn from all grade levels in the building about ICT integration into the curriculum.” Both mentee and mentor spoke to the benefit of being open and sharing with their Tech Buddy while still having time built into each quarter to meet with others was very helpful. The mentor said:

As great as it is working with your buddy, sometimes you really need collaboration with others to spark new ideas or to be exposed to new tools. It keeps you from feeling so isolated in what you are working toward. It kind-of helps you to be more focused.

She went on to say, “Having that accountability piece of not just your buddy but also everyone else in the program has really been helpful [when trying to] stretch yourself beyond what you already know.”

The 2nd grade (mentee) and 2nd grade (mentor) team had comments to add to this question. In reference to comparing integration of ICT into the curriculum before the Tech Buddy program and after the mentee said, “I didn’t use a lot of technology prior to this [Tech Buddy program] year; it was more just an occasional thing.” She explained why she did not use much technology prior to this year when she said:

I would bring it in, but it was such a big ordeal. I didn’t have any help so I kind of shied away from it because I felt it took a lot of instructional time away. Just to bring it in and address all of the issues that came up, being a single adult in the room with all of these kids and all the devices. Ugh!

When asked if she felt she looked at integration differently after being a part of the Tech Buddy program she replied,

I do feel like I can integrate tech more and it’s not this thing that I dread. Because it was before, I want to use it but I dreaded doing it, because I knew there were going to be kids “I can’t log in” or “mine’s not...” and you’re trying to run all over the place, so I did have that dread and now I do feel like I can integrate it more. I just know what to do to help them or to lead them to discovering themselves. So I feel comfortable in that sense in now having a wealth of ideas out there that I could integrate into my classroom.

The mentor began her comment to RQ1 by referencing how the idea of the mentor and mentee was beneficial when she said:

I think it’s a whole different game to go and sit somewhere and get instruction with a whole group of adults and then not be with that person to implement it with. I think it’s helpful to do it [ICT integration] with that teacher [Tech Buddy]

to have that teacher right there kind of guiding and going through the same thing.

I know that is a way I learn best and my mentee has said she likes it better this way, too.

The mentor had other thoughts for clarification on integration of ICT into the curriculum when she said:

I think a lot of people, before we use tech a lot, think they want their kids to use tech as a game or drill, which is not bad but it's not their only use and it's not what it should be all the time. So, I think just getting people to understand that you can put technology in your kid's day every single day with practice but you just have to find ways to use it with your curriculum with a tech piece so your kids are more engaged. Using it in a more engaging way, that is the key.

When the mentor was asked if she could give examples to clarify what she was thinking she said:

Like the ByteSlide thing, we knew we wanted to use it for our Native Americans project but it didn't have recording but we liked the layout of it. So, for that reason, knowing it also worked on Chromebooks, we thought we could use that [ByteSlide] and do something extra to get the voice. So we looked at Screen Castify and that worked.

She went on to explain how she approached beginning to integrate ICT with her mentee when she gave the example, "Just looking for things to do with technology on a daily basis that they were doing already in Daily Five. That is kind-of where we started with my mentee."

The 3rd grade (mentee) and 5th grade (mentor) team shared their comments. The mentee began by saying:

Well, first off it helps so much in being able to integrate tech into my curriculum because it gives me time. My favorite part, I guess, is the planning. When we get together and we plan and we hear what other people are doing and we see what other people are doing and I think ‘Oh, I can do that, or try that with this.’ The Units of Study [curriculum guide] aren’t new but what we can bring through this [tech integration] is new.

Regarding the release time the group met together during the study the mentee said:

If we didn’t have the time to learn from each other, learn from other colleagues, I would not be able to do this. Because like I said, I only know what I know. The time to be able to sit and see what others are doing and hear the process they went through and to show me how to do things, that’s critical. Then knowing they’re going to show you AND the support [mentor] is going to be there too for you to then go take it to your classroom. The other thing that makes this program so wonderful is the fact we have support from administration. Not only administration in our building but administration at the district level. This is something they are wanting and they’re giving you the support to try these new things.

She went on to say, “Last year we did some tech but it was more of the end product. This year, now, I can see a BIG difference how we are using it throughout. It’s not just the final piece.” She referred to some forms of integration when she said:

Just the opportunities for the kids, extending it, it's a collaboration tool when they use the jigsaw approach where the kids become experts and they present on one thing and other kids are able to go in and listen and learn from what they have done. They become the teachers as well.

When she finished her comment, she sat for a moment without responding and then added:

It's really incredible to think about my classroom last year compared to this year. Like the fact that we have a Symbaloo page for choice activities the kids can go to. We blog now, they can respond to each other. They can go find their assignment on line and interact with each other. I mean Reader's Notebooks are great but it's one way.

The mentor seemed equally as pleased regarding ICT integration into the curriculum. She began with discussing how the devices provided in the program would help:

I already knew from last year after taking the BYOD class and the Flipped Classroom class and getting our teacher Google accounts from the classes that I wanted to go in that [integration of ICT] direction. To have my kids on Google Drive, the way of turning things in in Google Forms, I knew I wanted to go that route.

She added, "I truly don't think I would have been able to do it [ICT integration] successfully without the Tech Buddy program."

She also added comments on the release time and how it helped them when she said:

When my mentee and I got together, we got to see what each other was working on [in their own curriculum]. We would ask what the other had coming up in their Units of Study and then we would start thinking ‘Oh, I could morph that into...’ and then we would get our kids together and let them teach each other. It was nice to see everything from her grade level perspective and it gave both of us some fresh ideas to what we could do.

She explained how they have dealt with having different curriculums as evidenced by this comment:

We have enjoyed it and have had different things going on. She has tried things out in her classroom. We send kids back and forth like when we started Voice Thread she had done it before we had done it.

She explained about sending the 3rd grade students to her room as helpers for the 5th grade student in using Voice Thread. She added, “They [3rd grade students] were so excited to come down and show us.”

The mentor explained how her experiences had changed from the previous year to this year when she said:

Before we started the program, I was excited about getting our hands on more tech because [last year] I was in competition for the laptop cart. I liked the idea of having them on a more regular basis, because that spontaneity part, or when kids need to grab one, or when something comes up and you wish you could do it but you have got to go see if it is checked out and sometimes that moment is lost.

She explained how she was looking forward to being in the program when she said:

I was nervous about this year that I wouldn't have enough kids with their own tech. But when I found out I was going to be a part of the Tech Buddy program I felt, oh my gosh, now I'm going to really learn this and I can do the set up I want.

She added, "I have all my parent communication going through it. I truly don't think I would have been able to do it successfully without the TB program." She gave an example of how participating in this program had also affected her students when she said, "They [the students] went from the beginning of the year asking me 'Can I use the computer for this or that' to just knowing when to pick them up, what to use them for."

The 4th grade (mentee) and 4th grade (mentor) shared thoughts on the effects the Tech Buddy approach to professional development had on integration of technology into the curriculum. The mentee began with, "I feel the Tech Buddy program has allowed me more access to teachers and devices. It has helped me just being able to share ideas and information so I can integrate technology." She explained:

I think had I not had this program I probably wouldn't have been able to help my kids who aren't maybe the best at writing or the best at reading find another outlet to show what they know. I think it has helped me so much with that.

She went on to say, "I feel like I have a better idea what they really know because they're choosing their own voice on how to show me. Whether it's with Lensoo or VoiceThread it's their chance to really shine."

The mentor had similar comments. She began with, "I do feel like I have learned a lot, programs and apps and things. I feel I have set out to accomplish those goals. I have gotten a chance to use them from iPads, from tablets, from Chromebooks." She explained how it affects her day to day in her classroom when she said, "I can do it [ICT

integration] so much more readily in my classroom. It doesn't take nearly as long any more for me to introduce and infiltrate something new to my kids." She continued by stating, "I now know so much more about technology integration professionally. So that's been really cool, it's made me a different sort of teacher this year."

RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been effected by this program?

The Kindergarten mentee in the K and 1st grade team was very vocal on how the Tech Buddy program has affected her comfort and self-efficacy levels. As mentioned by the LMS, before participating in this program she did not integrate any ICT into her classroom. When asked directly the mentee replied, "I feel more comfortable, definitely!" When asked for specific examples she began with how they had set up their planning and practicing time together and how her mentor was always very helpful, even during the school day. She explained:

If something happens that I can't help them with and I'm puzzled with it and my [student] experts are puzzled then she is very helpful and is okay with them coming down to her room and get their question answered. They usually come back and tell me what she said to do.

Since the students from the mentee class spent time every week in the mentor's classroom, they knew how to navigate the school to get there.

When asked the effects on her self-efficacy levels she immediately stated:

I still have a ways to go but I feel like I have grown so much and used so much with technology I've never done in the past. I'm not ready though to be a mentor to someone, but I'm getting there.

She stated she knew as a learner herself “I just need all that repetition and doing it every week is what I need” As she shared the improvement in her self-efficacy, she also noted that her mentor was always happy to meet more than once a week if needed. She stated that a number of times they met with their students twice a week for 30 minutes when they had a particularly challenging project they were working on.

The mentor had similar comments when she spoke of her increase in comfort level. She felt she came into the program with a fairly developed comfort level when she stated, “I was comfortable before but I’m even more now. I think if we get too comfortable we’re not doing a good job because the way technology changes we have to be willing to always be a little bit uncomfortable.”

The mentor seemed to be particularly pleased with the ongoing aspect of the program as evident in her statement, “I think for me the ongoing type of thing works well. I need people to remind me and keep it at the forefront of my mind and not get bogged down with other stuff.” This preference aligns with current research.

The subject of self-efficacy brought out a response from the mentor that seemed to be a theme among many of the mentors. Her comment about how:

It [the Tech Buddy program] has forced me to stay one-step ahead of my mentee.

I take the role of mentor seriously so yes it has forced me to stay one-step ahead to make sure I know what’s going on.

This showed the impact on her self-efficacy by the design of the program. She spoke of how the responsibility of having a mentee helped her stretch herself more than she would have on her own. Admittedly, she had always been interested in integrating technology

into her curriculum, however through the dedication of having a mentee she also looked for ways to integrate beyond just her student's experience and learning.

The Kindergarten (mentee) and 3rd grade (mentor) pair had much different results than the Kindergarten (mentee) + 1st grade (mentor) pair. As mentioned above, the K/1 pair both increased their comfort and self-efficacy levels. However, in the K/3 pair neither participant expressed they experienced much of an increase in their comfort level or self-efficacy level in ICT integration into the curriculum but for different reasons. The mentee noted, "I don't feel like I've learned anything" to help increase comfort level or self-efficacy level. She did mention she has "tried a couple of apps we talked about" but that she did not mention any success with those with her students.

The mentor mentioned he had increased his pride in how he was progressing toward his personal goal of being an Instructional Technology Specialist when he said "this has given me, you know, validation this is something I'm really good at and this is something I could do full time." However, he did not mention how the program had affected his comfort level or self-efficacy level with ICT integration into the curriculum.

The 1st grade (mentee) and 2nd grade (mentor) both expressed an increase in their comfort levels and self-efficacy levels. The first comment the mentee said was "yes, a lot and I don't think I realized honestly how much because I would always say 'Oh gosh, that's hard and I can't do that' and now I realize I do do more than a lot of people." She explained effect of the program when she said, "I think my comfort level is definitely a lot better than it was last year for sure. I am not afraid to try it, I might mess up, but that's okay, I'm not afraid of them [devices] at all." She also said:

I feel much more comfortable, even to the point of, and this is pathetic, but even just turning the Wi-Fi on. Last year I'd have to go to my neighbor and ask what's wrong and have them do it. Now I'm not afraid I'm going to mess it up. I was always afraid I would push the wrong thing and mess it up and so I guess I have realized I'm not going to mess it up, most likely.

The mentee went on to explain how the program has affected her beyond her own classroom when she said, "When I get back to my grade level I can really see it." She explained how:

In meetings when we are talking, just being able to say I am doing it and it isn't hard. So talking about it more in PLC when we are trying to do stuff has helped my comfort and self-esteem levels.

She spoke several times how her comfort level had changed. For example, she stated, "Listening to other people around the building, even though I'm still not good at it, I'm a little more receptive to try things and give it a whirl." She followed this by saying, "I am comfortable with what I have added on and now need to get comfortable with other stuff." She chuckled when she said, "If it [ICT] doesn't work it doesn't work. I'm not afraid I'm going to break it anymore if I touch the wrong button."

The mentor stated similar comments in reference to reflecting on the experience when she said:

It's just amazing when I think about it. I was comfortable with tech before being a part of this program. But, to see how much my comfort and self-efficacy levels have grown it so makes this whole thing so totally worth it. I mean, come on!

The reflection time we are getting, the debriefing time we are getting, the

planning time we are getting, all of it just is so beneficial to anyone at any stage in this journey to integrate tech into our curriculum. I just love it.

The 2nd grade (mentee) and 2nd grade (mentor) had many thoughts on how the Tech Buddy program affected their comfort level and self-efficacy level. The mentee stated:

I didn't feel like I was a technology idiot but I didn't know a lot. So my hope with it, in the whole program, was to go from the use to the integration, feel more comfortable with it, and introduce a lot more things to my kids and avoid all the issues with it.

She then went on to say, "That is what I had heard was happening [last year with the first mentee + mentor] the kids were helping and being the experts." She mentioned again frustration with ICT integration before being in the program when she said, "I shied away from using it because I didn't feel I could be the expert in it." She continued saying, "I'm not necessarily the expert now, I have the kids help me." She explained that, "Honestly, it [introducing something new to the students] is chaos at first, but they're focused and want to do it. It's amazing how they rise to the challenge. That is a new comfort for me."

She discussed some of the things she realized as she went through the program. She stated:

My comfort level has increased, because it's kind of that odd thing, you don't want to do the technology because it's such a big deal, but when you do do the technology it's not a big deal anymore because the kids become more proficient

with it. They can figure things out before I can figure things out, so what was keeping me from doing it before?

She explained when she realized the change in her fear of not being the expert when she said, “I’ve gotten really good at telling them they need to keep trying and figure it out, and they do.” She went on to give the examples of, “I feel like it’s more integration when we have taken away their Stop n Jot notebook and they’re KidBlogging” and “the content areas, that’s complete integration because it all goes back to we do the researching and writing about it.” She also said, “The one thing I have been really adamant about; it’s not just a babysitter to get on and go play whatever you want.”

The mentor also expressed an increase in her comfort level and self-efficacy level when she said:

I think it has made me more comfortable to start something new. I was comfortable with the iPads but I hadn’t ever used a Chromebook and I had Chromebooks to start the year. So I started with looking for ways to use them in Daily Five to give the kids and myself a chance to get a little more comfortable with them before we did anything more involved with them. I feel that was a good way to start something new for me as well as my mentee.

She also said:

Once we kind of had a feel for them and how they worked differently than iPads we started looking and deciding what it was we want to do to meet the learning standard? And looking at all those options that are out there and deciding which tech tool would make sense to use with which learning standard?

She summed up her answer to this question when she said:

I think I realized it was helping my comfort level when I realized that once you taught them one specific thing, the carryover. Once they realized how to do something in that particular thing like an app or tool or particular platform, they would kind of just build on that and figure it out based on what they already knew about what they learned before.

Then she said:

After realizing that it kind of freed me up to be able to say ‘Ok, I don’t have to be tied down to a certain thing, I can look for new tools and focus on the best one for the standard’ that’s when I realized it went beyond just comfort. My self-efficacy level was being affected.

The 3rd grade (mentee) and 5th grade (mentor) team shared many comments to this question. The mentee said:

My comfort level and self-efficacy level have been increased! Absolutely! Before people would throw out terms and ideas out and stuff and I wouldn’t understand them and now I understand what they are talking about... the lingo, the language. Definitely! That’s the first place I have been affected.

She went on to explain how she has seen a change when she said, “I feel like between last year and this year I can tell I have taken it to a new level.” She was asked if she could give examples. She replied:

Honestly with anything, like just setting up a Symbaloo page or getting people used to using a research site or whatever. I have been so much more confident and self-assured. It really helps me feel I can help others. Like I have helped one

teacher initiate some things and I have told another teacher my kids can come down and help.

She referenced transitioning into a mentor when she said, “I can see myself doing that part, with the kids being helpers, too.”

The mentor also had comments explaining the effect on her comfort and self-efficacy levels with technology integration into the curriculum by participation in the Tech Buddy program. She began by saying, “I’m learning a lot of new stuff.” She stated, “I feel like I’m doing more integration by looking at the repertoire and thinking how a certain tool would work in the curriculum.” When asked to elaborate she said, “Getting to the idea of what fits rather than what activity can I learn? Moving from ‘I can use technology’ to ‘It really makes sense to use it in this capacity.’ I’m so ready to do more.” She went on with the example:

We have something coming up in our Units of Study where we could use the idea of videoing kids holding cards and telling a story with the cards without talking.

It’s just getting to the idea of what fits rather than what activity can I learn?

The 4th grade (mentee) and 4th grade (mentor) team each had positive comments regarding the effect on their comfort levels and self-efficacy levels by participating in this program. The mentee began with, “I guess I always thought I was comfortable with technology until I was truly integrating it on a daily basis.” She commented regarding a concern she had always had with how many times her students would know more than she did. Specifically she voiced how that concern had changed when she said, “[I was always] thinking some of the kids know more than I do, which I now see is okay.” She

stated, “Now I’m constantly ‘What else can we do, what else can we do?’ just so that they’re learning.” After a few moments of reflection, she added:

I think my comfort level is increasing because I’m teaching myself too along the way. Like today, sitting there reading KidBlog and watching how their writing has progressed and how fast they’re getting it done now and how comfortable they are with it. It’s just made it so much easier for all of us, the kids and me.

The mentee referred to her self-efficacy level in a slightly more cautious tone when she said, “I think it has changed somewhat. I’m not there yet, I want to keep learning. I’m never going to be a person who feels like I’m here, I’ve done it, I feel great and that doesn’t bother me.” She explained that while she was integrating more she felt her understanding of her own self-efficacy improved compared to her students and their ability to use ICT in personal and appropriate ways to show learning. Her statement, “Maybe that is my self-efficacy that I feel like when they’re able to choose a way they can show me what they know but they choose a path” was evidence of her understanding.

The mentor’s comments began with reflecting on her comfort level. She started by stating:

Well, comfort level, simply being we’ve used it more so I’m more confident we can use it has increased. But, I think it’s more than that. I’m very comfortable now, I’m to the point too where I will say to the student ‘If anyone else finds something we can do during our Daily Five on the Chromebooks I will expect you to jot it down on a post-it and share it with our class at the end’. So I’m now letting the students take a lot of that control.

She paused for a bit then added, “Really, I wasn’t that uncomfortable before so I guess my self-efficacy has been affected more.”

When asked to expand on the effect on her self-efficacy level she stated:

I guess a case in point would be when I watched the Google Classroom presentation once and then I made my own, but then pushed it to the side and the day I introduced it to the students they learned with me. So I was secure enough in the fact that I know I can use technology and I know that if there are little roadblocks the kids and I can maneuver around them.

She added, “I didn’t feel like there was one of me and 22 of them and I was the only one who could help anybody.” She explained how she encouraged students to become expert helpers and how they would share the teaching of ICT with her. In an example, she shared her approach to this when she said:

It was more like ‘Hey guys, I’m really excited you now have Google Drive accounts and we are going to set up Google Classroom today. If one person at your team is following along and doing it, I’m going to have that person help other people at their team’ which really helped me understand the role the kids can take in tech integration.

She explained her thoughts about tech integration before participating in the Tech Buddy program when she said, “I guess I thought I would have to micromanage this tech stuff and I’m seeing that I don’t have to.” She added:

It was one of those things where I found I didn’t need to have 4 days prior to get everything set up perfectly...Like I’m going to tell them this step, then this step,

like they have to do point A before they can do point B before they can do point C.

The mentor suggested, “If more teachers would do that I think more would be willing to use tech in their curriculums.”

RQ3: Is the Tech Buddy program more effective on teacher comfort and self-efficacy levels when implemented with the same grade level or mixed grade level teachers?

The program consisted of three types of pair; two same grade level pair, two adjacent grade level pair, and two skipped grade level pair. The two same grade level pairs were Second grade and Fourth grade. The two adjacent grade level pairs were Kindergarten (mentee) paired with First grade (mentor) and First grade (mentee) paired with Second grade (mentor). The two skipped grade level pairs were Kindergarten (mentee) paired with Third grade (mentor) and Third grade (mentee) paired with Fifth grade (mentor).

The Kindergarten (mentee) and First grade (mentor) pair were both very pleased with the results of their experience in improving their comfort level and self-efficacy. They both mentioned their curriculums were not exactly the same; however, they were close enough to make the planning and integration of ICT very manageable. The mentor explained her plan for continuing to work with her mentee as similar to a Gradual Release of Responsibility model.

One of the things the mentor mentioned was that the adjacent pair was “[working out] better than I thought it would.” Original she thought it would be “Almost impossible

to plan with someone who didn't have the same curriculum." However, she stated their pairing allowed her to plan for various levels of student ability. She did say:

I go a little both ways here because I think it would be easier to plan with someone in the same grade level doing the same things. Even though in K and 1 there's a lot that's similar there is a lot that's not similar, too. So there was a little bit of a thing there.

As the mentor reflected and discussed the effects of the pairing on her students, she mentioned:

I'm a big believer that my kids should not be the teachers all the time. If all they're doing is teaching their buddy then to me they're not getting as much out of it as they need to and that was important.

The mentee also mentioned how she and her mentor wanted to make sure the older students were not doing everything for the younger students when she said, "Sometimes you never know, the 1st grader can think "oh, I know what to do" and not let the Kindergartener learn." She felt it helped when she was able to go back into her own classroom to observe and said, "It's good for me to see it [students demonstrating how to use and manipulate ICT] in a small kindergarten group and see if they're really catching on and understanding" what they are learning."

The concern that the students in the mentor's class would not be learning as much as the students in the mentee's class was a concern the mentor had regarding the Kindergarten and 3rd grade pair. The difference in ages between the students in the mentee class and the students in the mentor class was too large a gap "if there is a two

year gap I don't know if those older kids can really get as much out of it as the younger kids."

The Kindergarten (mentee) and 3rd grade (mentor) pair had very strong opinions regarding how their split of grade levels did not work toward increasing teacher comfort levels or self-efficacy levels with ICT integration into the elementary curriculum. The Kindergarten mentee said numerous times their split was a problem when she said for example, "I just don't think there is enough connection there [between K and 3rd]" and "the big projects are based on what his kids are doing and my kids add to it" and again when she said, "My kids haven't really learned anything. Our curriculum doesn't match." She felt the age difference between the two groups was too wide stating, "The 3rd/Kindergarten sounds good, because they're older to teach, but yet the stuff they can do, my class can't do."

The mentor paused after hearing the question. He then stated similar comments when he said:

You know, Kindergarteners trying to manipulate a keyboard [on a Chromebook] is a bit of a challenge. I still think they can do it, but it would take a lot of training and a lot of... You know, that was something I was unaware of because I have had third graders and fourth graders who come, you know, pretty tech savvy most of the time.

He also said, "We haven't been able to do a whole lot because of the grade level difference and the ability of the kids."

The 1st grade (mentee) and 2nd grade (mentor) pair felt their age differences were not a problem. The mentee said:

I do like the vertical teaming as far as when the kids are using the devices because when I would work with the same grade level there were a lot of constant questions from the kids. Just having that one year difference, the 2nd graders can answer a lot of the questions they would normally come up here and ask me

She went on to say:

Having a 2nd grade buddy I noticed right off the bat that is somebody they [her students] can relate to. They're more comfortable and they [2nd graders] didn't take over. My kids didn't feel like they were intimidated to try something which was nice. They [2nd graders] had a little bit of info but they didn't know everything.

She compared this experience with prior experiences when she had a different buddy teacher for general purposes. "I think the one year is a good span because when I had buddy class before it was with 5th grade and that was too much of a span because they couldn't get comfortable with each other." She explained further when she said, "Our regular buddies before were 5th grade buddies and it was hard for them to build relationships, 1st grade and 5th grade they just didn't connect." She also commented:

I have really liked the one-year difference. I didn't do anything technology wise in the past with older classes but I feel with just the plain old buddy class they just didn't develop the relationships with each other because there were so many years difference.

The mentee did mention the possibility of more than one-year difference being successful when she said, "A couple years might work too."

The mentor supported her mentee's thoughts when she said, "I have an adjacent buddy class. It's been great, no problems whatsoever. My kids can help her kids or they can learn with her kids." She felt:

I think it's really more about how the mentor advises their own kids. If the mentor sets it up from the beginning with their class that even though they are older, they can't be the ones to do the work for the younger kids. The mentor has to be sure to protect her students' learning as well as her mentee's students learning. So as long as that is established from the beginning, and the older kids don't do for the younger kids, I think it would work with any age.

The mentor went on to say:

I also think the mentor has to be sure whatever they plan together is good for both groups. I think that could be a slippery slope if my students were quite a bit older than my mentee's students were and I looked at them as support for my kids. I don't think that would be right for any of the kids involved; not to mention the mentee teacher. Otherwise, what would the mentee be gaining?

The mentor did mention a word of caution she and her mentee experienced regarding curriculum when she said:

We had a few instances where our curriculum didn't match at all. When that happened, we just went to the standard the students had to learn, not the content. Then we were able to plan a type of lesson or lessons that were going to be great learning opportunities for both groups.

She also warned, “We ran it by our administrator and she said as long as the content we were replacing wasn’t going to be a part of something specific to an assessment we were fine.”

The mentor summed up her thoughts on the question when she said, “Really it comes down to how the whole relationship is approached. Just being diligent in protecting the learning for all the students and the mentee is the key.”

The 2nd grade (mentee) and 2nd grade (mentor) team spoke to the experience in their same grade level pairing. The mentee said, “I think it [vertical teaming] has some value” She explained more when she said,

My mind was not very open to that [vertical teaming] last year. I kept thinking, how’s that going to work for them (the teams paired vertically)? I kept saying, how’s that going to work if I’m partnered with a 5th grade teacher? What in the world are we going to do?

She went on to say, “Now I’m thinking, ‘Well, it really wouldn’t be so bad, we could be using the same kinds of programs and the 5th graders could be helping, we could be helping each other’ and now I completely see that.” When asked what caused her to change her mind she replied:

Now I’ve kind of changed after going to some of the meetings and hearing how some of the vertical teams are going because I was thinking ‘How is that going to work?’ but they can use the same program they’re just doing two completely different [curriculum] things.

She went on to say:

I was so closed minded with that last year, but now I'm like 'Well, I could have been with the 3rd grade mentor, I could have been with the 4th grade mentor, I could have done that.' I didn't see that last year, that's been a big eye opener for me this year.

She explained further, "It's not really about the content of what you're doing. It's about using the resources you have and creating things with the different apps and programs."

The mentor said, "I think that it [vertical teaming] is helpful, I can't say for sure because I'm not in a vertical team." She then went on to say, "I can fathom that it would be helpful just because then you have the mentor teacher who will be teaching to their kids who will then be able to help their mentee's kids as well." She explained that since she and her mentee are in the same grade level "I don't think we have to deal with some of the nuances the other [vertical] teams have to deal with." She said, "Since our kids are the same age they can all help one another equally."

When asked if she has any thoughts on any vertical teaming, which might not work, she replied, "Some grade levels would work because the kids have a foundation, but some it wouldn't work. Like Kindergarten plus Kindergarten I think would be really hard because none of those kids have a foundation, yet." When asked what she was referring to when she used the word foundation she replied:

I just think everything is brand new to the kids at that [Kindergarten] level in general. I do think Kindergarten plus 3rd grade or Kindergarten plus 2nd grade or Kindergarten plus 1st grade would work well but I think you would have to be super careful with Kindergarten plus Kindergarten.

She added, “If you are going to pair a Kindergarten up it would almost be a 1st grade or 2nd grade as the best pair with them.” She summed up by saying, “I think it boils down to experience. It’s just little things that you take for granted if you haven’t taught in the primary grades.”

The 3rd grade (mentee) and 5th grade (mentor) were very favorable toward the idea of mixed grade level teams. The mentee began by saying:

Well, I liked the fact that not only was I going to have a mentor, but I was going to have a group to support me. Like how it was set up so that we have more than just one person to go to. So it gave me the chance to learn from other grade levels.

She was more specific to the learning experience she had with her mentor when she said:

For us it [mixed grade level teaming] has been fine. We are able to see what they are expected to do in 3rd grade and see how that progresses to 5th grade. It helps me even to know what we have to prepare them for. There have been no issues. She went on to add, “Any tech integration she is able to do with her 5th graders I can find a way to adapt it to my 3rd graders as well.” She gave examples of how they have been able to help each other when she said, “I sent a few of my kids down to help her with Voice Thread and she sent kids down to help with KidBlog. It works great.”

When asked if differing curriculums were a problem between the mentor and the mentee, she stated:

No, not at all. Our curriculums don’t have to match. 5th grade was working on completely different topics, but the knowledge gaining, the researching, the

learning, the sharing, the publishing – that’s the commonality. Regardless of the information or the skills or the objectives, it’s irrelevant, really. The commonality is the tech you can use to get to the goal. It doesn’t matter what the skill is.

That’s why the vertical teaming with technology fits perfectly.

She then added:

There have been a few times where I have asked how to do something, and she even learns a little about it for me before we get together. It may not be something she will do right away, but she knows I want to do it so she learns and helps me learn.

She later stated:

One thing, when we get our kids together, because they’re bigger bodies and over 40 kids that size in a classroom is overwhelming, we reserve the Learning Commons. We have gotten together in the classroom a couple of times, but it just becomes too tight.

The mentor started by saying, “I loved having different grade levels [because] we got to see what each other is working on.” She explained, “It was nice to see everything from her grade level perspective and it gave us some fresh ideas to what we could do.” As an example, she stated, “Like when she [mentee] did the collaborative Google Slide of the Branches of Government and then we went down there and they showed us what they did and we ended up using Google Slides with something similar in Science.” She also added how her class was able to help the mentee’s class learn a new ICT integration tool when she said, “Then we started KidBlog and using something in it and showed it to her class then she started using it.” She commented:

We would say ‘What do you have coming up in your Units of Study and then we would start thinking ‘Oh, I could morph that into...’ and then we would get our kids together and let them teach each other.

The 4th grade (mentee) and 4th grade (mentor) felt from their experience being in the same grade levels it was difficult for them to speak specifically to other possible situations. However, the mentee referred to the student’s perspective when she stated, “I think that [being paired up with a different grade level] would have been fun in the respect that my 4th graders would have loved a little opportunity to show some leadership and be that kind of mentor person.” She added,

I think that is important for 4th and 5th graders because maturity wise they need something. I can’t pat them on the back non-stop all the time and they need that recognition so I think that would have been fun. I also think it would have forced them to take a step down, too a little bit.

When asked what she meant the mentee stated, “You know, slow down a little for their younger partner. Understand from that younger learner’s perspective. I think that would have been good.” She added the impact on her own when she stated, “You can see the nuts and bolts [from younger grades] on how it builds up so I think that would have been fun to do that.”

The mentor did not comment as much regarding other teams. She began her comments by stating, “At first I was excited that my mentee would be in the same grade level, because I thought there would be extra struggles and difficulty if we weren’t in the same grade level.” She explained, “I was afraid if we weren’t it would be really difficult to get together for the planning.” She added her observation regarding the other teams

when she said, “But I think with the planned time we have built in to the program, people are making it work. It seems like it’s working.” She concluded her comments by stating, “I’m not against vertical teaming, but I felt comfortable and was happy my mentee was in my grade level.”

RQ4: How has student engagement been affected with this program?

The Kindergarten (mentee) and 1st grade (mentor) pair both mentioned the impact of ICT integration on learning and student engagement. They shared a few examples. The mentee mentioned when she was working with her students in their small group reading time the students who were working independently were much more focused on the task “even if it’s in a learning center and they’re using it to practice letters and sounds” when technology was involved. She also mentioned when both classes were together “They’re close to the same age and one kid isn’t taking over. They’re more on the same levels. That has been a good thing” to maintain student engagement.

The mentor also referenced how using ICT with both groups of students helped engage them in future learning. Recognizing “my kids have to have a lot of background knowledge that they [the other students] don’t have” and that using the ICT helps to build their background knowledge. She also mentioned her students “were so excited and focused on the task every time we used technology. It really helped all my students at every level.” So much so that she said, “I want to keep them [the devices] forever. I can’t imagine going back to teaching without using technology as much or more than I have been.”

The Kindergarten (mentee) and 3rd grade (mentor) team had differing comments regarding student engagement. The mentee teacher expressed concerns with student

engagement when she said, “They’re constantly up saying ‘I can’t...’ and then I can’t get anything done” and “we tried it [ICT] and it frustrates them so they just do something else.” She went on to say they seemed to be more off task because they could not figure things out. She also mentioned how ICT was creating difficulties and frustrations with her students when she said, “They click on stuff and I’m like ‘how did you get in here, how did you do this?’ and they’re like ‘I don’t know, I just clicked’.”

The mentor had opposing comments. He was referring to student engagement when he said, “They’re doing it [learning and applying ICT] on their own. They can survive without me.” When asked directly about what he saw in regards to student engagement with struggling learners or disruptive students he made several comments. His first comment spoke to his own motivation before the Tech Buddy program to integrate ICT when he said, “That’s [student engagement] what drove me to start doing this [ICT] more and more.” He gave an example:

I have one individual who is just lazy. There is no other word for it. He will do the bare minimum and that’s it. Now he is coming up with full 4 or 5 paragraph stories. Granted he’s, the writings not that great. But, in terms of where he was at the beginning of the year, where to him a story was 3 sentences, now he is expanding on it and he’s more motivated. He gets to share it, he loves that, and then I go into Google Drive and tweak it with him and offer suggestions.

He went on to say, “That motivation [of using ICT] is just immense.” He continued with:

I see tremendous changes in my kids, it’s not always quantitative but qualitative. Shy kids are not shy any more. They’re talking to others. Kids who didn’t get

along before have to work together. They have to in order to survive, they're doing it. There's no behavior problems. I haven't written an office referral in a year and a half now, whereas before that it was a weekly basis for me most of the time.

The 1st grade (mentee) and 2nd grade (mentor) pair both reported a positive effect on student engagement. The mentee told how her students felt when she said, "Uhhh, they LOVE IT" and "I think it's been a huge motivation to use it." She explained, "It's not just motivational but beneficial, too." She gave an example in the story:

We used Google Earth to talk about maps. Our object was to talk about the whole Earth and continents. It was really cool to zoom in to each of those. And the kids were so engaged and learned so much! When I have done that lesson in the past, they only used globes and atlases. This time they really got the perspective difference between the earth and the continents and where we are.

When asked if she could be specific about how it affected all her students, she commented, "I really feel like it's the one thing they all can do. And, it is easily adapted to each of their levels, it's on their level." She went on to explain how the individuality of learning for each students was achieved when she said, "Even my low kids, it's not a scary thing to them. What they produce might be very different from the high kids, but it's something they feel they can tackle and do." She felt ICT assisted her in differentiating for all her students when she gave the example "like with productions my low kids can read [voice record] their [research] finding and what they are learning and the high kids can type it." She also explained how some of the research sites she used had the capability of reading the information to the students. This helped lower readers

in their research efforts. The mentor explained student engagement improved when she told the story:

Before using tech in teaching and learning I always had kids who would zone out and just not participate. It was always a struggle keeping them engaged. Now when they are using the device they are really involved in the conversation or in the research or in the production. They're asking great questions about what they're learning. They're collaborating both verbally and through blogs or Google Docs.

She added to her comment saying:

The old saying of 'hogs and logs' unfortunately was real. The kids who were always engaged, the hogs, still have that interaction. But now, the kids who were more frequently disengaged, the logs, now have a motivation to be more engaged.

One of the points the mentor kept bringing up referred to, "My lower students don't feel so overwhelmed with tasks." She said, "It has really helped my struggling writers because they see the task of writing as not so daunting. They see editing and revising as so much more immediate." She also said:

Asking a 2nd grader to research before using tech was so hard for my struggling readers. They would look at all the book resources and drag their feet even opening the book. Then they would only focus on the pictures and captions. They would miss so much information in the body of the text. Now with using tech they're excited and discovering so much more.

In reference to other students in her class, she said:

It works so well for extensions in learning for my students who are ready for that. They don't have to wait on others to finish or catch up to them. I've worked on showing them that when they're finished with the assigned task they can take whatever we are learning even deeper or how they can do independent work on things they may be interested in that we won't be able to get to.

She summed up her comments to RQ4 when she said, "I can't imagine not using tech with my students and their learning. Actually, I think they would throw a fit!"

The 2nd grade (mentee) and 2nd grade (mentor) team added similar responses to the question. The mentee said, "They love it! I'm really seeing some great thing happen. As they become more and more involved in this [Tech Buddy program] I can see it [student engagement] getting better and better." She added, "I can tell you after we did our first project on Educreations every single kid in my room that had an iPad at home got the free version on their device. They're just going crazy with it [ICT]." She went on to say, "They are so motivated to work." When referring to how the students were reacting to using ICT in their learning she replied, "Honestly, it is chaos at first, but they're focused and want to do it." She continued saying:

I wouldn't help with the log in [on the Chromebooks] the first week and it took forever because I didn't help one kid. I kept saying 'keep trying, do it again, it's right in front of you [login information for each child on an index card]'. But, by the second week they logged in like that [snapped fingers], they knew how to navigate things, I mean they can figure things out before I can figure things out.

When answering RQ4 the mentor said, "I think all kids are more engaged." When asked to elaborate she said, "It's a motivator for kids who tend to not be willing to work

as hard or don't like things because it's harder for them. It's also a motivator for the other kids because it's more engaging." She went on to say, "If they [students] know they're going to be able to work with technology it gives them that little push they sometimes need to be productive." She mentioned how she uses it to help ensure quality work from her students when she said, "Knowing that 'If I am productive and doing quality work, that's what I get to do' really helps a lot of kids." She told a story of her son who was in Kindergarten:

He hated to write but set a goal of writing at least five sentences for his research project. He used the tech to research information, find pictures appropriately, and put all his learning, including the five sentences, into his report. It wasn't a fight to get him to do his work.

The mentor also explained how she felt the motivation of using technology also affected her higher achieving students. She said:

I think the highest ability kids are the ones who are more motivated to produce quality work, in general. For them using the tech helps them to go above and beyond. It helps them extend their learning and they love that.

She concluded her comments by saying:

I haven't yet seen a time when having my students learn through technology or using tech as a tool in their learning where they weren't super motivated. It just levels the playing field for all my students in their learning.

The 3rd grade (mentee) and 5th grade (mentor) team also added positive comments from their experiences on the effects on student engagement by the program.

The mentee said:

Just the opportunities for the kids [to be engaged], extending it, it's a collaboration tool where the kids become experts and they present on one thing and other kids are able to go in and listen and learn from what they have done. They become the teachers as well.

She began with a comparison of not using ICT integration with her students last year and using it with her students this year when she said, "I had the mindset, I was uncomfortable with it so I was going to have 23 students uncomfortable with it. But it's not the case." She referred to ICT integration affecting student motivation when she said, "Some kids are naturally more motivated than others so those that aren't as self-motivated without technology are more motivated if they know tech is going to be a part of it." She gave her observations when she stated, "It's just incredible the extension opportunities and the enrichment opportunities that you can provide for the kids. It just opens up the classroom – the doors are always open now to a classroom and they [the students] absolutely love it." She also spoke to the engagement for her struggling students when she said:

I do see it as far as the differentiated instruction, like for research for example, being good for the kids who are lower readers, lower levels that will read the information to them. Then I can get the other kids on different sights appropriate for them. So even that is not a one size fits all for what they're using as far as their needs.

The mentor had positive comments as well. She began by stating, "The collaboration between students had skyrocketed." She continued with:

I like to see them [the students] know a certain tech tool is what [they] can use for a certain learning goal. I hear them telling each other ‘Go to your Google account and use [a specific tech tool] or whatever.’ I like hearing their conversations where they are helping each other.

She explained how she has her students use ICT integration for collaboration on most subjects. She gave the example of, “Like with spelling, they know how to turn in their assignments on Google Drive and they [tell me it] is on Google Drive. Then if they need help with an assignment they share it with a friend.” She added:

They like to be helpful. I can’t help my entire class individually. Every time we start learning something new I always start with ‘Now don’t forget, there is one of me and 21 of you.’ and it quickly becomes where various kids become expert helpers or collaborators.

She explained the emphasis she made with her class on collaborating with another student instead of doing something for another student when she stated, “We have talked about not taking over when helping someone, but showing and modeling and suggesting. Not doing for them.” She added, “They have just really embraced using them [technology]. It has just become something they do. For example, they find reviews of books and want to share them. Book reports are completely different the kids love them.” She concluded by saying, “Kids are really taking this and moving forward with it on their own.”

The 4th grade (mentee) and 4th grade (mentor) both addressed student engagement with specific examples. The mentee began with an example:

I've got two boys who hate to write, it's painful for them. It will take hours for them to write. They just don't like it. Not only is it painful to write, but I can't hardly read their writing. Their reading teachers even have trouble getting them to write. But, when I have them record what they want to write and then type it out it's amazing the difference.

She explained how one of the students she referred to had a parent contact her regarding the parent's observations of their son, "I had one of the parents say 'Since you have allowed them to do KidBlog or Voice Thread it's just made a difference – it's not painful any more for him.'" She added, "The kiddo is bright, it's not that he is not bright, he just doesn't like to write and here is something different." When discussing the student's engagement she continued with, "But he will go on and on using KidBlog or loves to hear his own voice tell me all about it [the learning objective]."

The mentee also added a few comments regarding how student behavior had improved because of student engagement and participation in the program. She stated, "I think my kids are better behaved, I'll be honest with you, because they like to be on the device." When asked to elaborate she said, "It's one of those things where if you [the student] want to be on the devices you have to show me you can do it. They have to show me they can handle it."

The mentor also had examples to refer to when discussing the effects on student engagement with the program. She began with:

My students are so much more collaborative now. We use Google Classroom and we share almost everything with each other. They're sharing notes they have taken for what they are learning. They're helping each other find assignments and

resources. They're helping each other with revising writing. They're so much more focused on their learning. It's been amazing to see.

She explained, "I show them things they can do and just step back a little bit and they go for it. They are more than capable."

RQ5: How has technology integration vs technology use been affected in the classrooms of the program?

The Kindergarten (mentee) and 1st grade (mentor) team both mentioned how they feel their focus on ICT integration differed from use because of the way they look at the learning standards and plan according to student outcomes. When the mentee said:

I am actually taking it [ICT] back to my classroom and using it, we're doing community helpers in our curriculum and we have been doing Popplet, so I have my reading groups and we can do it in our groups and refresh and add on to what was learned with my mentor. So then I can make sure they're knowing what to do as they use the graphic organizer app to organize their learning.

She also mentioned how her Kindergarteners were doing research, "When we do research it's been more like PebbleGo that type of thing." She went on to explain:

We have been using graphic organizers. We did it on paper first and then using Popplet and it was really neat seeing their learning. I actually think doing it on Popplet helped them to understand the relationships in a graphic organizer better than just the paper version.

The mentor said, "When my mentee and I meet we look at the creation our kids can do [with what they learn]. I think we are both doing really well for integration

appropriate for our age of kids.” These comments corroborated what the LMS, Project Lead, and Administrative Intern had observed. The LMS said,

The fact that the teachers from different grade levels [kindergarten and 1st grade] are working together in planning and teaching the kids and then seeing what the kiddos are able to do with technology is just amazing. They’re not using technology as a baby sitter. They’re really helping the students use it as a tool to learn. What a wonderful thing to see.

The Project Lead had similar comments. She mentioned one of the times she observed the mentor and mentee working with their classes in this comment:

I had been in other classrooms before this whole program started and most often the teacher would use the tech as a way for the kiddos to practice math facts or spelling words or reading a book on a website. But, when I was in the classroom of the Kindergarten and 1st grade Tech Buddy team I saw kids using the tech to learn. They were able to go between several apps for research and learning then take what they were learning and use a graphic organizer to make sense of it. Then they were able to use the info from their graphic organizers and produce something with it. Now granted this wasn’t all in one day which would have been too much. I saw it over several times I could pop in and observe.

The Administrative Intern mentioned a time during her observation when she noticed how the technology was being applied when she said, “It was so great to see how the tech was just another learning tool the students were using along with more traditional tools. It wasn’t being used as a time filler.”

With the Kindergarten (mentee) and 3rd grade (mentor) team there were mixed results. The mentee teacher said, “I haven’t really gotten much out of the program, so I can’t really speak to whether it has moved from use to integration in my classroom.” She went on to say, “I hope my kids didn’t hold back his [her mentor’s] kids.” When asked if she wanted to add anything more to her answers she declined.

The mentor had very different comments. He spoke of his belief in integration and his understanding of the difference between integration and use but did not mention how participation in the Tech Buddy program affected either. For example, he said:

Um, technology integration to me is using the available tools and resources to accomplish a learning objective or a learning goal. Um, I saw a thing where they had a pack of markers. One marker was pulled up and they said, ‘Oh wow, look at this marker this marker is great! How can I use this marker in my teaching?’ and I think that is a more technology use idea. Whereas integration is more of ‘I have this thing that I want my kids to learn. What can I use to get them there? What can I use to guide them? To get to that point?’ To me that independent learning is the biggest and most wonderful thing that we can give our kids through the use of technology because they solve their own problems.

The researcher asked the mentor how a typical day might look in his class now that he was part of the Tech Buddy program. He elaborated by saying:

In my particular class, if you walked by it looks like I’m not doing anything. You know, but I’m sitting at my computer and editing their problems in their writing or whatever through Google Drive. And a kid runs into a problem and he comes to me and they have a problem and I tell them to go ask somebody else. I have,

they figured out who in the class is the problem solver. They solve their own issues when it comes to most things.

As the interview went on the mentor also focused on independent skills his students were gaining that moved beyond the curriculum, he was responsible for teaching as evidenced by:

Now when a Chromebook needs to be rebooted, I have one kid who can kind-of do it but he still struggles with it. To me that's integration because they're doing everything. I am more or less a facilitator. I'm not their teacher any more, I'm just kind of helping them, guiding them. I'm giving them ideas or resources or whatever because they're learning on their own.

He paused for several seconds then gave this example:

Right now we're doing ecosystems. They did all their own research they did their own reports on it. I literally did next to nothing as far as standing up here and telling them what to do and how to do it. They found their own stuff, they found *Infotopia* and used that to research. They made their own graphic organizers with spreadsheets. Then they wrote their own letters, right now we are getting ready to write persuasive letters to the EPA about deforestation and things like that. So we went into Minecraft and destroyed all their nature and watched it rebuild and got to see how long it takes to rebuild what we have destroyed. Like I said, I'm just the facilitator, I'm saying 'Here, try this'. They are doing it on their own. It's more self-guided, it's more independent. They're able to overcome these difficulties independently because they're constantly touching, they're constantly running into errors and having to fix it themselves because I more or less won't

help them. I mean that in a good way. To me that's what integration is... the school or the learning and the technology go hand in hand. They're cohesive, it's not 'Oh, let's use Little Bird Tales', its 'What do you want to do with this? How do you want to learn this information? How do you want to solve this problem? How do you want to present this information?' Occasionally I'll use the GreenScreen stuff and say 'Let's try this' to just introduce something new to them.

The comments from the 1st grade (mentee) and 2nd grade (mentor) pair were both positive. The mentee mentioned, "Consistently we use them for Daily Five, we use them for RAZkids for read to self and listen to reading, and I used Spelling City a lot for the phonics/word work part." She then explained how she was integrating ICT when she said:

We have also been integrating it when they take what they are learning through PebbleGo or other research sites and create a way to present what they have learned. We have used Keynote, Educreations and Sock Puppet, which was a lot of fun, for the kids to organize and show their learning.

She spoke more specifically of an app she was using with her students when she explained:

We have also done KidBlog and I liked it, it's just my time management, getting in it and adding to it. The kids really liked it, I just need to be better at adding to it. And using the [Tech Buddy] buddies to be able to reply through KidBlog it might be a good thing to really show how to model in a productive way rather than just 'good job'.

The mentor said, “There are still times during the day where we use tech for something like spelling practice or math facts practice. But, more and more we are using it instead of traditional tools like pencil and paper or reference books.” When asked if she had any specific examples she said,

The kids particularly like blogging with one another. However, we do frequently need to have a talk about comments needing to be helpful in some way and not so generic. I think they have a hard time breaking the habit of short texting. Writing complete sentences using technology is a topic we revisit it seems weekly!

She went on to say:

I think especially the kids who hate to write really seem to prefer using tech for their writing. They see the editing and revising as more manageable. That’s one of the benefits of integrating tech that is pretty obvious to see. The reluctant writers seem much more willing to write using tech than traditional paper and pencil. I am careful though in making sure they still use paper and pencil, however once their rough draft is done using paper and pencil, they type it into Keynote or Educreations or VoiceThread and then edit it. I think they love not having to erase and rewrite repeatedly.

She explained another point of caution when she said, “We spend a lot of time talking about Digital Citizenship and how copying and pasting from a resource is the same as cheating.” She also said, “I’d like to begin using TurnItIn or something like that to show them how paraphrasing is so important in writing research papers because that is a hard skill for this age level.”

The 2nd grade (mentee) and 2nd grade (mentor) both shared their comments regarding RQ5. The mentee said, “It’s [the Tech Buddy program] kind of made me think out of the box when looking at... curriculum.” She added, “I’m finding I’m integrating it more with project based things into our writing because there’s the research involved and then there’s actually creating a finished piece.” She also said:

Now some of it does fall on the technology use side, so not everything during the school day can be a project. We are using it in math intervention time, that I would say it really is more use. And, the same way in reading.

She further explained how she sees the difference between use and integration in her classroom when she said:

So there’s a little bit of both in my room and I feel the more I learn things I feel like writing is complete integration into everything we do. The content areas, that’s complete integration because it all goes back to we do the researching and writing about it. I think in most areas it’s integration, there are a few where it’s use like the math intervention and the RAZkids. But mostly it’s integrated during the day.

The mentor answered the question from a different perspective. She answered the question from a place of advice rather than response when she said:

I think a lot of people, before we use tech a lot, think they want their kids to use tech as a game or drill, which is not bad but it’s not their only use and it’s not what it should be all the time.

She went on to explain:

I think just getting people to understand that you can put technology in your kid's day every single day with practice but you just have to find ways to use it with your curriculum with a tech piece so your kids are more engaged.

When asked if she could elaborate or give examples of what she was referring to she said:

I use tech in places where the objective is more skill practice but I integrate tech in places where it is a learning tool, something they use to learn or create or collaborate instead of something traditional. Research is an easy example. Instead of just using books on a subject, they are using tech. Instead of using paper and pencil to take notes or a worksheet with a graphic organizer, they are using tech. That kind of thing.

She went on as a caution when she said:

They're still at that age [2nd grade students] where they need to practice writing out answers and they're visual. I think it is easy to get them distracted with tech sometimes. So it's good to have them have to sit and write it out first. That's a step and practicing them knowing when they are going to produce something I have to make sure I have complete sentences, that I edit, that I proofread and it's more of a quality response.

She explained further that, "When they are going to produce something they [the students] have to make sure they have complete sentences that they edit, that they proofread and it's more of a quality response. Tech integration really helps in that."

The 3rd grade (mentee) and 5th grade (mentor) spoke of their experiences on how ICT integration vs. use has been affected by the program. The mentee started by saying:

The whole integrating vs use thing. It can be grey. I feel, to me we are integrating. Last year we did tech but it was more of the end product which is fine. This year, now, I could see a big difference how we were using it through out. It's not just the final piece.

She went on to say, "Like when I talked about KidBlog. We blog now, they can respond to each other. They can go find their assignment on line and interact with each other. That's integration." She elaborated on how she had felt this year in the program was very different from the previous year when she said:

I still feel like between last year and this year I can tell I have taken it to a new level. Kids aren't just publishing something, they're having to be responsible for a part of something that either goes along with a big something or they then have to go in and use what other kids have done because I may have questions or an assignment based on what others have done or published.

The mentor had similar comments. She began with, "I feel like I am learning the difference between use and integration with my buddy." She explained that when they began the program planning together they had a different focus than when they ended the program. She stated, "When we started we would get together and think what piece do we want to learn?" She then explained how the focus during their planning changed when she said, "It moved to does it fit with what they are learning?" Her example was, "For example we were using Little Bird Tales when Voice Thread came out but didn't use it right away because we knew in an upcoming unit it would be perfect." She summed up her response by saying:

We have gone beyond trying to find an activity to learn to thinking what works here? What do we have coming up and what would work best instead of just what do we want to learn? We are finding a piece that is actually integrated instead of just saying we use tech because we use this new piece. So yeah, our understanding of technology integration vs. technology use has really changed.

The 4th grade (mentee) and 4th grade (mentor) had similar comments regarding how technology use vs technology integration into the curriculum had been affected by participation in this program. The mentee said, "I think that's very tricky because I think use is good. Because if you don't know how to use it then you can't integrate it, is my philosophy." She elaborated when she stated, "I think it's okay to use it because I'm using it and getting comfortable with it and then you start digging deeper, integrating it." She further explained how she views the transition from use to integration when she said:

I think it depends on what the assignment, or expectation, or the outcome is whether you need to be technology using or integrating. For example, my Quick Checks for math is using. But it's usage so we know who is going where for the next step.

When asked to elaborate on usage to direct the next steps she explained:

It's almost like now they're able to direct themselves. They know by the quick checks and the results shown instantly where they need to be to move from red or yellow. They just know and have become proficient with it and what to look for to improve their learning in math.

She explained:

Because we're in this program and talking about it and using it they know what it means. Like 'I know now because of my score what I need to do for interventions. I don't even have to tell them anymore which is wonderful. If I wasn't in the program and still using a certain online assessment it wouldn't mean as much to them it would just be that they were red or yellow. But because we're talking about it more, they direct themselves more.

The mentor commented, "I still feel that a lot of times, the first time I'm showing them anything we're using it, just to take the tour to become a little bit more used to it. But, the integration then happens very quickly." When asked to elaborate the mentor gave the example:

For instance, I had to show them how to use Google Classroom and let them make little fun posts to a question I had done for a Read Aloud. But then 2 days later I was telling them to go on to Google Classroom, access this document, be prepared to read this before we start talking about erosion so you have some background knowledge. So, I think that was integration of Google Classroom. Instead of me having to copy a 6-page article for every single child and then it being paper copies they had to keep track of, they know they were going to find what they had to read and learn about through Google Classroom and that that was the expectation.

She added, "I think use has to happen first on anything we do and then the integration follows."

Survey Results

All participants took a self-assessment survey before the program started and at the conclusion of the program. The results indicated an increase in most participants from the pre-program assessment to the post-program assessment. In Survey Question 1 participants were asked to integrate ICT in multiple interactive ways. The results indicated an increase for most (see Table 4).

Table 4

Survey Question 1

I provide technology rich interactive learning opportunities, which are beyond skill based. For example, students are evaluating internet resources for research, using collaborative note-taking tools, and producing multimedia products, which are shared with a global audience as a direct result of student research.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Strongly Disagree	Agree
1st grade mentor of K/1 pair	Agree	Strongly Agree
Kindergarten mentee of K/3 pair	Strongly Disagree	Disagree
3rd grade mentor of K/3 pair	Strongly Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Strongly Agree	Strongly Agree
2nd grade mentee of 2/2 pair	Neutral	Agree
2nd grade mentor of 2/2 pair	Agree	Strongly Agree
3rd grade mentee of 3/5 pair	Disagree	Agree
5th grade mentor of 3/5 pair	Agree	Strongly Agree
4th grade mentee of 4/4 pair	Agree	Strongly Agree
4th grade mentor of 4/4 pair	Agree	Strongly Agree

In Survey Question 2 participants were asked their own use of social media to increase their learning and collaboration opportunities (see Table 5).

Table 5

Survey Question 2

I am an avid user of social media for communication and collaboration purposes and personal learning (i.e. Twitter chats).

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Disagree	Disagree
1st grade mentor of K/1 pair	Neutral	Agree
Kindergarten mentee of K/3 pair	Disagree	Neutral
3rd grade mentor of K/3 pair	Strongly Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Disagree
2nd grade mentor of 1/2 pair	Neutral	Agree
2nd grade mentee of 2/2 pair	Disagree	Disagree
2nd grade mentor of 2/2 pair	Neutral	Agree
3rd grade mentee of 3/5 pair	Disagree	Neutral
5th grade mentor of 3/5 pair	Neutral	Agree
4th grade mentee of 4/4 pair	Disagree	Agree
4th grade mentor of 4/4 pair	Neutral	Neutral

Survey Question 3 was designed to measure the participant's self-directed learning of technology as it related to the need for face-to-face assistance (see Table 6).

Table 6

Survey Question 3

I can confidently navigate new technology (i.e. apps, platforms, devices, software) independently with little or no face-to-face assistance.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Strongly Disagree	Disagree
1st grade mentor of K/1 pair	Strongly Agree	Strongly Agree
Kindergarten mentee of K/3 pair	Neutral	Disagree
3rd grade mentor of K/3 pair	Strongly Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Strongly Agree	Strongly Agree
2nd grade mentee of 2/2 pair	Disagree	Neutral
2nd grade mentor of 2/2 pair	Agree	Strongly Agree
3rd grade mentee of 3/5 pair	Disagree	Agree
5th grade mentor of 3/5 pair	Agree	Agree
4th grade mentee of 4/4 pair	Neutral	Agree
4th grade mentor of 4/4 pair	Agree	Strongly Agree

Survey Question 4 encouraged the participant to be open and willing to grow in the idea of having learning resources available for student outside of the regular school day (see Table 7).

Table 7

Survey Question 4

I consistently provide my students with digital resources that can be accessed outside of the traditional classroom setting.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Strongly Disagree	Agree
1st grade mentor of K/1 pair	Disagree	Strongly Agree
Kindergarten mentee of K/3 pair	Disagree	Agree
3rd grade mentor of K/3 pair	Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Neutral	Strongly Agree
2nd grade mentee of 2/2 pair	Strongly Disagree	Neutral
2nd grade mentor of 2/2 pair	Disagree	Agree
3rd grade mentee of 3/5 pair	Disagree	Agree
5th grade mentor of 3/5 pair	Disagree	Strongly Agree
4th grade mentee of 4/4 pair	Disagree	Agree
4th grade mentor of 4/4 pair	Disagree	Strongly Agree

The purpose of Survey Question 5 gave the participant the opportunity to self-reflect on the research process (see Table 8). It brought to mind for the participant the need to instill at a young age proper methods for the student to follow.

Table 8

Survey Question 5

I know how to properly search, organize, evaluate, cite and share resources throughout the research process.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Disagree	Disagree
1st grade mentor of K/1 pair	Agree	Agree
Kindergarten mentee of K/3 pair	Disagree	Neutral
3rd grade mentor of K/3 pair	Agree	Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Agree	Strongly Agree
2nd grade mentee of 2/2 pair	Neutral	Agree
2nd grade mentor of 2/2 pair	Agree	Strongly Agree
3rd grade mentee of 3/5 pair	Disagree	Strongly Agree
5th grade mentor of 3/5 pair	Agree	Strongly Agree
4th grade mentee of 4/4 pair	Disagree	Strongly Agree
4th grade mentor of 4/4 pair	Strongly Agree	Strongly Agree

The purpose of Survey Question 6 was to keep ICT integration as a valued element of the classroom (see Table 9).

Table 9

Survey Question 6

 Mobile technology is an integral part of my classroom environment.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Strongly Disagree	Agree
1st grade mentor of K/1 pair	Strongly Agree	Strongly Agree
Kindergarten mentee of K/3 pair	Strongly Disagree	Disagree
3rd grade mentor of K/3 pair	Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Strongly Agree	Strongly Agree
2nd grade mentee of 2/2 pair	Disagree	Agree
2nd grade mentor of 2/2 pair	Strongly Agree	Strongly Agree
3rd grade mentee of 3/5 pair	Neutral	Strongly Agree
5th grade mentor of 3/5 pair	Agree	Strongly Agree
4th grade mentee of 4/4 pair	Agree	Agree
4th grade mentor of 4/4 pair	Agree	Agree

Once participants were comfortable with and showing efficacy in integrating ICT within their curriculum, Survey Question 7 evaluated whether the participant was giving the students more freedom to be self-directed learners and applying all they had learned throughout this program (see Table 10).

Table 10

Survey Question 7

 I allow my students choice in extending their digital learning opportunities.

Participant	Pre-program self-assessment	Post-program self-assessment
Kindergarten mentee of K/1 pair	Strongly Disagree	Disagree
1st grade mentor of K/1 pair	Agree	Agree
Kindergarten mentee of K/3 pair	Disagree	Neutral
3rd grade mentor of K/3 pair	Strongly Agree	Strongly Agree
1st grade mentee of 1/2 pair	Disagree	Agree
2nd grade mentor of 1/2 pair	Agree	Strongly Agree
2nd grade mentee of 2/2 pair	Disagree	Neutral
2nd grade mentor of 2/2 pair	Agree	Strongly Agree
3rd grade mentee of 3/5 pair	Disagree	Strongly Agree
5th grade mentor of 3/5 pair	Agree	Strongly Agree
4th grade mentee of 4/4 pair	Agree	Agree
4th grade mentor of 4/4 pair	Agree	Strongly Agree

Conclusion

The results showed a positive increase in responses from pre to post survey made by most participants. The mentee of the Kindergarten and 1st grade pairing was more positive in her responses on five of the seven questions. The mentor either maintained her high scores or became more positive in her responses. The Kindergarten mentee of the Kindergarten and 3rd grade pairing showed a negative response on Question 3 and either maintained or became more positive in all other responses. The mentor's responses either maintained or became more positive. The mentee of the 1st grade and

2nd grade team became more positive in all responses, except on Question 2, which remained unchanged. The mentor had no change on three of the seven questions and became more positive on the remaining four. The mentee of the 2nd grade and 2nd grade pairing showed no change in her response to Question 2 and became more positive in all other responses. The mentor showed a more positive view on all responses except Question 6, which remained unchanged. The mentee of the 3rd grade and 5th grade pairing showed became more positive in responses on all questions. The mentor also became more positive in all responses except for Question 3, which remained unchanged. The mentee for the 4th grade and 4th grade pairing became more positive in her responses on all questions except for Question 6 and 7, which remained unchanged. The mentor became more positive in all her responses except for Question 2, which remained unchanged.

Positive comments regarding participation in the Tech Buddy program ranged from “I’m very happy with who I’m teamed with and that we’re close in age and it’s been great!” to “it’s a wonderful thing.” Several comments referenced the built in time for pairs to collaborate as evidenced by “I think that is one of the great parts; support and time together that is provided but not a burden” and “I like the fact that time was built in during the day to do this.” Other comments referenced how thorough the participants felt the program was, “It truly gave me flexibility to learn with my mentor without taking me out of the classroom a ton” and “my mentor made sure to not go too fast for me but to push me. That coupled with the times we were able to meet were so helpful.”

Chapter Five: Interpretation and Implications

Introduction

The results from the study were mostly positive and expected. Previous research by Strudler (2014) and Moore-Hayes (2011) had suggested several vital recommendations for educators to consider when providing professional development to teachers to improve comfort levels and self-efficacy levels. Both of these were barriers in ICT integration into the curriculum. Other researchers augmented these recommendations and included first, providing the professional development within the context of a community of collaboration (Sugar & Slagter van Tyron, 2014). Second, embedding the professional development into the classroom setting (Okojie, Olinzock, Adams, & Okojie-Boulder, 2008). Third, being included within the PLC structure (Sugar & Slagter van Tyron, 2014). Fourth, following the format of the Community of Practice model (MacDonald, 2008). Fifth, using a mentor/mentee approach (Alderfer, 2014).

The Tech Buddy program followed all of these recommendations, to varying degrees, while adding to the body of literature concerning the question of whether teacher comfort and self-efficacy levels were more effected by same grade level pairing or mixed grade level pairing. The study was completed with mostly successful results as evidenced by the participant interviews and increases in responses of surveys taken by participants pre to post study. Through the interview process the program was found to be successful as evidenced by comments from the participants. These opinions were corroborated by the results of the post study survey. There was only one decrease in response on the survey. This response came from the Kindergarten teacher who was paired with the 3rd grade teacher. By using interviews conducted in the middle and end

of the program, data was gathered and the results were used to help guide the process and respond to needs during the program. The pre and post study surveys were used to gage overall comfort and self-efficacy levels before and after implementation of the Tech Buddy program.

RQ1: What effect does the Tech Buddy approach to Professional Development have on integration of technology into the curriculum?

The researcher believed the effect the Tech Buddy approach to Professional Development had on integration of technology into the curriculum was extremely positive. Reviewing the comments from the mentee group showed multiple examples of the extremely positive effect. The first theme noticed was the idea of having the mentor readily available to the mentee for immediate collaboration, planning and feedback. The mentee from the Kindergarten (mentee) and First grade (mentor) team mentioned, “I was really excited because this was a hands-on approach and I would be with one person who wouldn’t just show me and be gone.” Other mentees mentioned this idea of ongoing collaboration with their mentor as well. The mentee from the 1st grade (mentee) and 2nd grade (mentor) team said, “Having a mentor helps me to keep thinking of ways to integrate the ICT into my curriculum instead of just going to the quick use of it for something like drill or skill practice.”

Another theme the researcher noticed was the opportunities the participants had to learn from other participants beyond just their mentor. Multiple participants mentioned this theme. The mentee from the 1st grade (mentee) and 2nd grade (mentor) team said, “One of the best parts of this whole program has been the chance to really talk to and

learn from all grade levels in the building about ICT integration into the curriculum.”

The mentee from the 3rd grade (mentee) and 5th grade (mentor) team said,

My favorite part, I guess, is the planning when we get together and we plan and we hear what other people are doing and we see what other people are doing and I think ‘Oh, I can do that, or try that with this’.

The mentee from the 4th grade (mentee) and 4th grade (mentor) team said, “It [the Tech Buddy program] has helped me just being able to share ideas and information so I can integrate technology.”

Mentors also mentioned the positive effect the Tech Buddy approach to Professional Development had on integration of technology into the curriculum. The mentor from the Kindergarten (mentee) and First grade (mentor) said, “We work on finding a way for the students to use the technology to go deeper into their learning or be creative with what they have learned.” She added, “We are really focused on making sure it is used beyond drill and skill.” The mentor for the Kindergarten (mentee) and 3rd grade (mentor) pair commented, “Having the devices and having the support just makes everything so much easier.” The mentor for the First grade (mentee) and Second grade (mentor) team commented, “As great as it is working with your buddy, sometimes you really need collaboration with others to spark new ideas or to be exposed to new tools.”

These were just a few of the comments made by the participants of the Tech Buddy program demonstrating the positive effect it had on integration of technology into the curriculum.

RQ2: How have teacher comfort and self-efficacy levels with technology integration into the curriculum been effected by this program?

Teacher comfort and self-efficacy levels with technology integration into the curriculum showed positive increases by this program as evidenced by comments made by the program participants and comparison of the pre and post study survey results. The researcher found a common theme among most of the mentees; that since they had a mentor and time built into their schedule to meet with their mentor; they were able to build up their confidence and self-efficacy levels with technology integration into the curriculum.

The mentee of the Kindergarten (mentee) and First grade (mentor) team explained how it gave her the ability to be able to try things in her classroom when her mentor was not beside her that helped her increase her comfort level. She explained:

If something happens that I can't help them with and I'm puzzled with it and my [student] experts are puzzled then she is very helpful and is okay with them coming down to her room and get their question answered. They usually come back and tell me what she said to do.

This was a significant feeling of safety for the mentee. She mentioned multiple times throughout the study that she needed to be shown how to do something and be given a chance to practice it with someone available to answer questions. She explained, "I still have a ways to go but I feel like I have grown so much."

The mentee of the First grade (mentee) and Second grade (mentor) team had very similar comments. Several times, she compared her own confidence and self-efficacy levels she was experiencing during this study to before the study. She stated, "I think my

comfort level is definitely a lot better than it was last year for sure. I am not afraid to try it. I might mess up, but that's okay. I'm not afraid of them [technology devices] at all." She added, "When I get back to my grade level I can really see it."

The researcher felt the confidence and self-efficacy levels of 3 of the 6 mentees were very similar in their extreme growth. They were the mentees in the Kindergarten (mentee) and First grade (mentor) team, First grade (mentee) and Second grade (mentor) team, and the Third grade (mentee) and Fifth grade (mentor) team. These mentees showed an eleven, twelve, and fifteen point gain respectively in their surveys from pre to post study. The mentees in the Second grade and Second grade team and Fourth and Fourth grade team showed slightly less gain in their surveys from pre to post study. Those gains were 8 points and 9 points respectively. The mentee showing the least gain in pre to post survey results was in the Kindergarten (mentee) and Third grade (mentor) team. That gain was 7 points.

The mentors also showed gains in comfort and self-efficacy levels. A common theme among this group focused on the collaboration that involved all participants. The mentor in the Kindergarten (mentee) and First grade (mentor) team stated:

Being able to hear what others are doing in the upper grades, even though at my grade and my partner's grade it is usually not feasible, it still stretches me to think how can we adapt that to our lower grade?

She added, "I need people to remind me and keep it at the forefront of my mind and not get bogged down with other stuff." The mentor of the First grade (mentee) and Second grade (mentor) team spoke specifically to the times the whole group met when she said:

I know it was only 4 half days during the whole year, but those days were so powerful for me as a learner, too. To see and hear how the others were implementing tech it was exactly what helped me push myself forward. In education we talk so much about collaboration focused on student achievement. I really feel we miss out on ways to help ourselves.

She added, “It’s just amazing when I think about it.” The mentor in the Second grade team was more specific when she said:

I think it has made me more comfortable to start something new. I was comfortable with the iPads but I hadn’t ever used a Chromebook and I had Chromebooks to start the year. I feel that was a good way to start something new for me. Then on top of that, I could get so much help and so many suggestions from the teachers in the upper grades when we met together. It was great.

The researcher felt these examples were typical of the effects on teacher comfort and self-efficacy levels experienced by participants of the Tech Buddy program.

The survey results for the mentors showed gains ranging from 2 to 8 points. The mentors in the Second grade team and Third grade (mentee) and Fifth grade (mentor) team attained the greatest gains; those points were 7 and 8 respectively.

RQ3: Is the Tech Buddy program more effective on teacher comfort and self-efficacy levels when implemented with the same grade level or mixed grade level teachers?

The researcher felt the results of this question did not demonstrate an either/or statement. Rather, the Tech Buddy program was effective with same grade level and mixed grade level teachers. All of the participants, except for the Kindergarten (mentee)

and Third grade (mentor) team, gave numerous comments in the interviews that spoke positively of the effectiveness on teacher comfort and self-efficacy levels resulting from their experiences. The mentor of the Kindergarten (mentee) and First grade (mentor) team admitted she went into the study expecting to find it difficult to accomplish the goal of increasing the comfort and self-efficacy levels of her and her mentee due to their grade level differences. However, during her post study interview she stated:

I went into this with an open mind, but really did expect to have some problems with planning because of our team being different grade levels. Even though in K and 1 there's a lot that's similar there is a lot that's not similar, too. So there was a little bit of a thing there. But, I'm glad I kept an open mind because I really did see it's doable with mixed grade levels.

The mentee felt the difference in grade levels was a non-issue. She also mentioned that the curriculum for Kindergarten was similar to the curriculum for First grade. This enabled their planning to be comparable. She said, "It has worked out well. When we plan together she can plan for her students to take things a step further."

Similar comments came from the other teams who were mixed grade levels. The mentee of the First grade (mentee) and Second grade (mentor) felt the vertical teaming of adjacent grade levels was a positive experience for her students as well as for herself when she stated:

The older kids can help my kids or learn right along with them. And as far as our curriculums, there were a couple of times where it didn't match at all but my mentor helped me find a way we could use the same app or tool and it worked out fine.

She then said, “There really have been no big issues, which I think has helped me feel more comfortable.” The mentor corroborated the statement when she said, “It has been great, no problems whatsoever. My kids can help her kids or they can learn with her kids.” Both members of the Third grade (mentee) and Fifth grade (mentor) team added to the positive comments. The mentee stated, “For us it has been fine. There have been no issues.” She added, “Any tech integration she is able to do with her fifth graders I can find a way to adapt it to my third graders as well.” The mentor said, “I loved having different grade levels. We got to see what each other is working on.”

The members of the same grade level teams commented that their experience was a positive one. The mentee of the Second grade team stated, “My mind was not very open to that [vertical teaming] last year.” She continued with, “But then I thought well, it wouldn’t be so bad, we could be using the same kind of programs. We could help each other and now I see how that would work.” She commented since she has been in the program she has seen how the other teams have worked together her thoughts have changed; “Now I’ve kind of changed. I see I could have been with any of the mentors.” Her mentor stated, “I think that it [vertical teaming] is helpful.” The mentor of the Fourth grade team spoke of logistical concerns she had before the program started if she was teamed with a mentee who was not in the same grade level. She mentioned:

I was afraid if we weren’t [in the same grade level] it would be really difficult to get together for the planning. But I think with the planned time we have built into the program, people are making it work. It seems like it’s working.

The mentee even stated her thoughts regarding being paired with a different grade level mentor when she said, “I think that would have been fun in the respect that my 4th

graders would have loved a little opportunity to show some leadership and be that kind of mentor person [to the other grade level students].”

Both participants from the Kindergarten (mentee) and Third grade (mentor) team each spoke of difficulties, which they attributed to the differences between their grade levels. The mentee stated, “I just don’t think there is enough connection there” referring to the connection between the curriculum. She acknowledged, “The Third/Kindergarten sounds good, because they’re older to teach, but yet the stuff they can do, my class can’t do.” The mentor had similar comments when he said:

You know, Kindergarteners trying to manipulate a keyboard is a bit of a challenge. I still think they can do it, but it would take a lot of training and a lot of... You know, that was something I was unaware of because I have had third graders and fourth graders who come, you know, pretty tech savvy most of the time.

These examples of how the placement of same or mixed grade level partners, for the most part, seemed to indicate the ability to increase teacher comfort and self-efficacy levels were not dependent upon grade level, rather how the mentor approached their role. Each of the mentors who felt their pairing was successful mentioned to some degree on how their focus to help their mentee directed toward using the technology as a tool to learn what their mentee’s students needed to learn. Their focus did not lie in the tool itself.

RQ4: How has student engagement been affected with this program?

The researcher expected student engagement to be high. One reason was the natural draw students seem to have to using technology. Another reason was the types of

activities the participant teachers would be planning would be more interactive and naturally more engaging.

Some general comments, which supported the researcher's expectations, were, "It has really helped my students at every level," "the motivation [for the students] is just immense," "they are so motivated to work," and "they love it!" Specifically participants pointed to how the technology engaged students of all ability levels. A few of those comments were, "I really feel like it's the one thing they can all do," "my lower students don't feel so overwhelmed with tasks. They can do the same thing their peers are doing" and "I think all kids are more engaged." Many comments made specific reference to struggling learners. These are just a few, "Those that aren't as self-motivated without technology are more motivated if they know tech is going to be a part of it." One other participant stated, "I had one of the parents say 'Since you have allowed them to do KidBlog or Voice Thread it's just made a difference [with his writing], it's not painful any more for him.'" Additionally, it was stated, "If they know they're going to be able to work with technology it gives them that little push they sometimes need to be productive."

RQ5: How has technology integration vs technology use been affected in the classrooms of the program?

Through the observations conducted by the researcher, LMS, Administrative Intern, and comments made by the participants, technology integration in the classrooms of the program was purposeful and curriculum based. The participants supported the observations of the researcher. For example comments such as, "We're doing community helpers in our curriculum and we have been using a graphic organizer app to

organize their learning” and “the fact that the teachers from different grade levels are working together in planning and teaching the kids and then seeing what the kiddos are able to do with technology is just amazing.” Other participants noted, “I think use happens with the first time we do just about anything, but integration follows when it has a purpose in learning” and “we have gone beyond trying to find a(n) [technology] activity to learn, to thinking what works here?” These examples demonstrated how participants in this program shifted their thinking from using technology as an extra to integrating technology as a learning tool.

Relation to Current Literature:

The results supported what other researchers recommended. Professional development for teachers in technology integration into a curriculum should be within the context of a community of collaboration (Sugar & Slagter van Tyron, 2014). The professional development should be embedded into the classroom setting (Okojie, Olinzock, Adams, & Okojie-Boulder, 2008), included within the PLC structure (Sugar & Slagter van Tyron, 2014) and follow the format of the Community of Practice model (MacDonald, 2008). And finally, the professional development should use a mentor/mentee approach (Alderfer, 2014). The Tech Buddy program pulled together these recommendations while adding to the body of research the next logical question of whether teacher comfort and self-efficacy levels could be effected more by same grade level pairing or mixed grade level pairing.

Several of the pairs had various comments regarding their experience in the program and the effects it had. The Kindergarten (mentee) and 1st grade (mentor) team were both overall pleased with their results from participating in the program. The

mentee said, “I’m very happy with who I’m teamed with and that we’re close in age and it’s been great!” The mentee summed up her experience by saying, “I just love my mentor and this has been just a great program! Just what I needed!” The LMS was able to speak to this when she mentioned, “She [the kindergarten teacher] is one that it has really benefited and that is just really exciting to see.” The mentor was also as pleased to participate when she said it was what she needed due to the fact “it’s an ongoing thing.” She explained, “I’ve always felt pretty comfortable with pushing myself” however, sometimes she would go to professional development and afterward say, “I really feel like I need a monthly refresher.” She then went on to say “but this [the Tech Buddy program] is an all year thing so it’s not something I learn and then go back to my room and get bogged down with other stuff and forget.” The mentee of the 1st and 2nd grade pairing explained how participating in the program had affected her comfort and self-efficacy levels when she said:

And I think a lot of it is because I can answer the kid’s questions now and I couldn’t before. I would always have to go to my neighbor [teacher]. Just playing with it and letting the kids play with it is comfortable for me now.

When the mentee reflected upon and reviewed her entire experience in the Tech Buddy program, she stated:

I have the devices I need [which were part of the Tech Buddy program grant], we have collaboration [with the release times we meet], I have my mentor right next door where I can say ‘what do I do’. Honestly, I’ve not felt like it was an added thing that takes up a lot of time and that probably is one difference when I listen to other people who haven’t used tech much. They say ‘I can’t put one more

thing on my plate' but it's not one more thing it's just what you do, it fits in.

That's the beauty of it, I really don't see the [Tech Buddy] program as having any pitfalls.

The mentor had similar comments to the interview questions. When asked for her thoughts regarding participation in the Tech Buddy program the mentor said:

I have loved being a part of this. It hasn't been something that pulls me away from the classroom a ton. We have been provided release times we meet each quarter as a big group and times my mentee and I get meet. Other than that, we have had a few times we [mentor + mentee] met to do a little bit of planning or she might ask a few questions here or there [that wasn't addressed during a release time], but really it's not a big time taker. I think that is one of the great parts; support and time together that is provided but not a burden.

The mentor also mentioned some reactions she received from parents of her students during the study:

I had a couple of parents at Open House question what kind of tech I was going to use and how I was going to use it. I think they were more skeptical thinking from the perspective of their second grader's abilities, but by the end of first quarter conferences when I showed them what they [their student] had learned and their end results they [the parents] were stunned. One mom even sat back and said 'I am shocked at the level of sophistication my son is learning and using technology. Will the 3rd grade teachers continue this?' That was kind of funny thinking here we were at first quarter conferences and the parents were already looking to next

year. I guess it shows how if you use the tech with the students and their learning with fidelity, parents will and should expect it.

Results indicated, as supported by statements from participants, that the most valued parts of the program included built in time for collaboration, planning and reflection with each participant's mentor or mentee, as well as the whole group collaboration, sharing and reflection. Unexpected but pleasant comments from parents were another valued element the Tech Buddy program garnered.

Implications for Future Research:

In the future, the researcher would like to continue the program for one more year while bringing in another mentee for each pair. This would allow the original mentee to begin the transition to a new mentor while still under the guidance of the original mentor. At the end of the second year of implementation, the researcher would like to assign a new mentee to the original mentor and transition the original mentee into the role of mentor to their added mentee.

Since the research indicated no preference for same or mixed grade level pairing, the researcher would like to add a teacher from outside the regular classroom setting to include Special Education teachers or teachers of the Special Areas (art, music, physical education). This would present the opportunity for similar study as to whether a mentor in a regular classroom setting would be an effective mentee to a teacher in another setting.

An unexpected limitation, which emerged from this study, revealed the need to address more specifically the role and goal of the mentor. The researcher felt the

Kindergarten and Third grade team was limited in success due to the approach the mentor took to their role.

Recommendations to Improve the Program

While the program resulted in positive outcomes for most participants, there were several recommendations I would suggest for improvement of the program. The first recommendation would be for the project lead to have continuous purposeful dialogue with the mentor participants. This dialogue would focus on making sure all mentors had the same goals for their mentees in reference to embedding ICT in curriculum. It would also be beneficial for that dialogue to include all mentors more frequently as it would give them a chance to compare what they were doing with their mentee to other mentor's approaches. Another recommendation would be for all participants to use a common collaborative tool for blogging their experiences. This would allow more connection and communication between participants without having to wait for the release days when all would be able to share. Also, inviting parents to participate through a common collaborative tool for blogging what they observe. The parent who commented about their observations revealed a missed opportunity in the study. This would also be powerful data to take to School Boards for justification of the program. The final recommendation I would suggest is to share regularly the experience through social media. Again, this would be a powerful way to help garner public support for such a vital need.

Conclusion:

Researchers have shown there was an increase in access to and training in technology (Ertmer & Ottenbreit-Leftwich, 2010), however integration into teaching

resulting in learning had been limited (Buabeng-Andoh, 2012). The design of this study focused on two leading barriers for ICT integration; the comfort and self-efficacy levels of the teachers charged with the integration. From the beginning of the study, participants began commenting on their experiences in the Tech Buddy program and its effects. The positive outcomes of the study demonstrated how the Tech Buddy program increased comfort and self-efficacy levels of participating teachers.

Getting to the root cause of the barriers to ICT integration into curriculums is why I started this journey. In my experiences, teachers who had a general comfort level with technology seemed to be the ones who were willing to stretch themselves into the implementation of technology into their curriculum. I had worked one on one with numerous colleagues in an effort to help them feel more comfortable with technology. I was always frustrated when they would be very grateful for the focused help, yet it was not enough to move them closer to being comfortable with ICT integration into their curriculum. I felt if I could just get them more comfortable, they would be self-directed learners and thus their self-efficacy would improve. In the 2013-2014 school year, I developed the basic plan for the Tech Buddy program and saw success with my mentee. The review of literature revealed many recommendations; however, none had seemed to bring everything together to improve the comfort and self-efficacy levels of all participants. As I researched more into the recommended methods of professional development for ICT integration, the whole Tech Buddy plan became solid. My research added to the body of knowledge by bringing together many current recommendations while adding the variable of using same and mixed grade level pairs.

References

- Afshari, M., Bakar, K. A., Luan, W. S., Samah, B. A., & Fooi, F. S. (2009). Factors affecting teachers' use of information and communication technology. *International Journal of Instruction, 2*(1), 77-104.
- Al-Awidi, H. M., & Alghazo, I. M. (2012). The effect of student teaching experience on preservice elementary teachers' self-efficacy beliefs for technology integration in the UAE. *Education Tech research Dev, 60*(5), 923-941.
- Alderfer, C. P. (2014). Clarifying the meaning of mentor–protege relationships. *Consulting Psychology Journal: Practice and Research, 66*(1), 6-19.
- Ally, M., & Samaka, M. (2013). Open education resources and mobile technology to narrow the learning divide. *The International Review of Research in Open and Distance Learning, 14*(2), 14-27.
- Ambrosetti, A., & Dekkers, J. (2010). The interconnectedness of the roles of mentors and mentees in pre-service teacher education mentoring relationships. *Australian Journal of Teacher Education, 35*(6), 42-55.
- An, Y.-J., & Reigeluth, C. (2011-12). Creating technology-enhanced, learner-centered classrooms: K-12 Teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54-65.
- Anthony, A. B. (2012). Activity theory as a framework for investigating district-classroom system interactions and their influences on technology integration. *Journal of Research on Technology in Education, 44*(4), 335–356.
- Armstrong, A. (2014). Technology in the classroom: It's not a matter of "if," but "when" and "how." *The Education Digest, 79*(5), 39-46.

- Bauer, J., & Kenton, J. (2005). Toward technology integrating in the schools: Why it isn't happening. *Journal of Technology and Teacher Education*, 13(4), 519-546.
- Bektas, M. (2013). An examination of the elementary school teacher's preferred teaching methods and instructional technologies in terms of various variables in life study lesson. *International Online Journal of Educational Sciences*, 5(3), 551-561.
- Berrett, B., Murphy, J., & Sullivan, J. (2012). Administrator insights and reflections: Technology integration in schools. *The Qualitative Report*, 17(1), 200-221.
- 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.
- Brunner, C. (1992). *Integrating technology into the curriculum: Teaching the teachers*. New York, NY: Center for Technology in Education.
- Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1), 136-155.
- Carrasco, M. R., & Torrecilla, F. M. (2012). Learning environments with technological resources: A look at their contribution to student performance in Latin American elementary schools. *Education Tech Research Dev*, 60(6), 1107-1128.
- Cavas, B., Cavas, P., Karaoglan, B., & Kislal, T. (2009, April). *A study on science teachers' attitudes toward information and communication technologies in education*. Izmir, Turkey: The Turkish Online Journal of Educational Technology.

- CDW-G. (2012, January 30). eMINTS and CDW-G chart a new course for ed tech professional development. *Business Wire*. Vernon Hills, IL, USA. Retrieved June 5, 2015, from <http://www.emints.org/results-impact/i3-grant/i3-grant-history/i3-grant-partners/cdw-g/emints-and-cdw-g/>
- Chen, F. H., Looi, C. K., & Chen, W. (2009). Integrating technology in the classroom: A visual conceptualization of teachers' knowledge, goals and beliefs. *Journal of Computer Assisted Learning*, 25(5), 470-488.
- Chikasanda, V. K., Otreel-Cas, K., Williams, J., & Jones, A. (2013). Enhancing teachers' technological pedagogical knowledge and practices: A professional development model for technology teachers in Malawi. *Int J Technol Des Educ*, 23(3), 597–622 .
- Christensen, R. (2002). Effects of technology integration education on the attitudes of teachers and students. *Journal of Research on Technology in Education*, 34(4), 411-433.
- Cifuentes, L., Maxwell, G., & Bulu, S. (2011). Technology integration through professional learning community. *J. Educational Computing Research*, 44(1), 59-82.
- Clark, S. (2010). Avoiding the blank stare: Teacher training with the gradual release of responsibility in mind. *English Teaching Forum*, 52(2), 28-35.
- Creighton, T. (2003). *The Principal as Technology Leader*. Thousand Oaks, CA: Corwin Press.
- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

- Cviko, A., McKenney, S., & Voogt, J. (2012). Teachers enacting a technology-rich curriculum for emergent literacy. *Education Tech Research Dev*, 60(1), 31-54.
- Davis, N., Preston, C., & Sahin, I. (2009). Training teachers to use new technologies impacts multiple ecologies: Evidence from a national initiative. *British Journal of Educational Technology*, 40(5), 861-878.
- Dawson, K. (2012). Using action research projects to examine teacher technology integration practices. *Journal of Digital Learning in Teacher Education*, 28(3), 117-124.
- du Plessis, A., & Webb, P. (2012). Teachers' perceptions about their own and their schools' readiness for computer implementation: A south african case study. *The Turkish Online Journal of Educational Technology*, 11(3), 312-325.
- Eartmer, P. (1999). Addressing first and second order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61.
- Ehman, L. H., & Bonk, C. J. (2002). *A model of teacher professional development to support technology integration*. Descriptive - Speeches/Meeting Papers, American Educational Research Association, New Orleans.
- Eristi, S. D., Kurt, A. A., & Dindar, M. (2012). Teachers' views about effective use of technology in classrooms. *Turkish Online Journal of Qualitative Inquiry*, 3(2), 30-41.
- Ertmer, P. (1999). Addressing first and second order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61.

- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284.
- Fisher, T. (2006, October 7). Educational transformation: Is it, like 'beauty' in the eye of the beholder, or will we know it when we see it? *Education and Information Technologies, 11*(3), pp. 293-303.
- Ham, V. (2010). Participant-directed evaluation: Using teachers' own inquiries to evaluate professional development in technology integration. *Journal of Digital Learning in Teacher Education, 27*(1), 22-29.
- Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution and change. *Journal of Curriculum Studies, 37*(2), 155-192.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Education Technology Research & Development, 55*(3), 223-252.
- Hokanson, B., & Hooper, S. (2004). *Integrating technology in classrooms: We have met the enemy and he is us*. Chicago, IL: Association for Educational Communications and Technology.
- Hord, S. M. (1998). Creating a professional learning community: Cottonwood Creek School. *Southwest Educational Development Laboratory, 6*(2), 1-8.
- Hsu, S., & Kuan, P.-Y. (2013). The impact of multilevel factors on technology integration: The case of Taiwanese grade 1-9 teachers and schools. *Education Tech Research Dev, 61*(1), 25-50.

- International Society for Technology in Education. (2014, June 11). *About ISTE*. Retrieved from ISTE: <http://www.iste.org>
- International Society for Technology in Education. (2014, June 11). *About ISTE-Program - NETS*. Retrieved from ISTE: <http://www.iste.org>
- Januszewski, A., & Molenda, M. (2009). *Educational technology: A definition with commentary*. New York, NY: ERLBAUM.
- JISC. (June, 2014 12). In their own words: Exploring the learner's perspective on e-learning. London, England. Retrieved from <http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/iowfinal.pdf>
- Jones, W. M., & Dexter, S. (2014). How teachers learn: the roles of formal, informal, and independent learning. *Education Tech Research Dev*, 62(3), 367-384.
- Jung, I. (2005). ICT-Pedagogy integration in teacher training: Application cases worldwide. *Educational Technology & Society*, 8(2), 94-101.
- Kim, P., Hagashi, T., Carillo, L., Gonzales, I., Makany, T., Lee, B., & Garate, A. (2011). Socioeconomic strata, mobile technology, and education: A comparative analysis. *Education Tech Research Dev*, 59(4), 465-486.
- Kiper, A., & Tercan, S. (2012). The usage of information technologies in classroom environment among primary school teachers and their perception on in-service training programs on IT. *The Turkish Online Journal of Educational Technology*, 11(3), 386-392.
- Larson, L. (2009). A descriptive study of mentoring and technology integration among teacher education faculty. *International Journal of Evidence Based Coaching and Mentoring*, 7(1), 119-135.

- Loveland, T. (2012). Professional development plans for technology education: Accountability based applications at the secondary and post-secondary level. *Technology and Engineering Teacher, 71*(7), 26-31.
- MacDonald, R. J. (2008). Professional development for information communication technology integration: Identifying and supporting a community of practice through design-based research. *Journal of Research on Technology in Education, 40*(4), 429-445.
- Maigo, L. C.-j., & Mei-yan, L. (2010). The study of teachers' task values and self-efficacy on their commitment and effectiveness for technology-instruction integration. *US-China Education Review, 7*(5), 1-11.
- Martin, W., Strother, S., Weatherholt, T., & Dechaume, M. (2008). *eMINTS program evaluation report: An investigation of program fidelity and its impact on teacher mastery and student achievement*. New York, NY: EDC Center for Children and Technology.
- Medcalf-Davenport, N. A. (1998). Historical and current attitudes toward and uses of educational technology: A work in progress. *WebNet 98 World Convergence of the WWW* (pp. 1-15). Orlando, FL: St. Mary's University of San Antonio, TX.
- Miners, Z. (2009). Classroom technology integration. *District Administration, 35*-38.
- Mizell, H. (2007). Narrow the focus and expand the possibilities: Educate teachers, administrators, policy makers and system leaders on what high quality learning is and isn't. *National Staff Development Council, 28*(3), 18-22.
- Moore-Hayes, C. (2011). Technology integration preparedness and its influence on teacher-efficacy. *Canadian Journal of Learning and Technology, 37*(3), 1-15.

- Morueta, R. T., Igado, M. F., & Gomez, J. A. (2010). ICT integration in primary and secondary education in Andalusia, Spain: Curricular and organizational implications. *Educação, Formação & Tecnologias*, 3(2), 18-44.
- Nemcek, F. (2013). A progressive approach to integrating education technology. *Techniques*, 3(2), 32-35.
- Noveanu, G. N. (2010). Integrating technology in the classroom: A teacher training programme experience. *Buletinul*, 62(2), 78-84.
- O'Dwyer, L. M., Russell, M., & Bebell, D. J. (2004). Identifying teacher, school and district characteristics associated with elementary teachers' use of technology: A multilevel perspective. *Education Policy Analysis Archives*, 33(4), 1-33.
- Okojie, M. C., Olinzock, A. A., Adams, J. H., & Okojie-Boulder, T. C. (2008). Technology training dilemma: A diagnostic approach. *International Journal of Instructional Media*, 35(3), 261-270.
- Olele, C. N. (2013). Manpower development for information and communication technologies (ICTs) integration in education. *Journal of Business and Behavioral Sciences*, 25(1), 143-157.
- Owens, A. M. (2009). Do your teachers need a personal trainer? Preservice teachers learn the ropes while helping classroom teachers integrate technology into their lessons. *Learning & Leading with Technology*, 36(8), 14-17.
- Page, M. S. (2002). Technology-enriched classrooms: Effects on students of low socioeconomic status. *Journal of Research on Technology in Education*, 34(4), 389-409.

- Pan, S. C., & Franklin, T. (2011). In-service teachers' self-efficacy, professional development, and web 2.0 tools for integration. *New Horizons in Education*, 59(3), 28-40.
- Pelgrum, W. J., Reinen, I. J., & Plomp, T. (1993). *Schools, teachers, students, and computers: A Cross-national perspective*. Enschede: Netherlands: IEA.
- Potter, S. L., & Rockinson-Szapkiw, A. J. (2012). Technology integration for instructional improvement: The impact of professional development. *International Society for Performance Improvement*, 51(2), 22-27.
- Safar, A., & AlKhezzi, F. (2013). Beyond computer literacy: Technology integration and curriculum transformation. *College Student Journal*, 47(4), 614-626.
- Slagter Van Tyron, P., & Schwartz, C. (2012). A pre-service teacher training model with instructional technology graduate students as peer coaches to elementary pre-service teachers. *TechTrends*, 56(6), 31-36.
- SMART Tech*. (2015, June 18). Retrieved from <https://smarttech.com/us/About+SMART/About+SMART/Innovation/Beginnings+of+an+industry>
- Smith, T. (2013). Digital renegades in America: Changing metaphors to realize the potential of technology in education. *Critical Questions in Education*, 4(1), 30-41.
- Stein, S. J., Ginns, I. S., & McDonald, C. V. (2007). Teachers learning about technology and technology education: Insights from a professional development experience. *Int J Technol Des Educ*, 17(2), 179-195.
- Strudler, N. (2010). Perspectives on technology and educational change. *Journal of Research on Technology in Education*, 5(13), 221-229.

- Sugar, W., & Slagter van Tyron, P. J. (2014). Development of a virtual technology coach to support technology integration for K-12 educators. *TechTrends*, 58(3), 54-62.
- Szabo, J. C., & Hotch, R. (1993). How high tech works in schools. *Nation's Business*, (12), 65.
- Templeton, N. R., & Tremont, J. W. (2014). Applying business lessons to education: Mentoring as job-embedded professional development. *International Journal of Organizational Innovation*, 6(4), 54-59.
- Walker, A., Recker, M., Ye, L., Robertshaw, M. B., Sellers, L., & Leary, H. (2012). Comparing technology-related teacher professional development designs: a multilevel study of teacher and student impacts. *Educational Technology Research Development*, 60(3), 421-444.
- Wang, K. (2013). A public + private mashup for computer science education. *Techniques: Connecting Education & Careers*, 88(1), 22-27.
- Wegner, E. (1999). *Communities of practice: Learning, meaning, and identity* (18th ed. ed.). New York: Cambridge University Press.
- Willis, J., & Cifuentes, L. (2005). Training teachers to integrate technology into the classroom curriculum: Online versus face-to-face course delivery. *Journal of Technology and Teacher Education*, 13(1), 43-63.

Vitae

At the time of this study, Susan was a teacher of primary students in the Metropolitan St. Louis area. She held certifications in elementary education, gifted education and early childhood education. She had taught regular classroom students in grades Kindergarten, First, Second and Fourth. She had also taught identified gifted students in grades First through Sixth. She earned her undergraduate degree in Elementary Education from Lindenwood College in St. Charles, Missouri. She earned her Master of Arts degree in Gifted Education from Lindenwood University in St. Charles, Missouri. She hopes to teach elementary education courses at the university level. She also hopes to work with public and private schools to equip educators to meet the 21st Century needs of students.