# A DESCRIPTIVE CASE STUDY: ELEMENTARY TEACHERS' TECHNOLOGY ACCEPTANCE AND CLASSROOM INTEGRATION

by

Jenny Michelle Owens Whitt

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

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## ABSTRACT

The purpose of this descriptive case study was to examine elementary teachers' technology acceptance in the context of a student-supported professional development model in an elementary school located in the southern part of the United States. In this study, technology was defined as Internet, iPad™, or laptop use in a classroom environment as an instructional and learning tool. Face-to-face open-ended interviews, a survey, and archival data in the form of observations collected yearly as part of program evaluation for professional development were all used to answer the research questions. Research questions focused on (a) the impact of a student-supported professional development model on teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction; (b) the impact of a student-supported professional development model on teachers' actual use of technology in classroom instruction; and (c) the impact of sustained, student-supported professional development of technology on teachers' willingness to integrate technology into classroom instruction. The theory guiding this study was the technology acceptance model (TAM), which focuses on user acceptance of an information system (Davis, 1989). The theory of reasoned action (TRA) is the foundation for the TAM (Davis, 1989). Data analysis followed the process of Yin's (2011) five-phased cycle including compiling, disassembling, reassembling, interpreting, and concluding. The four themes that emerged during the analysis of this case study included: skill and knowledge development, lack of use prior to intervention/professional development, successful experience with technology, and evidence of acceptance and integration.

*Keywords*: technology acceptance model (TAM), perceived ease of use, perceived usefulness, intent to use, actual use, and professional development.

**Copyright Page**

**Dedication**

I want to thank my husband, Vance Whitt, and our five children: Sura, Aden, Shelby, Tryston, and Shila for their support during the writing of my dissertation. I am glad that the six of you not only supported me, but also were willing to embark on this journey together. I love you with all of my heart.

I want to thank my parents, John Owens, Sr., and Laura Sue Freeze, for always supporting my dreams. I also want to thank my family and friends who have supported me on my journey through life.

I want to thank my dissertation Chair, Dr. Courduff, and my committee members, Dr. Szapkiw and Dr. Wendt, for their support. I am glad that they all agreed to be part of my committee. I would also like to thank Kelli Myers for her support throughout this journey.

I want to thank Dr. Fred Davis for allowing me to not only use, but also modify the technology acceptance model survey that he used in his 1989 research.

I dedicate this dissertation to my family and to other children who were likewise raised in a lower-income family. Remember that you are capable of doing anything you put your mind to.

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## List of Abbreviations

Generation of Youth and Educators Succeeding (GenYes)

Information and Communities Technology (ICT)

Interactive Whiteboard (IWB)

Institutional Review Board (IRB)

Investigation for Quality Understanding and Engagement for Students and Teachers (iQUEST)

Technology Acceptance Model (TAM)

Technology-Based Assessments (TBA)

Theory of Reasoned Action (TRA)

# CHAPTER ONE: INTRODUCTION

## Overview

Chapter One provides the foundation for a descriptive case study on teachers' technology acceptance and classroom integration in the context of a student-supported professional development model. The technology acceptance model (TAM) is used as the theoretical framework, which guided the examination of teachers' perceived ease of use, perceived usefulness, intent to use, and actual use of technology. This chapter discusses the problem, purpose, and significance of the study. Three research questions are introduced. A discussion on situation to self, the limitations, and the delimitations of this study are provided.

## Background

Even with the billions of dollars that the United States spends on educational software and digital content, technology integration in classroom instruction is still underutilized (DeNisco, 2014; Goo, Watt, Park, & Hosp, 2012; Gray, Thomas, & Lewis, 2010; More & Hart, 2013; Mundy, Kupczynski, & Kee, 2012; Schnellert & Keengwe, 2012; Teo, 2009). While not a natural consequence of its availability, meaningful technology integration in classroom instruction is indeed important as it has been shown to boost student achievement and learning (Machado & Chung, 2015). Delen and Bulut (2011) conducted research to determine if student exposure to technology at school and home impacted student achievement in mathematics and science. These researchers concluded that students with more exposure to technology performed better in science and mathematics (Delen & Bulut, 2011). They discussed that technology use at home was a predictor of science and mathematics performance; however, school usage had a limited impact because there was a lack of integration in classroom instruction (Delen & Bulut, 2011).

Research conducted by Chacko, Appelbaum, Kim, Zhao, and Montclare (2015) demonstrated student success when technology was integrated into academic content. For two summers, these researchers studied technology integration during a bioengineering program provided for high school students. Chacko et al. concluded that technology in science instruction was beneficial for the participants, as student work for lesson topics one (diabetes) and two (HIV/AIDS) demonstrated 100% mastery. Cancer, which was topic three, resulted in 93% of students mastering the content.

A vital factor influencing teachers' technology acceptance and integration in the classroom is effective professional development (DeNisco, 2014; Foughty & Keller, 2011; Lawless & Pellegrino, 2007; Machado & Chung, 2015). Professional development is the process of enhancing the instructional practices and knowledge of teachers as a means to improve student learning (Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009). Teachers need relevant and effective professional development support in the area of technology use as an instructional tool in the classroom (Wang, Myers, & Yanes, 2010). Unfortunately, professional development with regard to the use of technology is often ineffective and does not results in the acceptance and integration of the technology in classroom instruction (Akengin, 2008; Desimone, 2009; Howley, Wood, & Hough, 2011; Machado & Chung, 2015; Ravitz, 2009; Smolin & Lawless, 2010).

The majority of technology professional development initiatives include a one-day, lecture-based approach without any follow-up or additional support services provided. The result of this professional development approach is that teachers feel that they are inadequately prepared to effectively use technology during classroom instruction (Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009; DeNisco, 2014; Howley et al., 2011). Feeling

inadequately prepared, teachers do not integrate technology in their classrooms despite research supporting the benefits of utilization during instruction (Machado & Chung, 2015). Ndongfack (2015) discussed professional development practiced for the past two decades in Cameroon. It consisted of one-day training sessions at the end of each term, resulting in a total of three sessions per year. The findings, as published in the 2009, 2010, and 2011 annual reports, support the fact that one-day training sessions are ineffective in teacher acceptance and integration of technology into classroom instruction. The reports concluded that the teachers preferred long term or ongoing technology professional development opportunities.

Gray et al. (2010) concluded that 66% of the teachers in their study spent eight hours or less on activities or tasks that provided them with technology professional development within a 12-month timeframe. The one-day model, in addition to the small portion of time allotment for technology professional development, suggests teachers' technology professional development may need to be restructured to ensure acceptance and effective integration of technology into the classroom.

Research has shown that effective technology training should be characterized by professional development that is long-term or ongoing, is embedded into day-to-day practices, and is accompanied by a mentor or coach (Lutrick & Szabo, 2012; Ndongfack, 2015; O'Koye, 2010). A study by Duran, Brunvand, Ellsworth, and Sendag (2012) using 218 teachers and administrators that provided a district-wide, research-based professional development model focused on the development and usage of wikis in classroom instruction. The research-based professional development model included new roles for teachers such as mentoring and collegial learning, and was an ongoing process. During the six-month study, teacher participants received numerous technology professional development sessions. In addition to the professional

development sessions, follow-up support and one-on-one instructional opportunities were provided. The results suggested that professional development had a significant impact on teacher technology, specifically as it related to the increase of knowledge and skills of participants. Duran et al. also concluded that research-based professional development enhanced learning as well as changed technology practices in classroom instruction. After the study was completed, Duran et al. noted that 57% of the participants continued to use wiki sites; however, they stressed that more work was needed to understand technology professional development that results in teacher acceptance and is effective in supporting integration of technology into classroom practice (DeNisco, 2014; Machado & Chung, 2015; O'Koye, 2010). This descriptive case study focused on teacher technology acceptance and classroom integration in context to a specific technology professional development model, which included many elements of effective professional development including long-term and on-going, connecting technology to instruction, and embedding it into day-to-day practices. It however extends the professional development knowledge base in that it included another element, elementary student support, that has received little to no attention in research.

## Situation to Self

My years as a classroom teacher, instructional coach, and instructional technology director have led me to recognize an increasing need for teacher technology acceptance and integration into classroom instruction, as well as for effective technology professional development. Having experienced technology integration firsthand, I also know and understand that there are obstacles to achieving both acceptance and usage of technology by teachers.

As a qualitative researcher, my philosophical assumption that guided this study was the paradigm of constructivism. I chose this paradigm because reality focused on interpretations of

each individual (Lincoln & Guba, 1985). Constructivism is a paradigm that is used when one wants to provide each participants perception as they will each vary. This study implemented three data collection methods where I was fully immersed, thus adhering to the constructivism framework (Charmaz, 2014).

Ontological assumptions, which address multiple realities and attempt to discover the nature of the reality, were a part of this case study (Creswell, 2013; Guba & Lincoln, 1989). The words of each participant were voiced through interviews, a survey, and archival data consisting of classroom observations conducted during the 2013-14 and 2014-15 school year as part of program evaluation.

This study relied on epistemological assumptions, wherein I am "trying to get as close as possible to the participants being studied" (Creswell, 2013, p. 20). As a means of striving to achieve an accurate picture of what each participant was saying (Creswell, 2013), I conducted all professional development sessions in participants' classrooms. All professional development sessions had occurred during the 2013-14 and 2014-15 school years as part of a district technology integration rollout plan, which included a professional development program evaluation component that I both created and implemented. My active involvement in professional development sessions provided additional opportunities to learn and understand the level of technology integration of participants as well as their experiences with technology in classroom practices.

This study revealed rhetorical assumptions, which addressed my need to write in a manner that was personal and based on the findings that are credible, transferable and dependable to provide a holistic view (Creswell, 2013; Feagin, Orum, & Sjoberg, 1991). My job was to accurately report all observations in an objective manner (O'Neil, 1998). To do so, I used

open-ended interview questions for teachers (Appendix A) and administrators (Appendix B), transcribed the responses, and then provided participants with the opportunity to review and clarify the responses in order to member check. In addition, participants reviewed the findings. This ensured that the recorded answers were both objective and a direct reflection of the responses provided by each participant.

## Problem Statement

Despite researchers' support for the advantages of technology inclusion in the classroom (e.g., increase in student achievement), technology integration in classroom instruction has not changed much in the last decade (DeNisco, 2014; Morgan, 2014; Navidad, 2013; Schnellert & Keengwe, 2012; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011). This lack of increased use of technology is primarily the consequence of ineffective technology professional development for teachers (DeNisco, 2014; Goo et al., 2012; Gray et al., 2010; Howley et al., 2011; Machado & Chung, 2015; More & Hart, 2013; Ravitz, 2009; Schnellert & Keengwe, 2012; Tamim et al., 2011). While numerous research studies on technology professional development exist, research on an effective model resulting in an increase of teacher acceptance and integration of technology in elementary classroom instruction is limited (DeNisco, 2014; Schnellert & Keengwe, 2012; Skoretz, 2011). While some research exists on using a coach or mentor and providing continuous educational support as a tool to increase technology acceptance and integration in the classroom, they are neither commonly used, nor cost effective (Machado & Chung, 2015). There is a gap in the literature that addresses elementary student-supported technology professional development. This case study included students as a support for professional development to raise teacher technology acceptance and integration into classroom instruction.

## Purpose Statement

The purpose of this descriptive case study was to examine teachers' technology acceptance and classroom integration in the context of a student-supported professional development model at an elementary school located in the southern part of the United States. In this descriptive case study, technology was defined as using the Internet on an iPad™ or laptop in a classroom environment as an instructional and learning tool. Student-supported professional development was defined as teachers receiving and participating in nine sessions of technology professional development with the students in their classroom. Student-supported technology professional development occurred in the 2013-14 and 2014-15 school year as part of a two-year district technology integration rollout plan; therefore, it was only conducted for two years. A specific agenda (Appendix G) was implemented, which included specific tasks and a homework component. Student support included enhancing teacher technology knowledge and application; motivation; exposure; comfort level; and ability to explore, demonstrate and recall skills. Students exhibit technology expertise, are more competent with technology, and have a higher set of technology skills than teachers (Bajt, 2011; Gu, Zhu, & Guo, 2013). The theory guiding this study was the TAM, as it was used to explain teacher technology acceptance and integration into classroom instruction (Davis, 1989).

## Significance of the Study

Empirical research targeting elementary student-supported professional development does not exist. Research beginning as early as the 1990s discussed elementary students as technology troubleshooters, but not as support during professional development (Corso & Devine, 2013). The research that is available focuses on middle school and college students

taking on technology leadership roles resulting in integration into classroom instruction, but not in an elementary setting (Breiner, 2009; Corso & Devine, 2013; Gu et al., 2013).

Although researchers have identified effective elements of professional development, there was a gap in the literature addressing the potential of elementary student-supported professional development (Duran et al., 2012; Gayton & McEwan, 2010; Koh & Newman, 2009; Neuman & Cunningham, 2009; Potter & Rockinson-Szapkiw, 2012). Furthermore, effective technology professional development models are needed, especially at the elementary level. Examining teachers' technology acceptance and classroom integration in the context of a student-supported professional development model, through a longitudinal study, could possibly answer how. This study offers an effective professional development model that school personnel can adopt to enhance teacher technology acceptance and use in the classroom.

An in-depth examination of teachers' perspectives pertaining to long-term technology professional development occurred in this study, thus adding to the literature as researchers have discussed the importance of conducting ongoing or long-term technology professional development (Lutrick & Szabo, 2012; Matherson, Wilson, & Wright, 2014). Rather than implementing one-day technology professional development, which has been shown to be generally ineffective, this study provided support for the implementation of long-term programs (Blackmon, 2013; Borthwick & Pierson, 2008; Dede et al., 2009).

## Research Questions

Technology professional development plays a role in teacher acceptance and integration of technology in classroom instruction (DeNisco, 2014; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). Research supports effective elements of professional development that enhance teachers' acceptance of technology and integration into classroom instruction

(Lutrick & Szabo, 2012; O'Koye, 2010); however, additional studies are needed to develop effective models for supporting it, especially at the elementary level (DeNisco, 2014; Machado & Chung, 2015; O'Koye, 2010). Three research questions were used to study teachers' technology acceptance and classroom integration in the context of a student-supported professional development model. Research Question One focused on teachers' beliefs that technology will be effort-free and good for their job, along with their plan to use technology as an instructional tool in classroom instruction.

**RQ 1:** How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction?

Because it has been available throughout their lives, today's elementary students have an understanding of technology that previous generations lacked (Bajt, 2011; McAlister, 2009). Therefore, they also tend to have well-developed technology skills, knowledge, and competencies (Bajt, 2011; Gu et al., 2013). Research supports the need for teachers to rely on the technology expertise that their students possess (Corso & Devine, 2013; Krier, 2008). Research Question Two addresses how student-supported professional development impacts teachers' ability to use technology in the classroom.

**RQ 2:** How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction?

Research supports that professional development is the primary factor impacting teacher acceptance of technology and technology integration in the classroom (DeNisco, 2014; Ertmer et al., 2012). The process of studying the impact on teachers' technology use in classroom instruction provided an understanding of teacher acceptance. Research Question Three studies

the relationship between a student-supported professional development model and teachers' technology integration in the classroom.

**RQ 3:** What evidence suggests that student-supported professional development for technology is responsible for the encouragement of teachers' technology integration into classroom instruction?

Most of the literature discussing technology professional development focuses on ineffective models (DeNisco, 2014; Gray et al., 2010; Schnellert & Keengwe, 2012; Skoretz, 2011). There are certain effective elements of professional development supported by research, such as professional development learning that is embedded into day-to-day practices, is long-term or ongoing, and uses a mentor or coach; however, no research exists that targets elementary student support for professional development (Lutrick & Szabo, 2012, O'Koye, 2010).

## Definitions

1. *Actual use* - The genuine utilization of a specific technology a person exhibits based on the person's perceived ease of use, perceived usefulness, and intent towards using. Actual use is actual computer adoption behavior (Davis, Bagozzi, & Warsaw, 1989).
2. *Intent to use* - Based on perceived ease of use and perceived usefulness. Intent to use is the calculated goal a person has towards technology application. User intention is the actual plan that a user will employ technology (Davis et al., 1989).
3. *Perceived ease of use* - A construct of the TAM focusing on a person's belief that technology will be effortless (Davis, 1989). Perceived ease of use is an influence on perceived usefulness based on the thought that if technology is easier to integrate, then it is convenient.

4. *Perceived usefulness* - A construct of the TAM that focuses on the extent that a person believes the system will be good for his or her job (Davis, 1989).
5. *Professional development* - The process of enhancing teacher instructional practices and knowledge as a means to improve student learning (Darling-Hammond et al., 2009). Furthermore, professional development includes providing group instruction and/or activities focusing on specific skills, attitudes, and extending professional knowledge (Guskey, 2000).
6. The *Technology Acceptance Model* (TAM) - A model introduced by Davis (1989) based on theory of reasoned action. The TAM provides information regarding a person's perception of technology and usage behavior (Davis et al., 1989). Four of the TAM constructs are user perceived usefulness, perceived ease of use, intent to use technology and actual use of technology or technology devices.

## Summary

This study examined teachers' technology acceptance and classroom integration in the context of a student-supported professional development model. Specifically, describing how student-supported professional development influences teachers' technology acceptance and integration in the classroom. The theoretical framework for this case study was based on the TAM (Davis, 1989; Davis et al., 1989), which was introduced in Chapter One and then discussed in depth throughout Chapter Two. The problem statement, purpose for conducting the study, significance of the study, and research questions were discussed in this chapter. A presentation of the gaps in literature provided a framework for this study.

A descriptive case study was selected because an understanding of an intervention consisting of student-supported professional development as it pertains to a real-life context,

teacher technology acceptance, and integration was obtained (Stake, 1995, Yin, 2013). Specifically, using multiple methods to avow an in-depth investigation. The data collection methods for this study included a survey, open-ended face-to-face interviews, and archival data consisting of classroom observations collected yearly, during 2013-14 and 2014-15 school years, as part of program evaluation. Participants consisted of five elementary school teachers located in the southern part of the United States who received the student-supported technology professional development model and two administrator participants who observed student-supported technology professional development at least three times during the 2013-14 and/or 2014-15 school years.

# CHAPTER TWO: LITERATURE REVIEW

## Overview

In several studies that focuse on teachers' use of technology conducted in various settings ranging from kindergarten through higher education, less than half of the teachers across all the studies reported that they used technology regularly in their classroom instruction (DeNisco, 2014; Gray et al., 2010; Schnellert & Keengwe, 2012). Teachers report that a lack of professional development focusing on technology for instructional purposes was the main reason for limited technology inclusion in classroom instruction. This suggests the need for an effective technology professional development model.

This chapter provides a review of literature discussing (a) the theoretical framework; (b) technology integration in the classroom; (c) professional development; (d) issues that impede professional development and technology integration; and (f) students as support for technology integration in classrooms. A summary of the selection leading to the research gap concludes the chapter.

## Theoretical Framework

The theoretical framework for this research study was the technology acceptance model (TAM), which is based on the theory of reasoned action (TRA). TAM focuses on the interactions that occur between a person's perception of technology and the person's computer usage behavior (Davis et al., 1989). Knight (2012) discussed the importance of teachers' perceptions as a main factor in research on technology integration. TAM is based on the central beliefs that using technology is effortless and good for a person's profession, resulting in technology use (Davis, 1989).

**Theory of Reasoned Action**

TRA focuses on a person's performance of a specific behavior as primarily determined by that person's behavioral intention (Ajzen & Fishbein, 1980). Ajzen and Fishbein further explained that a person's behavioral intention is jointly determined by the person's attitude and the subjective norm concerning the behavior in question. Attitude refers to a person's mannerisms towards a behavior and specific performance of the behavior with limited regard to the overall performance (Fishbein & Azjen, 1980). Subjective norm is based on the opinions of others and consists of a person's perception about whether to perform or not perform a specific behavior (Venkatesh & Davis, 2000).

While originally introduced as a theory in social psychology, TRA has since been applied to specific domains like technology. For example, in 1980, studies that focused on the way that an individual adopts certain behaviors, technologies, or advice were included in TRA (Ajzen & Fishbein, 1980; Wallace & Sheetz, 2014). In terms of technology, when people view it as favorable, they are more likely to acquire and utilize it (Ajzen & Fishbein, 1980; Wallace & Sheetz, 2014).

**Technology Acceptance Model**

Davis (1989) found inspiration for TAM in technology-focused applications of TRA and introduced his theory as a tool for understanding technology use based on external factors, beliefs, attitudes, and intentions (Davis et al., 1989). However, while TRA both applies to theory and forms the foundation for TAM, some key differences between the two theories exist. Both TRA and TAM discuss belief as a determining factor in attitude; however, attitude determinants vary within each theory. Specifically, TRA asserts that "external stimuli influence attitudes only indirectly through changes in the person's belief structure" (Davis et al., 1989, p. 984), thus

providing a framework to analyze how a person responds to a particular situation. TAM, on the other hand, is used to provide possible explanations for why the individual did or did not adopt the technology in question (Davis et al., 1989; Hu, Clark, & Ma, 2003). TRA, therefore, encompasses intention or behavior and is used as a predictor, while TAM targets user intention and adaptive behavior. Additionally, TRA combines both perceived ease of use and usefulness as part of behavioral intention, while TAM holds them as separate and distinct.

Despite the refinement made possible by this distinction, TAM is limited insofar as perceived ease of use and perceived usefulness cannot explain all user acceptance behaviors (Juhary, 2014). Therefore, TAM has been modified and expanded to include additional variables and subjective norms (Venkatesh & Bala, 2013; Venkatesh & Davis, 2000; Wolk, 2009). Further, TAM has been modified as a tool to explain a person's utilization of information technology, specifically the determinants of perceived ease of use and usefulness. The result has been the development of various models such as the TAM2 (Venkatesh, & Davis, 2000), the TAM3 (Venkatesh, & Bala, 2013), and the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003).

These adjusted versions address guidance to practitioners; suggestions for a practical intervention; facilitation of conditions; and the influences of gender, age, voluntarism or experience, which are not examined in this study. This study will instead attempt to answer how student-supported professional development may impact teachers' technology acceptance and classroom integration. Because perceived ease of use and usefulness are important factors in this investigation, the original TAM model was selected for this case study.

**Technology acceptance model constructs.** The four constructs of TAM are perceived ease of use, perceived usefulness, intent to use and actual use. While a number of factors

influence teachers' intention to use and actual use of technology in the classroom, two key factors are beliefs about ease of use and usefulness (Abbitt, 2011; Bingimals, 2009; DeNisco, 2014; Howley et al., 2011; Inan & Lowther, 2010; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010).

***Perceived ease of use.*** The validity and reliability of perceived ease of use determines user acceptance (Kanchanatanee, Suwanno, & Jarenvongrayab, 2014; Moses, Wong, Baker, & Mahmud, 2013; Naeini & Krishnam, 2012; Nasser Al-Suqri, 2014). In education, the degree to which technology is implemented into instruction depends on teacher acceptance (Timothy, 2009), which is heavily influenced by perceived ease of use. For instance, recent research about attitudes toward laptop use in a sample of 292 science and 278 mathematics teachers demonstrated that perceived ease of use was a significant predictor of perceived usefulness of technology (Moses et al., 2013).

At least one study indicated that perceived ease of use influenced the technology use of students, as well. Naeini and Krishnam (2012) conducted research with a sample size of 201 Malaysian elementary school students focusing on their use of computer games. Specifically, they examined usage patterns based on perceived usefulness and ease of use. Naeini and Krishnam found significant positive correlation between these two variables and actual use of the technology. While perceived ease of use and perceived usefulness resulting in actual use among students will not be studied directly in the proposed study, it will be an essential component, as student acceptance of technology will be used as a resource to support both technology integration into classroom instruction and professional development.

***Perceived usefulness.*** Perceived usefulness is the realization that new technology will increase or improve overall performance (Davis, 1993). This perception directly affects a

person's intent to use technology (Chen, Chen, & Kazman, 2007; Rouibah, Abbas, & Rouibah, 2011). Researchers have affirmed perceived usefulness as a construct in TAM to determine user acceptance and actual use of technology (Amin, Rezaei, & Abolghasemi, 2014; Holden & Rada, 2011; Moses et al., 2013; Williams, Slade, & Dwivedi, 2014).

One of these studies examined the level of e-reader use among a sample of 234 consumers, and the researchers concluded that perceived usefulness positively influenced intent to use (Williams et al., 2014). Williams et al. supported existing TAM relationships, specifically technology perceived, as being useful was more likely to be accepted and used than was technology not deemed useful. Other research indicated that the opposite is also true, as Holden and Rada (2011) conducted a study consisting of a sample size of 99 kindergarten through 12th grade teachers focusing on educational technology acceptance and usage behavior. They concluded that when the user did not accept educational technology or did not believe that it improved work performance, the result was failure to implement the technology into the classroom.

***Intent to use.*** Research has suggested that the variables discussed previously (i.e., perceived ease of use and perceived usefulness) may influence teachers' intent to use technology (Holzinger, Searle, & Wernbacher, 2011; Kanchanatanee et al., 2014; Martin, 2012; Potter & Rockinson-Szapkiw, 2012). This variable mediates the relationship between perceptions and actual use (Bagozzi, Davis, & Warshaw, 1992). Specifically, studies indicated that teacher perception of a technology as useful and easy to use directly increased intent to use, which then influenced actual use (Al-Adwan, Al-Adwan, & Smedley, 2013; Davis, 1989; Davis et al., 1989; Lin, 2013; Park & del Pobil, 2013b; Yucel & Gulbahar, 2013).

***Actual use.*** Researchers have concluded that perceived ease of use and usefulness have an indirect effect—and intent to use a direct effect—on actual use (Lee, Hsieh, & Hsu, 2011; Park, Rhoads, Hou, & Lee, 2014).

**Validity and reliability of measures of the technology acceptance model.** The validity and reliability of TAM has been examined in numerous research studies (Ma & Liu, 2005; Mahmood, Hall, & Swanberg, 2001; Moon & Kim, 2001; Park & del Pobil, 2013a; Park & del Pobil, 2013b; Roca & Gagné, 2008; Tai & Ting, 2011; Wang, Lin, & Luarn, 2006; Wong, Ooi, & Hew, 2013). More than a decade of research findings has shown that the survey (Appendix C) used to measure the four TAM constructs is robust and powerful in determining the level of users' acceptance of technology (Venkatesh & Davis, 2000), and assessments of the survey have yielded reliability levels between 0.70 and 0.92 (Agarwal & Karahanna, 2000; Gefen, Karahanna, & Straub, 2003; Jiang, Hsu, Klein, & Lin, 2000; Klopping & McKinney, 2004; Selim, 2003; Wolk, 2009). Such high coefficients indicate that the survey provides a reliable way to measure technology use and its influences.

## Related Literature

Changes in teaching practices may be needed in order to effectively teach today's students (Huang and Yang, 2014; Matulich, Papp, & Haytko, 2008). Teachers who want to meet the needs of their students may need to understand and use technology in classroom instruction (Aviles & Eastman, 2012). In terms of bringing about this change, the degree to which implementing effective professional development increases perceived usefulness, perceived ease of use, and intent to use—and thus whether it increases actual classroom use—has long been a topic of debate.

Despite the fact that professional development has been integrated into both public and private schools at all levels—as well as into higher education—no specific technology professional development program or strategy has a strong empirical research base to support its use to increase effective technology integration in classroom instruction (DeNisco, 2014; Gray et al., 2010; Schnellert & Keengwe, 2012; Skoretz, 2011). However, researchers have suggested certain elements as being necessary for effective technology professional development (Lawless, & Pellegrino, 2007; Hayden, Ouyang, Olszewski & Bielefeldt, 2011; Potter & Rockinson-Szapkiw, 2012). These elements consist of ongoing or long-term support, embedding of technology into day-to-day activities, and mentoring or coaching (Lutrick & Szabo, 2012; O'Koye, 2010).

In addition, research conducted by Hutchison (2012) focusing on professional development and understanding the integration of technology into instruction provided insight as to four factors that teachers believe would enhance their usage. Open-ended survey questions focusing on teachers' perceptions were gathered from 1441 literacy teachers. Data analysis concluded that teachers need: (a) time to explore and prepare literacy lessons with technology integration; (b) additional access to technology equipment; (c) knowledge consisting of background, higher-level thinking, and presenters; and (d) ongoing or follow-up provided by support personal.

A study conducted by Wang, Hsu, Campbell, Coster, and Longhurst (2014) concluded similar results. Data collected from 24 teacher participants and 1,060 student participants examining the technology savviness of students versus teachers resulted in five barriers to technology integration in classroom instruction. The five barriers included: (a) limited access to technology, (b) time constraints, (c) limited technology skills and knowledge, (d) limited

integration skills, and (e) school policies limiting support and resources. Teachers also acknowledged that the majority of technology integration was limited to word processing, presentation tools, and Internet researching.

Effective technology professional development instruction should also incorporate device, software, or tool operation maintenance and instruction, as well as integrate instruction that focuses on fostering curricular connections. Potter and Rockinson-Szapkiw (2012) argued that effective teacher technology professional development should include technology operation, technology application and technology integration. During this study, technology professional development will include components addressing each of these variables.

Linton and Geddes (2013) discussed a small school district in North Carolina. The district's technology plan provided ongoing long-term support, embedded into day-to-day activities, mentoring, time to plan and explore, instruction on device and software, fostered curricular connections, and built teacher technology confidence. The results of the initiative include the district being recognized as one of the 10 highest achieving in the state, despite being low-funded. Classroom environments throughout the district are rich in technology integration as demonstrated daily throughout the district. Specific examples include students creating videos to send to Olympic athletes or interactive mathematic lessons. Despite the level of technology integration and student achievement increasing with this initiative, the role of technology supported by students was not examined. Therefore, more research in this area is needed because it is unknown to what extent student-support would have on teacher technology usage in classroom instruction.

**Influence of Technology Integration on Student Engagement and Achievement**

A need exists to more fully integrate technology into classroom instruction. Not only should students be better able to navigate a highly technological world, but research also indicates that the use of technology in the classroom results in higher levels of student engagement and achievement. In terms of the latter, researchers have found not only that students score higher when technology integration occurred in the classroom and was useful (Morgan, 2014; Navidad, 2013; Tamim et al., 2011), but also that technology continues to be underutilized in instruction (Goo et al., 2012; More & Hart, 2013; Sanders, 2009; Tamim et al., 2011; Teo, 2009).

Students appear to agree, as 80% of student respondents in one study stated that a hands-on practice of the kind made possible by technology is the best method for learning (Breiner, 2009). In another examination of this question, Hyland and Kranzow (2012) considered the perceptions of both teachers and students in the use of technology, particularly in the use of e-texts and e-libraries, in developing critical thinking and self-directed search. These researchers administered close-ended and open-ended survey questionnaires to 92 students and eight faculty members from a private, post-secondary institution. Analysis of both student and faculty feedback revealed that e-materials had a positive influence on students' learning behavior involving critical thinking and self-directed learning, which confirmed the researchers' (Hyland & Kranzow, 2012) alternative hypothesis. Both students and faculty members viewed e-libraries as efficient in providing a wide range of information in the shortest possible time.

Analysis of the open-ended questions indicated that the majority of the students believed they performed better in class upon using the e-materials in the sense that they had access to a wide pool of the latest information in an organized manner. It should be noted that in this study,

self-reporting was used, and it may be possible that the students' general positivity toward technology prompted them to overestimate its ability to help them think critically. As such, more research is needed to better understand the link between technology integration and student achievement.

A longitudinal study spanning three years concluded similar results. Blanchard, LePrevost, Tolin, and Guiterrez (2016) investigated ongoing technology professional development (TDP) of 20 mathematics and science teachers in high-poverty school districts. There results concluded that teachers who participated in TDP demonstrated an increase in their technology usage comfort level. Furthermore, the students of teachers that participated in TDP demonstrated higher assessment scores in both academic areas than students in non-TDP participant classrooms. The study also identified that student exposure to more than one TDP teacher resulted in higher achievement scores and substantial academic gains.

Not only does research support the theory that technology integration into classroom increases student achievement and engagement, but it also supports increased graduation rates. Yasar, Mailekal, Little, and Veronsei (2014) studied a specific teacher technology training program that emphasized technology, content, and pedagogy. The study consisted of providing 180 teachers from 15 schools ongoing technology training and support spanning three years. Data concluded that student engagement and achievement scores in both mathematics and science increased based off of comparisons conducted on the control and treatment group. Additionally, graduation rates of schools in the treatment group drastically increased, while no change was observed in the control group.

Understanding of the potential benefit of technology integration in classroom instruction may emerge through various learning styles. Huang and Yang (2014) examined preferred

learning styles of students and learning occurring in kindergarten through 12th grade classrooms. The sample size consisted of 28,300 primary and secondary students located in Beijing, China. All participants were administered the Digital Native Questionnaire by Horizon Research Publishing consisting of 30 questions. A focus group interview consisting of 28 students occurred, and participants were interviewed in groups of four using a six-part questionnaire focusing on content, sequence, materials provided, pedagogy, ICT usage, learning outcomes, and assessment.

The researchers found that content sequence, pedagogy, learning outcome, material provided, and assessment learning differed between digital native preferred and K-12 classes (Huang & Yang, 2014). Huang and Yang provided an analysis of what students needed to learn in classrooms and demonstrated the pitfalls of current classroom teaching. The research provided a roadmap for changing classroom teaching and suggested that teaching styles must change to meet the needs of Generation Y (born 1980-1994) students.

Paradoxically, Generation Y and Generation Z (born 1995-2010) students, in addition to needing more technology-driven instruction, are already more literate in this way than are students from previous generations, such as Baby Boomer (born 1946-1964) and Generation X (born 1965-1979) (Dupont, 2015). Current students feel as if teachers' technology comfort level inhibits their technology usage in the classroom (Greer & Sweeney, 2012). Today's students have been immersed in technology since birth, resulting in them being more technologically savvy than their predecessors (Bajt, 2011; Gu et al., 2013). The constant exposure to technology has been the foundation for the ability of today's students to try different technology avenues to obtain success (McAlister, 2009). Greer and Sweeney (2012) stated that over 90% of students have a computer in their home.

Research conducted by Wikia Technology (2013) supports the higher level of technology expertise associated with Generation Z. The study surveyed more than 1,200 teens ranging in age from 13 to 18 and focused on teens and technology. Data collection concluded that members of Generation Z display quick technology adaptive behaviors and use technology in more advanced ways than previous generations and in a manner that is beneficial to their future.

**Influence of technology on student engagement.** Another, well-established element of perceived educational benefit for students is engagement. Research has indicated that engagement increases as technology is integrated into the classroom. For example, the Turkish government began a technology integration program called the Fırsatları Artırma ve Teknolojiyi İyileştirme Hareketi (FATIH) or Movement to Increase Opportunities and Improve Technology Project in 52 pilot schools across the country. Pamuk, Çakır, Ergun, Yılmaz, & Ayas, (2013) conducted a study at 11 of those schools and learned that teachers and students viewed interactive whiteboards (IWBs) as having a positive impact on demonstrations, lectures, and reports. Additionally, participants also felt that using them increased their motivation to engage in lectures. In the literature review of Sung and Hwang (2014), similar conclusions were reached, as the use of technology in learning and classroom instructions tended to increase the students' academic interest and motivation.

Other studies provided support for these conclusions about IWBs. To examine the impact of its use, Esteves, Paulista, Fiscarelli, and Bizelli (2015) conducted a case study in Selmi Dei III, a primary school in Araraquara, a region of São Paulo, Brazil, which was chosen due to its excellence in teaching, as evidenced by numerous awards. The school was given two additional IWBs as part of one of those awards, which brought the school's total to three (two in third-grade classrooms and one in a fifth-grade classroom). Through live and videotaped

observation, the researchers inferred that students with greater access to IWBs were more engaged in class discussions and more patient and well behaved while waiting to use them. Additionally, only a handful of students refused to use the IWB, and Esteves et al. found that the refusal was due to fear of not knowing the answer, rather than fear of the IWB itself.

For validity, the researchers also interviewed some students about their experience in using the IWB, and the majority of them expressed an overwhelmingly positive opinion. The response was that they understood lessons better and found them to be more engaging than those utilizing a traditional blackboard and notebook. The researchers concluded that despite the students' difficulties, technology inside the classroom—simply the presence of it—might have served as a motivator in learning, thereby triggering student interest. This finding aligns with another study among teachers in Turkey, who reported that their students were more attentive to instruction delivered with the help of IWBs (Türel & Johnson, 2012).

In addition to IWBs, research supports iPads™ and computers increase student engagement (Dietrich & Balli, 2014). Dietrich and Balli (2014) conducted research at three different schools studying student perceptions of classroom learning and technology. The use of iPads™ was integrated into classroom instruction at one site. Participants, consisting of 15 elementary students, reported that iPads™ extended learning, often times made learning feel as if it was play, and provided an opportunity for student control. Students reported similar conclusions about computers, stating that they preferred to actually use them personally, rather than just observe teacher usage. The study also discussed student frustration when teachers lacked the skills to effectively integrate technology into classroom instruction, specifically pointing out that this led to student confusion and lack of interest.

Immediate feedback is a specific component of technology integration in classroom instruction. It increases student engagement and academic achievement. Muis, Ranellucci, Trevors, and Duffy (2015) studied the perceptions of kindergarteners in reference to the impact of technology in the classroom providing immediate feedback. Data collection consisted of interviews and various apps, only some of which provided immediate feedback. The sample included 64 kindergarten students. Data analysis concluded that when students did not receive feedback, they were not as engaged and demonstrated limited gains in achievement. When apps provided immediate feedback, engagement increased and higher levels of achievement occurred.

## Technology Integration in the Classroom

Integrating technology in the classroom has become common practice among some teachers (Potter & Rockinson-Szapkiw, 2016), and the aforementioned benefits help to explain why. There are different methods used to promote it within the classroom, and research has indicated that several strategies, such as linking technology use with improved pedagogy, helping students function as resources and support, and formalized technology professional development (especially when featuring mentoring or coaching), can be effective at increasing technology use by teachers.

**Connecting technology to curriculum and instruction.** Researchers have investigated the degree to which teacher perception of relevance of technology to curriculum and instructional practices relate to technology use in the classroom. Türel and Johnson (2012) used purposive and convenience sampling to recruit teacher participants that were actively using IWBs in their Turkish classrooms. There were 174 sixth through 12th-grade teachers who responded to the survey questionnaire. A typical respondent was a bachelor's degree holder under the age of 36 and with fewer than 10 years of teaching experience. The questionnaire used

was a researcher-constructed, 26-item Likert scale, which consisted of three subscales: the effects of IWBs on teaching and learning, the factors motivating IWB use, and the usability of IWBs. Analysis of the data indicated that the teachers felt IWBs were useful for any subject. Furthermore, the teachers believed that their pedagogical skills might have improved through IWB use (Türel & Johnson, 2012).

**Utilizing students as technology resources**. In addition to linking technology use with perceived instructional benefits, research has also revealed that students can encourage technology use among teachers. With access to numerous forms of technology, teachers may need this kind of assistance in the classroom, and in order to address this need, students have been trained and taught specific technology tasks (Corso & Devine, 2013; Lau & Yuen, 2013; Ozel, Ozel, & Cifuentes, 2014; Pamuk et al., 2013). Students in kindergarten through 12$^{th}$ grade have taken on various roles, primarily troubleshooting with regard to the use of technology in schools. In some schools, they have even become professional development leaders who teach basic technology skills to teachers, staff, and other students.

Brooks-Young (2006) discussed the benefits of supporting technology needs of teachers and schools when students take on various technology roles. The benefits of these roles include providing students with various opportunities to perform services for other people, as well as lower school technology costs (Corso & Devine, 2013). As such, students are vital assets to teachers who implement technology in classroom instruction (Brooks-Young, 2006).

Research investigating students as technology support began in the late 1990s (Corso & Devine, 2013), and one formalized method for utilizing students as resources is that of student technology teams, which have been deployed to classrooms when technology issues arise (Brooks-Young, 2006; Peto, Onishi, & Irish, 1989). Student technology teams consist of

students who are taught basic skills, such as how to connect a document camera to a computer, by technology personnel or librarians. Team members are called upon when these particular skills are needed in the classroom. As digital world, school resources, and teachers' needs have evolved, the roles of student technology team members have changed to include mentoring of teachers and other students (Corso & Devine, 2013).

Brooks-Young (2006) examined the use of technology teams in two schools in order to determine their impact. The first school created a group of technology savvy students identified as "Techno Team," who were trained by the computer teacher to run several utility programs and provide software maintenance support. A group of 12 to 15 seventh- and eighth-grade students were selected yearly as Techno Team members. The second school, by contrast, implemented a one-to-one technology program that consisted of laptop computers. The technology team at this school focused on troubleshooting technical issues that might occur on a laptop, and students were trained by two computer science teachers to fix any minor problems that occurred, as well as to create a maintenance order for technology technicians on devices having issue that they couldn't resolve. The result was that at least one student in each classroom had the skills to fix or refer out technology issues that might arise (Brooks-Young, 2006).

At times, students have also conducted technology professional development for teachers. Breiner (2009) wrote about "Technology Wizards," a student technology team consisting of 26 sixth and seventh-grade students trained throughout an entire school district to provide technology support to teachers. District training occurred once per month, and some schools held additional meetings to supplement that training. Technology Wizards were able to provide first-hand technology training to teachers.

With the advances of technology and the educational shift towards technology integration in classroom instruction, student roles as providers of technology support have begun to change. Pierce (2012) discussed a specific program called Generation of Youth and Educators Succeeding (GenYes), in which students are trained to support technology in the school. GenYes programs encourage student and teacher collaboration through an established curriculum that focuses on technology skills of Generation Z to enhance technology utilization. Programs such as GenYes utilize student expertise with technology, but do not focus on student-support for professional development. Thus, more research is needed.

Corso and Devine (2013) conducted a study concluding that technology integration at the university level was impacted when students were used as mentors for educators (Corso & Devine, 2013). Another study conducted by Liu, Tsai, and Huang (2015) examining pre-service teachers and mentor teacher collaborative technology professional development. Participants consisted of three groups encompassing a mentor and pre-service teacher in a junior high setting. Data was collected from focus group interviews, classroom observations, lesson plans, and video-recorded observations. Data analysis concluded that there was an increase in mentor implementation of technology into classroom instruction based off of support provided by pre-service teachers. Although student-supported technology professional development was shown to be effective at the college level and with pre-service teacher support, the potential for elementary student support is unknown.

Elementary students have a natural understanding of technology and the Internet based on their exposure since birth (Bajt, 2011). Elementary students learn through trial and error behaviors, are technology savvy, are multi-taskers, connect, collaborate and access information easily, and are able to navigate digital environments with ease (Emanuel, 2013; Gibson &

Sodeman, 2014; Hartman & McCambridge, 2011). Today's students are quicker to adapt to technology shifts than previous generations were; thus, these students tend to accept technology faster than their teachers (Bajt, 2011; Gu et al., 2013; Krier, 2008).

A significant limitation of these studies is that none examined the degree to which student classroom support leads to increases in teacher perception regarding the ease of use or usefulness of technology. While this study provided evidence that this kind of support does, in fact, cause teachers to perceive technology as being useful and easy to use (and thus more likely to actually use), the extent to which this relationship actually exists has not been explored previously.

Research was needed to determine whether this link, which this study supported, actually does exist. As yet, research on student involvement in the use of technology in the classroom has primarily focused directly on students who troubleshoot technology issues that arise throughout the academic day (Brooks-Young, 2006). Limited research has been conducted on students receiving instruction in how to provide technology professional development for teachers and administrators and how that might relate to changes in computer integration in the classroom (Gu et al., 2013).

**Formalizing technology professional development.** Technology professional development became a new concept in school districts as a result of the passage of the No Child Left Behind Act (2001), which required technology integration in schools. More recently, technology has been embedded in the Common Core Standards, which are being implemented throughout most of the United States (Yim, Warschauer, Zheng, & Lawrence, 2014). The required integration of technology into school curricula has resulted in the integration of technology professional development in school districts across the nation (Dede et al., 2009; Schnellert & Keengwe, 2012).

For learning through technology professional development to be sustained, it has been recommended that institutions not simply provide the technology, but also invest in training teachers to use it (Persico, Manca, & Pozzi, 2014). Aside from formal training, some schools provide access to networking, online forums and social media to enable teachers to communicate with each other and share their experiences, tips, and struggles in using technology in the classroom (McLeod & Richardson, 2013). While literature in this regard exists that supports middle school and college student technology professional development for teachers, no research exists that discusses elementary student support in technology professional development. Therefore, this study addressed a gap in literature about the effectiveness of teacher training and its impact on technology acceptance and use in the classroom.

***Significance of professional development.*** Studies suggest that in order to integrate technology effectively into instruction, teachers need professional development that is both timely and applicable to classroom practice (DeNisco, 2014; Ertmer et al., 2012). Teacher technology professional development is the main factor in teachers' positive attitudes towards both technology and the integration of technology into the classroom (DeNisco, 2014; Ertmer et al., 2012). In a study by Badri, Mousavi, Pour, Geravand and Yeganeh (2015), 190 secondary teachers took part in a survey to determine the relationship between technology professional development and technology use in the classroom. The results were that the two constructs had a significant positive correlation, indicating that technology professional development was predictive of technology use (Badri et al., 2015).

Gerard, Varma, Corliss, and Linn (2011) suggested that classroom teachers who received professional development to help them understand how technology enhanced and related to curriculum were more successful at integrating technology into their classrooms than were

teachers who did not. This finding indicates that teachers need to understand how to operate and effectively use technology to promote student learning, and there are numerous devices available to help them. Unfortunately, technology professional development is not always effective. In a study of 600 kindergarten through 12th grade teachers, 93% of those surveyed reported that technology had positive effects on student engagement; however, 46% of these teachers stated that they lacked the skills to use technology effectively in the classroom (DeNisco, 2014). In a broader examination, Howley et al. (2011) found that teachers felt as though they had been inadequately prepared to provide technology opportunities for students. As such, a need exists for school administration to implement both additional and more effective technology professional development (DeNisco, 2014).

***Understanding how to integrate effective professional development***. A lack of empirical research supporting professional development as a tool to increase effective technology use in public, private and higher education classroom instruction exists (DeNisco, 2014; Gray et al., 2010; Schnellert & Keengwe, 2012; Skoretz, 2011), and additional studies of technology professional development models are needed. Researchers have suggested that certain elements need to be present in technology professional development. These elements include connecting technology to instruction, embedding it into day-to-day practices, and providing ongoing or long-term support as well as curriculum and technology coaching or mentoring (Duran et al., 2012; Gayton & McEwan, 2010; Koh & Neuman, 2009; Lutrick & Szabo, 2012; Neuman & Cunningham, 2009; O'Koye, 2010).

**Impediments to Effective Technology Integration**

Technology has become a significant part of our everyday lives. Daily tasks have been performed by technological machines far more advanced than they used to be. In the academic

field, technology has been incorporated into lectures and demonstrations; however, despite the wide use of access to technology in the classroom, some educators still face some struggles that lead them to discontinue use of technology or opt to not use it at all (Dede et al., 2009; DeNisco, 2014; Howley et al., 2011). The following sections will discuss issues that teachers face with professional development, as well as technology acceptance and integration in the classroom. Among them is teacher belief, which acts both on its own and in concert with a lack of institutional support to reduce perceived usefulness and ease of use; intent to use; and actual use of technology (de Grove, Bourgonjon, & van Looy, 2012; Kusano et al., 2013).

**Lack of training and technical skills.** In some institutions, funding and facilities seem to be sufficient, while technology use in the classroom suffers. Asodike and Jaja (2012) investigated this phenomenon in both public and private primary schools in Rivers State, Nigeria, and surveyed a sample of 2,100 head teachers, teachers, and students. The questionnaire used was the Primary School Information and Communities Technology (ICT) Use Survey, which measures facilities that schools have and how often they are used. The instrument also measures the factors that hinder the use of ICT facilities, as well as the teachers' perceptions of their use.

The results of this investigation indicated that most of the primary schools had at least one desktop computer per classroom; however, the majority of teachers felt that they did not have adequate skills in computer operations, as most of them had not undergone training. Because this study was conducted in Nigeria and amongst a teacher population that lacked access to technology professional development, its applicability to teachers in the United States may be limited. However, regardless of the sophistication of the technology in use or the skill level of

the teachers using it, a lack of professional development may impede integration (Asodike & Jaja, 2012).

**Lack of motivation for initial or continued technology use.** One promising new technology involves the use of virtual worlds. While research supports teacher interest in using this technology for teaching, increased interest does not result in corresponding increase in actual use (Gregory, Scutter, Jacka, McDonald, Farley, & Newman, 2015). To examine this discrepancy, Gregory et al. (2015) disseminated a self-constructed online survey to 134 institutions across 28 countries, and data analysis consisted of information collected from 223 respondents. A total of 36 percent of the respondents had not used virtual worlds for instruction, but 60% reported that they would like to try implementing this technology into their classroom. Of those respondents who were currently using virtual worlds, 84% had used them in the past, and 90% reported that they wanted to continue using the technology. Interestingly, 18% of the respondents had used virtual worlds for teaching in the past, but had stopped using it for some reason. Analysis of the responses on the questionnaire indicated that teachers had either never used the technology or had stopped using virtual worlds due to technological issues, student difficulties, institutional issues, and personal perceptions.

Investigating more general technology use, Aypay, Celik, Aypay, and Sever (2012) studied pre-service teachers in Turkey to examine their intended use of technology in classroom instruction in the future. The aim of the research was to utilize the framework of TAM to provide information regarding new teachers' perceptions of technology use in the classroom. Convenience sampling led to the inclusion of 487 participants, all from Rize University in Northeast Turkey. Structural equation modeling of results suggested that the pre-service teachers' intention to use technology was influenced by perceived usefulness, attitudes toward

computer use, and computer self-efficacy (all of which are aspects of TAM). Other studies (Teo, Ursavas, & Bahçekapili, 2012) have yielded similar results, indicating that acceptance of technology use tends to be influenced by perceived ease of use, which varies depending on the complexity of the technology in question.

Some research has suggested that teachers' lack of motivation towards technology use may persist in spite of professional development. Chien, Kao, Yeh, & Lin, (2012) conducted a study consisting of 322 Taiwanese primary school teachers who had experienced Web-based professional development. The study focused on attitudes and motivation towards technology use in the classroom. Despite the professional development, 160 participants reported fewer than 12 hours per week of Internet use. By contrast, 73 reported 13 to 24 hours of use per week, and 89 reported more than 25 hours per week. The researchers administered the 30-item Motivation toward Web-Based Professional Development Survey to measure personal interest, social stimulation, external expectation, practical enhancement, and social contact. The researchers also administered the 27-item Attitude toward Web-Based Professional Development Survey with the subscales addressing perceived usefulness, perceived ease of use, affection, anxiety, and behavior. Analysis of the data revealed that different motivating factors had different influences on attitudes toward technology use. Teachers whose primary motivation for technology use was personal interest tended to have more positive attitudes towards use, while technology use due to external expectations corresponded with negative attitudes (Chien et al., 2012).

Blackwell, Lauricella, Wartella, Robb, and Schomburg (2013) reached similar conclusions when they strove to find out what impeded the use of technology among early childhood education teachers, despite availability of the devices. The study followed the framework of TAM to address the problem. An online survey was disseminated to 1,329 early

childhood teachers who taught children under the age of four. The questionnaire was researcher-constructed and contained 46 items. Two levels of independent measures: extrinsic characteristics (school type, school-level socioeconomic status, technology policy, and professional development) and personal characteristics of teachers (demographic characteristics, and attitudes toward and perceptions of technology use) were examined.

Results revealed that the devices most available for teachers were digital cameras, laptop or desktop computers, and TV/DVDs. The least accessible devices were mp3 players, e-readers, and tablet computers. In terms of school type, center-based programs were the least likely to have access to technology in general. Teachers who believed that technology was helpful for administrative tasks alone tended to use the devices less often than did teachers who felt more strongly about the benefits of technology integration for pedagogy and student achievement (Blackwell et al., 2013).

**Poor attitudes and beliefs toward technology use.** It may be that a lack of motivation for initial or continued technology use results from poor attitude, which may also impede technology integration in the classroom. Al Bataineh (2014) studied the relationship of teacher attitudes and perceptions of competency towards the use of technology in classroom instruction. Convenience sampling led to a study consisting of 221 Jordanian, seventh through 12-grade social studies teachers who were asked to complete an Arabic version of the Technology in Education Survey. This version contained 22 items with three subscales: demographic information, attitudes towards using technology, and competency for using technology. Results suggested that in addition to teaching experience positively correlating with perceptions of competency, these perceptions also correlated strongly with attitudes. As such, the findings

suggested developing teachers' acceptance and attitudes help to promote their feelings of competency in using technology (Al Bataineh, 2014).

Qualitative research on beliefs towards technology usage has yielded similar results. Chien, Wu and Hsu (2014) conducted such a study of teachers' beliefs through semi-structured interviews. The researchers contended that belief is a highly personal and context-based construct that is revealed more appropriately through language. Forty junior or senior high school science teachers, with teaching experience ranging between three and 15 years and an average age of 43 years, were selected through convenience sampling. The data was coded through an iterative process, and divided into the teachers' beliefs about technology-based assessments (TBAs, behavioral, control, and normative) and the frequency of use (non-user, occasional user, and frequent user).

For the behavioral beliefs, four themes emerged: TBAs presented many uses for the teachers; Web-based TBAs appeared to be the most useful; most teachers faced difficulties in using TBAs in spite of perceptions of usefulness; and experiences and personal preferences affected TBA use. For control beliefs, two themes emerged: The teachers felt that they lacked time and financial support in TBA use, and participants perceived support as being ineffective, (i.e., facilitating rather than mentoring). For normative beliefs, there were also two themes: The teachers felt that TBA use would not be supported by the school administration or the parents, and the teachers were unsure of the advantages and disadvantages of TBAs in student learning (Chien et al., 2014). These results suggested that even though TBAs were largely seen as being useful, a combination of perceived lack of support and poor attitudes compromised the ability of perceived usefulness to influence intent to use and actual use of technology.

## Responses to Effective Technology Integration Impediments

Institutions are typically aware of the issues that their educators face with regard to technology integration in the classroom, and in general, have taken action to address those issues (Kipsoi, Chang'ach, & Sang, 2012). Some institutions have employed coaches or mentors to aid their teachers (Li, 2015); some have conducted workshops to enhance their teachers' technical skills; and others have trained their students as technology troubleshooters that the teachers can call for assistance (Pamuk et al., 2013). While these interventions may be effective, impediments such as poor attitudes or a lack of motivation or support still exist. Researchers have examined ways to overcome these obstacles, and studies have found that coaching and mentoring, training, increased access, and student support all work by various means to increase teacher use of technology.

**Coaching and mentoring.** *Coach* and *mentor* are terms that are used in many professions; therefore, multiple definitions for these terms exist (Bennett, 2010). Megginson and Clutterbuck (2005) discuss coaching as guidance targeted at improvement in a targeted skill, while Bennett (2010) suggested that coaching is often short term and organized by objectives. Mentoring, on the other hand, is a long-term process where someone with experience guides someone with limited experience (Bennett, 2010; Dilts, 2004; Hobson, 2003). While both utilize objectives, mentoring involves guiding a person through specific concepts, while coaching helps people to ultimately create their own objectives and develop resources to accomplish them (Bennett, 2010). Despite these differences, Pask and Joy (2007) argued that they should not be viewed as two different exclusive concepts, but as a unified entity.

Researchers have demonstrated that a mentor or coach is effective in supporting changes to teacher practices in classroom instruction (Bennett, 2010; Cain, 2009; Hayden et al., 2011;

Machado & Chung, 2015; O'Koye, 2010; Resta, Huling, & Yeargain, 2013). Additionally, a mentor or coach's presence in the classroom affects whether a teacher integrates technology into instruction (Duran et al., 2012). Indeed, this guidance is so influential that researchers have also provided evidence that it is more effective than traditional, in-service technology professional development (Bennett, 2010; Cain, 2009; Hayden et al., 2011; Machado & Chung, 2015; O'Koye, 2010; Resta et al., 2013).

O'Koye (2010) conducted research consisting of 14 teacher participants and concluded that teachers who worked with technology coaches demonstrated a significant increase in feelings of efficacy towards technology use in classroom instruction. O'Koye quantified technology coaching as the "number of hours that a teacher has spent with an instructional technology resource teacher in a face-to-face session" (p. 16). Data was collected through participant interviews and a three-part survey measuring the participants' levels of technology integration, computer efficacy, and time spent with the technology coach. The participants credited changes in technology implementation in the classroom to support provided from the technology coach.

In a similar study, Blackmon (2013) suggested that school district technology professional development based on the single-day model is least likely to result in technology integration in classroom instruction. A total of 230 middle school teachers were given a survey called Training Methods for Learning Instructional Technology, which collected data on teachers' demographics and their perceptions of professional development for learning classroom instructional technology. The instrument consisted of 12 questions referencing nine professional development methods, and teachers were asked to rate each method on a five-point scale. Of all nine methods, the one perceived to be most effective was peer support or mentoring.

Additional research suggested that these perceptions correlate with reality, and importantly, that the benefits of coaching or mentoring are ultimately felt by students. Hayden et al. (2011) conducted a similar study using a structured professional development program called the Investigation for Quality Understanding and Engagement for Students and Teachers (iQUEST). This program, which included a mentor, was provided to educators for the purpose of strengthening their abilities and comfort with technology integration in classroom instruction to enhance science lessons for students. The resulting report stated that student performance was positively affected by teachers' professional development, resulting in significant gains throughout the school year (Hayden et al., 2011).

Despite the apparent benefits, many schools have not implemented the mentoring or coaching technology professional development model. Criticism of the mentoring or coaching professional development model centers on the requirement of significant school resources, as well as on the fact that it provides unrealistic compensation for the mentor or coach (Chuang, Thompson, & Schmidt, 2003; Machado & Chung, 2015). However, as discussed earlier, a possible solution to reduce the depletion of school resources resulting from mentoring or coaching is to include students in technology professional development. Because students demonstrate a strong use and knowledge of technology, they can support teacher technology use during instruction (Bajt, 2011; Gu et al., 2013), and some organizations such as GenYes promote student-led technology support in schools, especially those without expert technology integration personnel (McLeod & Richardson, 2013).

**Training and workshops.** Perhaps because of the criticisms associated with mentoring or coaching models, many districts continue to incorporate the training or workshop model. In the training or workshop model, technology is discussed and modeled, and/or participants are

shown how to use a specific device, program, or software. The specific structure of the training may vary, but single-day technology professional development in order to meet the needs of teachers is common (Borthwick & Pierson, 2008; Dede et al., 2009; Potter & Rockinson-Szapkiw, 2012). However, research has not supported this model as an effective way to implement professional development because studies have indicated that very little change in regards to the use of technology in classroom instruction results from it (Blackmon, 2013; Lutrick & Szabo, 2012; Kesson & Henderson, 2010). In Blackmon's study, the sampled teachers deemed several professional development methods ineffective. Among them were non-credit workshops provided by the school district or an outside consultant, drop-in clinics or open labs, independent, online help, and summer institutes consisting of weeklong training during the summer (Blackmon, 2013). Despite varying widely in form, each involved a one-time training without any in-classroom support to aid teachers in applying learning to the instruction of students.

Total consensus eludes the literature regarding the ineffectiveness of one-time professional development trainings. Lau and Yuen (2013) emphasized the importance of training to promote technology use in the classroom through the findings of their study with a sample of 90 secondary school teachers in Hong Kong who volunteered to join a technology professional development workshop. The participants attended five three-hour workshops emphasizing content, focus, active learning, coherence, duration, and collective participation. At the end of each one, participants were asked to complete an evaluation of the session and their attitudes toward technology use. At the end of the first session, demographic data was also collected, and at the end of the fifth session, an additional questionnaire about the actual use of technology was administered. Results indicated that the participants generally increased their

perceived efficacy in using technology to teach, as well as their belief in using technology to aid in teaching.

Overall, introducing technology in classroom instruction was said to aid students' education in general; however, it is important to note that two key limitations to this study exist. First, participants were selected from a group of teachers who had elected to take part in an extended workshop; therefore, it is possible that their perceptions of technology were already very positive, and their attitudes may have influenced responses to the survey questions. Second, the participants were asked to forecast their future use of technology, and their predictions, perhaps because of the positive attitudes they brought with them to the training, may have been influenced by their apparent optimism. More research is needed to determine to what extent these perceptions correspond with reality.

**Increased access to technology.** Some research has suggested that increasing teacher integration of technology may be achieved simply by giving them more access to it. In a cross-cultural study, researchers compared American and Japanese elementary school teachers' perceptions on technology use in classroom instruction (Kusano et al., 2013). A group of 99 teachers from Utah and 67 teachers from Hokkaido, Japan, were recruited. The age of the American teachers ranged from 22 to 57 years, with generally 6 to 10 years of teaching experience, while the majority of the Japanese teachers were 22 to 30 years old and had fewer than five years of teaching experience. The Teachers' Technology Attitudes survey by Holden and Rada (2011)—with subscales on perceived ease of use and usability, perceived usefulness, and attitudes toward using technology derived from TAM—was the instrument used in the study. Demographic data, availability of technology, and frequency of technology use were also taken into account. Results revealed that the American teachers were significantly more positive in all

areas and had more access—and thus more frequent use of technology—than their Japanese counterparts. As such, it appeared that access to technology prompted its use.

## Summary

Despite the increase in technology professional development provided to teachers, teachers are still struggling with integrating the ever-changing technology of the 21st century into classroom instruction. Teachers have reported that they are not comfortable with incorporating technology due to a lack of skills and training, resulting in a need for more effective technology professional development. Teachers have also reported that traditional professional development consisting of single-day instruction was not effective. Technology professional development is a key component in increasing teacher technology acceptance and integration in classroom instruction, but professional development has rarely resulted in these outcomes.

This descriptive case study was needed to determine if an elementary student-supported professional development model resulted in teacher technology acceptance and integration in classroom instruction. This chapter included a discussion of the TAM as the theoretical framework for this study, as well as empirical research related to technology professional development, professional development, students and technology and a discussion focused on Generation Y and Generation Z students.

# CHAPTER THREE: METHODS

## Overview

The purpose of this descriptive case study was to study teachers' technology acceptance and classroom integration in the context of a student-supported professional development model. Miller (2002) concluded that teachers see a need for students to participate in technology professional development activities. Five elementary teachers located in the southern part of the United States who participated in a student-supported professional development model during the 2013-14 and/or 2014-15 school years as part of a district technology integration rollout plan served as participants in this study. In addition, two administrators who observed student-supported technology professional development at least three times during the 2013-14 and/or 2014-15 school year were participants in this study. A survey, open-ended face-to-face interview questions, and archival data consisting of classroom observations conducted yearly between 2013 and 2015 as part of program evaluation were used to collect data. The research design, research questions, setting, participants, data collection methods, and data analysis are explained in this chapter.

## Design

A descriptive case study was selected as the research method because it is open ended and allows for an in-depth understanding of what is being studied (Creswell, 2013; Merriam, 2002). The result of qualitative research is an understanding of a complex issue and can extend experiences or add strength to what is already known (Shen, 2009). The focus of this study was to promote an understanding of the complicated intersections between teachers' technology acceptance and classroom integration in context to a student-supported professional development model.

This study method was selected due to the fact that it allows for the research to focus on multiple perspectives (Creswell, 2013). A case study is used when an investigation and a holistic view are needed, and it requires the researcher to see and then measure the data collected (Feagin et al., 1991; Stake, 1995). During this case study, I took on a more personal and connected role, thus providing an in-depth understanding of participant perspectives (Stake, 1995).

Creswell (2013) stated that descriptive case studies uncover themes and provide rich descriptions of the topic being studied. The goal of a descriptive case study is to document all of the particulars, thus providing specific details and often answering numerous questions, specifically "how" (Merriam 2009; Miles & Huberman, 1994; Stake, 1995; Yin, 2013). The skills of asking good questions, actively listening, adapting, displaying knowledge of topic studying, and maintaining objectivity during data collection are necessary for me, as a descriptive case study researcher, to implement (Yin, 2013).

This descriptive case study developed an understanding of an intervention: student-supported professional development model as it pertains to a real-life context, teachers' technology acceptance and classroom integration (Creswell, 2013; Merriam, 2009; Miles & Huberman, 1994; Stake, 1995; Yin, 2013). Research on this topic at an elementary school level did not exist when I conducted the review of the literature; therefore, the use of a descriptive case study provided a deeper understanding of experiences leading to patterns and themes in data (Creswell, 2013; Merriam, 2009; Yin, 2013). A case study consists of evidence conducted from six possible primary resources: documentation, archival records, interviews, direct observations, participant observations, and physical artifacts (Yin, 2013). The case study being conducted dictates which methods will be used to develop an understanding of the phenomenon being studied. Not all of the six primary resources of evidence need to be utilized in every case study.

However, it is important to ensure that there are multiple sources in order to guarantee that the reliability of the data is established. This is a process known as triangulation (Stake, 1995; Yin, 2013).

Triangulation was ensured through teacher face-to-face interviews (Appendix A), administrator face-to-face open-ended interviews (Appendix B), a survey (Appendix C), and archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school year as part of program evaluation. Three of the most common types of data collection used in technology and industrial education studies are observations, interviews, and document analysis, which correspond to the data collection methods that were employed in this descriptive case study (Evanciew & Rojewski, 1999; Foster & Wright, 2001).

Yin (2013) stated that qualitative data analysis includes an in-depth evaluation of research, which leads to data reduction and tabulation. This descriptive case study followed the process of data being coded, resulting in categories that led to themes (Saldaña, 2013). The specific process for this descriptive case study involved Yin's (2011) five-phased cycle. The following occurred throughout the compiling, disassembling, reassembling, interpreting, and concluding phases: (a) organize data, including transcribing and saving it, (b) upload into NVivo™ software, (c) open coding consisting of items, sentences, words and long passages were grouped and sequenced, (d) categories resulted in nodes, then (e) themes (Yin, 2013). Due to the projection of vast amounts of narrative text, NVivo™ data analysis software was used to organize codes and categories. Open-ended interview data and archival data consisting of observations collected yearly during the 2013-14 and 2014-15 school year as part of program evaluation was entered into the software.

## Research Questions

Three research questions for this descriptive case study are as follows:

**RQ 1:** How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction?

**RQ 2:** How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction?

**RQ 3:** What evidence suggests that student-supported professional development for technology is responsible for teachers' technology integration into classroom instruction?

## Setting

This study was conducted at an elementary school located in the southern part of the United States. Research supports that teaching styles vary within a single school district is greater than across school districts (Sawchuk, 2008). Only one elementary school is present in the district where this study occurred. The district hired me as the instructional technology director for the district in August of 2013. My job was to focus on facilitating instruction and supporting the tools teachers need to implement technology into classroom instruction and curricula. Since my responsibilities also included creating and implementing a district-wide technology integration rollout plan, I conducted all professional development sessions and collected archival data consisting of classroom observations conducted yearly during the 2013-14 and 2014-15 school year as part of program evaluation. In order to control for researcher bias that can occur in qualitative data collection such as with observations, I used a specific template modeled after Creswell (2008) that allowed me to focus primarily on what I saw, recording what I heard verbatim, and what was occurring in terms of classroom technology integration. Notes

were immediately recorded in a reflective journal (Appendix J) as a tool to ensure that all recorded material was free of my personal bias.

The district that this elementary school belongs to implemented a one-to-one laptop initiative in the 2013-14 academic year, resulting in all students in grades three through 12 having access to a laptop by the beginning of the 2014-15 school year. In addition, the school's kindergarten through fifth-grade classrooms had access to three iPad™ carts containing 25 devices each and two computer labs with 25 devices available to be checked out by teachers for classroom use. Each teacher had an iPad™ and either a laptop or desktop computer. Weekly computer classes consisting of typing, login instruction, Google™ applications, other basic skills, and iPad™ fundamentals were also provided to all students. This site was deemed appropriate for the study because it benefitted from a district-wide technology integration initiative, and was in the process of incorporating technology into classroom instruction and curricula, as well as included students in technology professional development during the 2013-14 and 2014-15 school year. In conclusion, this particular school was an ideal location to examine the utility of this type of professional development, as well as to support an area that the leadership in the district was focusing on improving.

The subject school had an enrollment of 458 students, the demographics of which were 95% Caucasian, 2% Hispanic, 1.5% African-American, 1.3% Native American, and 0.2% Asian. Of those students, 46% qualified for free and reduced-cost lunch. The school averaged a 96% daily attendance rate. The student to teacher classroom ratio was 17:1. The average number of years of teaching experience was 14.7, and 60.7% of the teachers had a master's degree or higher. The average teaching salary in the district was $42,665.

## Participants

Participants for this study were selected using purposeful sampling (Creswell, 2013), which involved selection based on a specific set of criterion (Glesne & Peshkin, 1992). Purposive sampling remains a technique commonly used for qualitative studies that focus on the inclusion criteria for its sample (Barratt, Ferris, & Lenton, 2014). Purposive sampling was used for this study, as I included only teachers who received student-supported technology professional development in either the 2013-14 and/or 2014-15 academic school years with student support provided by me for at least nine, 45-minute sessions or administrators who observed student-supported technology professional development at least three times in the 2013-14 and/or 2014-15 school years. In the sample, there were variations between teacher technology experience, number of years teaching, previous professional experience, and college degree.

Demographics data demonstrated that all of the teacher participants were female. One administrator was male, and the other was female. Six of the participants identified themselves as Caucasian, while one identified herself as Hispanic. The range in numbers of years teaching spanned from eight to 25, resulting in an average of 14.4 years. Two teachers had their bachelor's degree in education, but both were currently working on their master's degree in education. The other three teachers had their master's degree in an educational field. Both of the administrator candidates had their master's degree, while the male participant worked on achieving an additional master's degree. The administrators had an average of 17 years, experience ranging from classroom teaching to administration positions. Each participant was provided with a pseudonym to protect confidentiality.

Studies such as this one that use more than one data collection method require a smaller number of participants (Lee, Woo, & Mackenzie, 2002); while Yin (2013) stated that there should be more than five. This descriptive case study followed Yin's (2013) guidelines in reference to the minimum number of participants needed to gain a clear understanding of teachers' technology acceptance and classroom integration in context to a student-supported professional development model. Additionally, Patton (2002) discussed the importance of ensuring selection of participants was derived from their ability to provide information that is detailed. Therefore, five participants who participated in student-supported technology professional development during the 2013-14 and/or 2014-15 school years and two participants who observed student-supported technology professional development during the 2013-14 and/or 2014-15 school years were utilized in this case study.

As Yin (2013) discussed the minimum number of a sample size, researchers such as Lincoln and Guba (1985) stated that sample size is derived from collected information until saturation occurs. Creswell (2013) explained that data saturation occurs when no new themes emerge. Nineteen participants were contacted for participation in this descriptive case study, as they met the criterion. Only seven participants agreed to be part of this study. Seeking participation from additional participants was not necessary, as data saturation occurred after data was collected from five. Data was collected from the two other participants, but no new data was presented; thus, saturation was achieved. Teachers' technology acceptance and integration was examined through rich, in-depth details provided by participants (Patton, 2002).

## Procedures

Liberty University's Institutional Review Board (IRB) approval (Appendix D) was obtained prior to data collection and analysis. Data collection began with me e-mailing a letter

inviting teachers and administrators who meet the sampling criteria to join the study (Appendix E), along with the Informed Consent (Appendix F). The e-mail explained that participation in the study was optional and that the consent for participation form needed to be completed and returned via e-mail or in person within two weeks.

When the Informed Consent forms (Appendix F) were obtained, I e-mailed the survey (Appendix C) to teachers because a nonthreatening and comfortable environment occurs when data are collected through the Internet (Nicholas et al., 2010). After teachers returned the completed survey, an e-mail was sent to coordinate the face-to-face, open-ended interviews (Appendix A), which occurred in each participant's respective classrooms and without students present. After administrators returned their Informed Consent (Appendix F), an e-mail was sent to establish a mutual time in which the participant and myself could conduct the open-ended, face-to-face interview (Appendix B) in their office.

A panel of experts in the field of education consisting of the Assistant Superintendent, Director of Curriculum and Instruction, Executive Director of Elementary Education, and Technology Director reviewed the teacher interview questions (Appendix B). Feedback encompassed ensuring that participants were provided with the definition of student-supported professional development prior to answering questions. Additional feedback referenced the need to clarify whether the word "enjoy" in question four means "comfortable" or "happy" in reference to technology usage. As a result, the word "enjoy" was changed to address comfort level. Upon completion of interview transcriptions, each participant was provided with the chance to member-check their interviews, review findings, and provide feedback.

After administrator's Informed Consents (Appendix F) were obtained, I arranged the face-to-face open-ended interviews (Appendix B). A panel of experts in the field of education

consisting of a college Education Professor, Director of Curriculum and Instruction, Principal, and Teacher reviewed the interview questions. Feedback encompassed eliminating question eight because it was very similar to question seven in reference to no new information will be gathered. As a result, question seven was reworded and question eight was eliminated. Upon completion of interview transcriptions, each administrator was provided with the chance to member-check their interviews. In addition, each participant was also encouraged to review findings and provide feedback.

Professional development was organized and structured, and each session lasted 45 minutes (Appendix G). Topic selection was based on the district's technology vision and goals. Teachers and their respective students were provided with instruction on how to integrate technology in the classroom and curriculum. Additionally, they were given hands-on instruction on a specific technology task (Appendix G).

## The Researcher's Role

I played an active role throughout this qualitative research study because as the researcher, I was the primary instrument (Saldaña, 2013). Moreover, at the time of student-supported professional development integration, I was an employee in the school district where this qualitative research study occurred. Specifically, I was the district instructional technology director for the 2013-14 and 2014-15 academic school years; therefore, worked closely with instructional technology in the school where the study took place. However, I was not an administrator in the district nor had any direct influence on participant job performance, salary, retention, or hiring. My job was to focus on facilitating technology integration into classroom instruction and curriculum.

## Data Collection

Data was collected from three sources for validation through triangulation (Gall, Gall, & Borg, 2007; Yin, 2013). These sources included teacher face-to-face interviews (Appendix A), administrator face-to-face interviews (Appendix B), a survey (Appendix C), and archival data consisting of observations that were conducted yearly during the 2013-14 and 2014-15 school years as part of program evaluation. Collection encompassed three principles: (a) multiple sources of data were used; (b) a case study database was created; and (c) a chain of evidence was maintained (Yin, 2013).

### Survey

The majority of studies conducted in the field of education accessing the TAM have been conducted at a college level and utilize a quantitative methodology (Wolk, 2009; Wu, 2009). These studies have focused on the use of the Internet, online shopping, usability of technology, and course websites (Agarwal & Karahanna, 2000; Fusilier & Durlabhji, 2005; Gefen et al., 2003; Jiang et al., 2000; Klopping & McKinney, 2004; Lederer, Maupin, Sena, & Zhuang, 2000; Selim, 2003; Wolk, 2009).

The survey used in this descriptive case study was developed to study teachers' technology acceptance and classroom integration in context of a student-supported professional development model and was based on research by Davis et al. (1989). Permission to modify Davis' (1989) survey was obtained (Appendix H). Multiple educational studies have modified the survey based on the topic as a tool to ensure validity (Alharbi & Drew, 2014; Shroff, Deneed, & Ng, 2011; Smarkola, 2008; Timothy, 2009). Smarkola (2008) discussed that the TAM data collection instruments are often modified to address the type of technology being targeted.

The survey (Appendix C) consists of 23 questions using a 5-point Likert-scale, where 5 represents strongly agree and 1 represents strongly disagree. I administered the survey (Appendix C) online. Stoltzfus (2005) indicated than an online survey/questionnaire is both a valid and a reliable survey instrument. A sample survey (Appendix C) question was: *Using the Internet in my classroom can increase my productivity*. Other questions focus on user acceptance such as: *I expect my use of the Internet in my classroom instruction to continue in the future.*

This descriptive case study furthered research in the field of education because it was unknown if teachers' technology acceptance and integration in context to a student-supported professional development model would be beneficial. The validity of the survey's assessing TAM has been tested in numerous research studies focusing on the ability to predict a person's acceptance of technology (Ma & Liu, 2005; Mahmood et al., 2001; Moon & Kim, 2001; Roca & Gagné, 2008; Tai & Ting, 2011; Wang et al., 2010). More than a decade of research supports the TAM surveys as being robust and powerful tools in determining user acceptance of technology based on perceived ease of use, perceived usefulness and intent to use, which lead to actual use (Agarwal & Karahanna, 2000; Gefen et al., 2003; Jiang et al., 2000; Klopping & McKinney, 2004; Selim, 2003; Venkatesh & Morris, 2000; Wolk, 2009).

The TAM is primarily used for conducting quantitative research (Wu, 2009). The lack of qualitative TAM studies focusing on technology professional development and the TAM construct actual use were the basis for this descriptive case study. Since the majority of research in the literature utilizing the TAM does not measure actual use, an interview for teachers (Appendix A) and administrators (Appendix B) was used to gauge genuine use (Chang et al.,

2012; Roca & Gagné, 2008; Wang et al., 2010). The survey was administered after IRB approval and before face-to-face open-ended interviews occurred.

**Face-to-Face Interviews**

Open-ended, face-to-face interviews conducted with teachers (Appendix A) and administrators (Appendix B) provided a good way to increase informational sources and data gathering (Yin, 2013). I had some prepared, structured interview questions that were reviewed by a panel of experts in the field of education, but allowed participants' the opportunity to freely provide personal experiences (Farber, 2006; Yin, 2013). I made audio recordings of all interviews using both a laptop computer and a backup iPad™ app, RecorderApp™, in case technical difficulties occurred. After interviews were completed, I transcribed them for coding purposes. Interviews were transcribed word for word, which involved a tedious systematic review process. Transcriptions included identifying and recording nonverbal communication including facial expressions that I noted during each interview (Yin, 2011). Due to breach of confidentiality expressed in two interviews, identifiable information, such as student names and location of the site, were removed from the written and audio transcripts (Yin, 2011).

Member checking, which ensures that all responses are a direct reflection of each participant and not the researcher, occurred throughout data collection and analysis (Creswell, 2013; Yin, 2013). Member checks occurred twice in this study. This included after interviews were transcribed and then again to review the findings. Yin (2002) discusses the importance of having a case study database and chain of evidence resulting in a detailed analysis, which leads to validation of "case study conclusions" (Yin, 2009, p.83). Data sources were uploaded into NVivo™, which is software used for data compiling. In addition, I identified codes and used

them to categorize data for theme identification. Four themes were used to answer all research questions.

All teacher interviews were conducted in the participants' classrooms without students present. The two administrator interviews occurred in each of the participants' office. The length of each interview depended on the participants' responses, but lasted about 20 minutes. By asking participants to explain answers, provide examples, and describe personal experiences, I was able to obtain in-depth information throughout the interview (Rubin & Rubin, 2005). A written interview script was read to each teacher (Appendix A) and administrator (Appendix B) during the interview and prior to the questioning (Emory, 1985).

The questions selected for teacher (Appendix A) and administrator interviews (Appendix B) were based on the research examined in the literature review and the TAM (Ajzen & Fishbein, 2000; Davis, 1989; Kiraz & Qzdemir, 2006; Teo, 2009). Interview questions were designed to focus on the participants' experiences, beliefs, and feelings about a student-supported professional development model as it related to the components of the TAM in order to study teachers' technology acceptance and classroom integration (Welman & Kruger, 1999). The questions are provided below and were piloted by teachers after IRB approval and prior to interviews.

Face-to-Face, Open-Ended Interview Questions for Teacher Participants

1. Please describe your teaching experience, beginning with the number of years you have taught.
2. Please describe your educational background, technology training and implementation prior to participation in student-supported professional development.

3. What impact has student-supported professional development had on your ability to use technology in your classroom?
4. Please describe your comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development.
5. How often do you use technology during classroom instruction to do a task when there is a feature to help you perform it?
6. To what extent has student-supported professional development impacted your future use of technology classroom instruction?
7. To what extent has student-supported professional development impacted time management while using technology in your classroom instruction?
8. To what extent has participating in student-supported professional development provided you with a great deal of experience using technology during classroom instruction?

Throughout the interview, teacher participants were encouraged to elaborate on their answers and move on to the next question. Question 1 obtained background knowledge of each participant. Question 2 gained an understanding of teacher educational background to include technology training and integration prior to participation in the study (DeNisco, 2014). Teachers' perceptions of technology usage being effortless was studied through Questions 3, 5, and 8 (Davis, 1989; Knight, 2012; Timothy, 2009). The perceptions that teachers have towards the benefits of using technology at work were addressed in Questions 3, 5, 7, and 8 (Davis et al., 1989; Knight, 2012; Timothy, 2009). Teachers intent of use with regard to technology applied to Question 3 (Davis, 1989). Teachers' technology actual use was associated with Questions 3, 4,

6, and 8 (Davis, 1989; Davis et al., 1989; Fishbein & Ajzen, 1980; Hu et al., 2003; Knight, 2012; Wallace & Sheetz, 2014).

Administrators were asked the following face-to-face open-ended interview questions as a means to gauge their perceptions.

Face-to-Face, Open-Ended Interview Questions for Administrator Participants

1. Please describe your professional and educational background.
2. Please describe technology usage throughout the elementary school prior to student-supported technology professional development that started in the 2013-14 academic school year.
3. Please describe your perceptions of teacher comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development that began in the 2013-14 academic school year.
4. Please describe your perceptions of student comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development that began in the 2013-14 academic school year.
5. Please describe how often and at what level you observe technology usage during classroom instruction in a classroom where student-supported technology professional development occurred?
6. Please describe how often and at what level you observe technology usage during classroom instruction in a classroom where student-supported technology professional development was not conducted?
7. To what extent has student-supported professional development impacted teacher technology acceptance and integration into classroom instruction?

During the interview, administrator participants provided detailed and in-depth answers. Obtaining background information of each participation was essential; therefore, Question 1 was asked. Question 2 addressed technology integration and usage prior to the teacher participants participating in student-supported technology professional development. Administrators' perceptions of teachers' and students' comfort level while using technology were studied through Questions 3 and 4 (Davis, 1989). Administrator' perceptions addressing the frequency and level of rigor pre-and post-student-supported technology professional development was addressed in Questions 5 and 6 (Davis et al., 1989). Observations made by administrator participants of teachers' technology acceptance and integration into classroom instruction post student-supported technology professional development was asked in Question 7 (Davis, 1989; Davis et al., 1989; Fishbein & Ajzen, 1980; Hu et al., 2003; Knight, 2012; Wallace & Sheetz, 2014).

**Archival Data: Observations**

The final data collection tool was archival data consisting of observations conducted yearly as part of program evaluation during the 2013-14 and 2014-15 school year. Observations are the process that involves gathering open-ended information firsthand through watching people and places in the site where research takes place (Creswell, 2008). The observer can use all five senses to note phenomena during observations, which the researcher records for scientific purposes (Angrosino, 2007). Good qualitative observers are able to change roles from one form of observation to another, which did not occur in this study (Creswell, 2013; Spradley, 1980).

Creswell (2013) identified four types of observations: (a) complete participant, (b) participant as observer, (c) nonparticipant/observer as participant, and (d) complete observer. The archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school year as part of program evaluation implemented the nonparticipant as observer method of

observation. Despite the fact that I conducted all professional development sessions during the 2013-14 and 2014-15 school year as part of a district technology integration rollout plan, observations occurred at a separate time where I was observing and not participating. My role as a nonparticipant observer was to gain subjective data without interacting with participants (Creswell, 2013). This allowed me to focus on what was occurring in the classroom.

Observations were unscheduled and occurred three times in 2013-14 and then again three more times during the 2014-15 school year. Observations occurred in October, January, and March each year while teachers were conducting instruction. Observations were recorded using a template (Appendix I) modeled after the example and process provided by Creswell (2008). The template (Appendix I) included recording aspects specifically focusing on technology integration, application and operation, teacher interactions and routines, what the students were doing, what was heard verbatim, and the physical setting. The results were uploaded on the district teacher-shared drive and included on the yearly technology report provided to the school board, which was written by me using specific individual codes for each teacher. Therefore, the documents contained no specific identifiable information.

## Data Analysis

Qualitative data analysis for case studies is a spiral or iterative process that involves examining, categorizing, tabulating and/or recombining evidence to address the original propositions of case study (Creswell, 2013; Yin, 2013), with the overall goal being to find the answer to the research questions (Merriam, 2009). The data analysis plan for this descriptive case study involved looking for themes and trends that were identified throughout the analysis. Data analysis followed Yin's (2011) five-phased cycle consisting of compiling, disassembling, reassembling, interpreting, and concluding. The five-phased cycle included the process of

gathering and coding data, which resulted in identifying categories that led to themes (Saldaña, 2013; Yin, 2013). Prior to beginning data analysis, I reread all data collected. I then organized data including the saving and transcribing of data by participant resulting in individual data bases, which was then uploaded into NVivo™ software. NVivo™ was used to compile, examine, and compare archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school year as part of program evaluation and interviews. In addition, NVivo™ software strengthened validity and reliability in this case study.

Open coding occurred where I analyzed and connected various items, sentences, words, and long passages. During open coding, I noticed that many of the Level 1 codes related; therefore, Level 2 codes emerged (Yin, 2013), such as experience and prior to student-supported technology. During the first cycle of coding, I identified and labeled codes. The second cycle of coding involved the sorting and categorizing of data where categories and themes were developed (Appendix K). This cycle is where I determined relationships among data. NVivo™ software noted the frequency for which a specific code occurred. Coding is the backbone of descriptive case study analysis because it encompasses the process of developing themes or dimensions and building detailed descriptions (Creswell, 2013). Coding allowed me to discover patterns and was used as a method to organize data (Auerbach & Silverstein, 2003). Each participant's data was analyzed individually for themes, and then all results were compared to identify reoccurring themes.

Saldaña (2013) stated that manual coding is rarely correct the first time completed; therefore, interview transcripts and archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school year as part of program evaluation were uploaded into the NVivo™ data analysis software. I discovered and used four themes that were identified to

provide a holistic picture of this descriptive case study. Saldaña (2013) noted that themes are an outcome of coding.

Back-up files for all data, including transcripts and other documents for review, are contained in a password-protected thumb drive and stored in a locked file cabinet. Transcripts were e-mailed to participants through Gmail using DodoShare™, which password protects electronic documents, so that member checks can occur. Pseudonyms, such as "Mary," were assigned to each participant. An understanding of teacher's perceptions pertaining to technology and usage behavior was examined using the survey (Appendix C) by reviewing perceived ease of use, perceived usefulness, and intent to use technology (Davis et al., 1989).

## Trustworthiness

Trustworthiness is one tool qualitative researchers use to ensure accuracy in qualitative research (Lincoln & Guba, 1985). Trustworthiness addresses the following; (a) credibility, (b) dependability, (c) transferability, and (d) confirmability (Lincoln & Guba, 1985). In studying teachers' acceptance of technology and classroom integration in context to a student-supported professional development model, I considered all influences, which are explained below in detail.

## Credibility

There are multiple ways to achieve credibility in research. Lincoln and Guba (1985) discussed credibility in terms of the researcher becoming acquainted with participants and the setting where research will occur. Since I was a new employee to the district when student-supported professional development was implemented, I established a relationship by e-mailing a letter of introduction to all teachers in the district. During the 2013-14 school year, teachers were allowed to determine whether they wanted to participate in student-supported professional

development or if they preferred to participate in the traditional, one-day model. Prior to integrating the student-supported professional development model with teachers who volunteered, I met with each teacher individually in order to build familiarity. For added credibility, I asked participants to review their interview transcripts and findings through member checking.

Three primary methods ensure trustworthiness in qualitative research: (a) triangulation, (b) member checking, and (c) auditing. Triangulation of data, member checking, and creating an audit trail were utilized in this descriptive case study. Another way to achieve credibility is through triangulation, which will be accomplished by using multiple sources to collect data (Lincoln & Guba, 1985; Yin, 2013). Triangulation occurred through the combination of the survey, interviews conducted with both teacher and administrator participants, and archival data consisting of classroom observations that were conducted yearly during the 2013-14 and 2014-15 school years as a part of program evaluation. Triangulation consists of data gathered from numerous sources used as a tool to determine if findings are consistent (Yin, 2013). Researchers support that analyzing multiple sources of data and converging them is a strong validation strategy implemented in qualitative research (Stake, 1995; Yin, 2013).

Member checks and peer debriefing were implemented for quality-assurance. Member checks were conducted through data collection to ensure accuracy as a means of confirming that written text and observations were a direct reflection of each participant (Yin, 2011). Additionally, member checks were used to gain feedback and insight from all participants. Peer reviews were received in a written form and supported the conclusions of this study.

## Dependability and Confirmability

Saldaña (2013) noted that when something is dependable, it will yield similar if not the same results when duplicated. Lincoln and Guba (1985) suggested creating an audit trail to ensure dependability. The audit trail that was used in this descriptive case study included notes that were recorded on the password-protected thumb drive and password-protected computer used for research. Notes included what I, as the researcher, saw, heard, observed, and did (Brinkmann, 2012). I also created an audit trail consisting of notes created while conducting all professional development sessions and archival data consisting of observations conducted yearly as part of program evaluation in both the 2013-14 and 2014-15 school years. Dependability was achieved during data analysis. Manual errors were eliminated by uploading the face-to-face interviews and archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school years as part of program evaluation into NVivo™ software.

Confirmability ensures that the results of this descriptive case study were supported by the participants and occurred independently of the researcher (Brinkmann, 2012). To achieve the accuracy stressed by Yin (2013) as being important, I remained focused on data collection methods and analysis. Furthermore, I conducted an audit trail (which Brinkmann [2012] advises doing as a means to address confirmability), outlining data collection and data analysis throughout this descriptive case study. Data was uploaded into the NVivo™ software as a means of ensuring that manual data analysis errors are not made and then disassembled and reassembled. A peer review of data occurred with the main goal being "given the evidence present, is there consensus in the interpretations?" (Ary, Jacobs, Sorensen, & Walker, 2012, p. 74).

Confirmability was also achieved through the use of an external auditor. An external auditor was used because I wanted someone not connected with the research to deduce the conclusions reached from data (Creswell, 2013). Additionally, an external auditor was free of bias or expectation, thus they should depict inaccurate conclusions.

## Transferability

Yin (2013) stated that the outcomes of one context should be transferable to other contexts or settings. I provided rich descriptions of participants, setting, sample size, data collection, and actual data (Lincoln & Guba, 1985). Data collection methods were transferable because they involved using a survey and face-to-face interview questions that are based on research conducted by Davis et al. (1989). Direct quotes that were collected through archival data consisting of observations conducted yearly during the 2013-14 and 2014-15 school years as part of program evaluation had an impact on this descriptive case study. In addition, direct quotes collected during the face-to-face interviews of both teacher and administrators also had a direct impact on this descriptive case study by providing an in-depth understanding of teacher technology acceptance and classroom integration.

## Ethical Considerations

The data collected for this case study is stored in a well-secured location: a locked file cabinet that was located off-site from where the research occurred and accessible only by me. All electronic files are password protected along with being saved on a password-protected thumb drive, which was secured in the locked file cabinet. It was also my responsibility to protect participants' identities in this study by providing each with a pseudonym, which was selected from the Social Security's top 100 names of all time. A list of participants and their pseudonyms was placed in the same locked file cabinet. Once pseudonyms replaced actual

names of participants and data was recorded, all materials with identifiable names was changed to reflect the pseudonyms. I am not a direct supervisor to any of the participants. Participation in the study was optional, and participants knew that their data may be permitted or denied at will and without consequence.

## Summary

This chapter consists of providing support for the methods used in this study. A descriptive case study was selected because I examined a real-life context answering the question of "how" (Stake, 1995; Yin, 2013). The purpose of this descriptive case study was to examine teachers' technology acceptance and classroom integration in context to a student-supported professional development model. The literature reviewed provided a foundation for this descriptive case study and was used as a tool to explain data collection and data analysis. The details of participants' selection, my role as the researcher, and a description of the setting were discussed in this chapter. Teacher perceptions of how technology professional development with elementary students' support did or did not increase teacher technology acceptance and integration in classroom instruction were examined. The results gained from this descriptive case study may help school districts determine if elementary students should be included in technology professional development.

# CHAPTER FOUR: FINDINGS

## Overview

The purpose of this descriptive case study was to examine teacher technology acceptance and integration into classroom instruction in context to student-supported technology professional development. The study centered on the importance of technology integration and how technology plays a role in the classroom. Miller (2002) concluded that teachers see a need for students to participate in technology professional development activities. Elementary teachers located in the southern part of the United States who participated in a student-supported professional development model during the 2013-14 and/or 2014-15 school years as part of a district technology roll-out program served as participants in this study. Themes presented in this chapter were derived from data collected from a survey, face-to-face open-ended interviews, and observations conducted in 2013-14 and 2014-15 as part of program evaluation. Further, this chapter encompasses the present findings and analysis of the following research questions:

**Research Question 1:** How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction?

**Research Question 2:** How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction?

**Research Question 3:** What evidence suggests that student-supported professional development for technology is responsible for the encouragement of teachers' technology integration into classroom instruction?

## Participants

Purposeful sampling with the following criterion was used for participation in this descriptive case study: (a) must be 18 years of age, (b) an elementary teacher who participated in student-supported technology professional development in either the 2013-14 and/or 2014-15 school years provided by me, or (c) an administrator who observed student-supported technology professional development at least three times during either the 2013-14 and/or the 2014-15 school years provided by me. Pseudonyms were used throughout this descriptive case study to protect the confidentiality of all participants.

Five teachers and two administrators returned their consent to participate in this study, which meets the criteria set forth for a case study sample (Englander, 2012; Yin, 2013). Additional attempts to encourage participation were made via e-mail, but proved futile. Originally, my goal was to obtain consent from 19 candidates; however, only seven agreed to participate. Although I was unable to obtain additional participants, this study includes a diverse group in terms of technology experience, usage, and classroom integration. Data saturation occurred after data was collected from five participants. Data was collected from the two other participants, but no new data was presented; therefore, I was able to obtain data saturation.

All teacher participants were Caucasian females. The average number of teaching years was 14.4, with three teachers having been in the classroom less than 10 years and two teachers more than 20 years. Three participants had their master's degrees, while two were currently enrolled in master's degree programs. One administrator was male, while the other was female. Table 1, below, provides specific details about all participants.

Table 1

*Teacher and Administrator Participants*

| Name | Race | Education | Years of Educational Experience | Role |
|---|---|---|---|---|
| Mary | Caucasian | MA | 25 | Teacher |
| Patricia | Caucasian | MA | 22 | Teacher |
| Margaret | Caucasian | MA | 8 | Teacher |
| Elizabeth | Caucasian | BA + | 8 | Teacher |
| Linda | Caucasian | BA + | 9 | Teacher |
| Barbara | Caucasian | Ed.S | 8 | Administrator |
| James | Caucasian | MA | 22 | Administrator |

**Mary**

Mary had been an elementary teacher in the southern part of the United States for 25 years, the first seven of which were spent in in special education and the remainder in first grade. She stated, "I always wanted to be a teacher." Mary discussed growing up in a home where education was highly valued; both her mother and father had obtained two-year college degrees. Mary herself had a master's degree and had been raised in the community in which she taught.

When first approached about integrating technology into classroom instruction, she stated, "I hardly know how to use a computer, but if you will help and it is in the best interests of my students, then I am willing to give it a try." Additionally, she stated, "Before we get started, I need to know how to turn the iPad™ on." When asked about her experience with technology in classroom instruction prior to student-supported technology professional development, Mary admitted, "I would say virtually zero. I honestly didn't use technology a whole lot before this. I did use the overhead projector, and that was about it." She also discussed previous failed

attempts at integrating technology into classroom instruction that took place prior to student-supported technology professional development stating, “We had times when we would have to go into the computer lab and do a lesson and teach ourselves, by ourselves. I pretty much let the students play games, that’s all I knew how to do.”

**Patricia**

Patricia had been an elementary teacher of 22 years in the southern part of the United States, 14 of which had been spent in a rural school district. She shared, “I love watching kids grow.” She holds a master’s degree in curriculum and instruction and was not raised in the community in which she taught.

When first approached about integrating technology into classroom instruction, Patricia stated, “Well, I am willing to try it, but I do not know where to start,” and added that “a lot of guidance” would be needed. She primarily used technology for administrative purposes. When asked whether she’d integrated technology in her classroom prior to this study, Patricia confessed, “No, not a lot. I have not implemented technology much before this.” She went on to clarify that she had not used it as much as she would like to. “Prior to this, I had basic technology skills or understanding,” she said, adding that while she had attended multiple, one-day technology professional development courses, she had not integrated the content into classroom instruction.

**Margaret**

Margaret had been a teacher for eight years, all in a single elementary school district located in the southern part of the United States. During her career, she taught multiple grades, both in a departmentalized and non-departmentalized setting, and various subjects. “I really enjoy teaching,” she said. The community in which she taught is much larger than the one in

which she was raised. Having obtained a master's degree in administration, Margaret's goal was to become a school administrator.

When first approached about integrating technology into classroom instruction, she stated, "Get me the devices I need, and I am ready. I am ready right now." She also stated, "I have always tried to use technology in the classroom and at home. I feel confident with technology. If I do not know how to use something, I feel like I can learn how to do it pretty easily." When asked specifically about technology integration prior to student-supported technology professional development she responded:

> Prior to this, my kids did all their math tests online. They did things with their math website games. They also did mini-lessons to help them. Prior to this, I used technology in the classroom in a manner that was more teacher-led.

**Elizabeth**

Elizabeth had spent eight years teaching elementary school in the southern part of the United States. The entire time, she taught the same grade level at the same school, which was located within 10 miles of where she was raised. "Teaching children is very enjoyable," she said. Elizabeth had enrolled in a master's degree program, but had not yet decided on the specific concentration. Prior to becoming a teacher, she worked in the clerical field; therefore, she had a lot of administration technological skills and knowledge.

When first approached about integrating technology into classroom instruction, she said, "When are we going to start? I have taught myself most of the technology that I know. I like to explore and learn things on my own." Elizabeth also disclosed that she had been able to extend her educational training in technology through various classes and professional development, but what she'd learned was rarely integrated into classroom instruction.

**Linda**

Linda, an elementary teacher of nine years in the southern part of the United States, said, "I love what I do." Six of those years were spent in a smaller district than where she is now, but she had been raised in a nearby community that was larger. She was working on her master's degree in administration and hoped to one day become an elementary principal. When first approached about integrating technology into classroom instruction, she stated, "I know how to use technology. I do need some help with implementing it into my classroom instruction." When asked about her technology level and experiences prior to this study, Linda concluded, "Probably about average; not an expert with it. Not used to using them with the students though." However, she discussed that she utilized a lot of technology for personal application.

**Barbara**

Barbara was an administrator with eight years of experience in teaching and administration in the southern part of the United States. Additionally, she had observed student-supported technology professional development at least three times in the 2013-14 and/or 2014-15 school years. She had a bachelor's degree in education with a minor in special education and a specialist degree. Her career consisted of teaching special education, kindergarten, first grade, and early childhood education. When asked about technology integration in classroom instruction, she stated, "Student-supported technology professional development has increased the amount and rigor of technology in the classroom. Technology usage has increased."

**James**

James had spent seven years teaching and 15 years working as an administrator in the southern part of the United States. He had observed student-supported technology professional development at least three times during the 2013-14 and/or 2014-15 school years. Prior to

student-supported technology professional development, he noted, “I did not observe the teachers doing anything with technology. The teachers mainly used the lab like indoor recess.” After student-supported technology professional development, James noticed a difference in technology integration into classroom instruction. He stated, “Teachers definitely learned. They developed much better uses for technology than previously demonstrated.” Regarding recent technology integration, he stated, “There was one particular activity where students made videos and did other things where the teachers were impressed that the students could work independently and exhibit learning and independence, even in kindergarten.”

## Results

The three research questions that guided this descriptive case study were answered using three data sources that consisted of a survey, face-to-face open-ended interviews, and archival data consisting of observations conducted during the 2013-14 and 2014-15 school years as part of program evaluation. The TAM survey, which was given prior to the face-to-face, open-ended interviews, was analyzed as a tool to answer research questions one and two. The survey was administered online using Survey Monkey™.

All surveys were analyzed (Table 2). The survey (Appendix C) consisted of 23 questions using a 5-point Likert scale, where 5 represents strongly agree, and 1 represents strongly disagree. A sample survey (Appendix C) question was: *Using the Internet in my classroom can increase my productivity*. Other questions focus on user acceptance such as: *I always try to use the Internet in as many cases or occasions as possible during classroom instruction.*

Table 2

*Technology Acceptance Survey Results*

| Questions | Mary | Patricia | Margaret | Elizabeth | Linda | Average |
|---|---|---|---|---|---|---|
| 1 | 3 | 3 | 5 | 3 | 4 | 3.6 |
| 2 | 3 | 4 | 5 | 3 | 4 | 3.8 |
| 3 | 3 | 3 | 5 | 3 | 4 | 3.6 |
| 4 | 4 | 3 | 5 | 3 | 3 | 3.6 |
| 5 | 2 | 3 | 4 | 2 | 5 | 3.2 |
| 6 | 4 | 4 | 4 | 2 | 5 | 3.8 |
| 7 | 3 | 3 | 4 | 2 | 5 | 3.4 |
| 8 | 3 | 4 | 4 | 2 | 5 | 3.6 |
| 9 | 3 | 3 | 4 | 2 | 5 | 3.4 |
| 10 | 3 | 3 | 4 | 2 | 4 | 3.2 |
| 11 | 3 | 3 | 4 | 2 | 4 | 3.2 |
| 12 | 5 | 3 | 4 | 2 | 4 | 3.6 |
| 13 | 5 | 3 | 4 | 2 | 4 | 3.6 |
| 14 | 5 | 2 | 1 | 3 | 4 | 3 |
| 15 | 1 | 3 | 3 | 2 | 2 | 2.2 |
| 16 | 4 | 2 | 3 | 2 | 3 | 2.8 |
| 17 | 5 | 3 | 5 | 3 | 3 | 3.8 |
| 18 | 5 | 4 | 4 | 5 | 5 | 4.6 |
| 19 | 3 | 4 | 3 | 4 | 3 | 3.4 |
| 20 | 1 | 5 | 2 | 5 | 2 | 3 |
| 21 | 3 | 5 | 3 | 5 | 2 | 3.6 |
| 22 | 3 | 2 | 3 | 1 | 3 | 2.4 |
| 23 (a) | 7 | 7 | 12 | 10 | 8 | 8.8 |
| 23 (b) | 3 | 4 | 3 | 3 | 6 | 3.8 |

The highest overall resulting Likert score on the survey was for question 18, which states: *I expect my use of the Internet in my classroom instruction to continue in the future*. Patricia and Margaret rated this question as a four, while the other teacher participants gave it a five. The lowest overall participant score addressed question 16, which was: *I always try to use the Internet during classroom instruction to do a task whenever it has a feature to help me perform it*. Patricia and Elizabeth both rated this question with a two, which is somewhat disagree, while Mary had a four, which is somewhat agree. Elizabeth gave question 22 a one, strongly disagree. Margaret also stated that she strongly disagreed with question 14, while Mary noted the same rating for questions 15 and 20. The survey also revealed that the average number of years'

participants have used the Internet for personal use is 8.8, while the average number of years that the Internet has been integrated into classroom instruction is 3.8, which addresses actual use. Margaret noted that she had used the internet for personal reasons over a 12-year span, but had only used it in the classroom for three. Linda stated that despite only using the internet for personal reasons for eight years, she had integrated it into the classroom for six.

Teacher interviews were conducted face-to-face in the participants' classrooms. Administrator interviews were conducted face-to-face in their offices. All interviews were recorded using both a laptop computer and a back-up recording device in case technical difficulties occurred. Interviews were transcribed by me using Microsoft™ software and then e-mailed to each participant for confirmation.

Archival data consisting of classroom observations conducted in the 2013-14 and 2014-15 academic school years as part of program evaluation were retrieved for each teacher participant. Archival data were originally collected to analyze perceptions of technology usage and gauge levels of technology integration in classroom instruction as a means of determining what the school district's current professional development needs were.

Each teacher participant was observed six times throughout 2013-2014 and 2014-2015 school years (Table 3). All observations occurred in the classroom and focused on technology integration. At the beginning of an observation conducted March 2014 in Mary's classroom, she said to her students, "I am very nervous about doing this without support" and demonstrated fidgeting behavior. At the conclusion of the lesson, she stated, "That was really easy, and the students enjoyed it. I enjoyed it! I did not know that I could do that on my own. I am ready to do more."

Table 3

*Archival Data: Classroom Observations*

| Date | No Device Being Used | Teacher Using Device | Students Using Device | Students and Teacher Using Device |
|---|---|---|---|---|
| October 2013 | 2 | 1 | 1 | 1 |
| January 2014 | 1 | 2 | 1 | 1 |
| March 2014 | 0 | 2 | 2 | 1 |
| October 2014 | 0 | 1 | 4 | 0 |
| January 2015 | 0 | 2 | 3 | 0 |
| March 2015 | 0 | 1 | 2 | 2 |

Upon transcription, observations and interviews were analyzed through NVivo™, which is qualitative analytic software. Data analysis included Yin's (2011) five-phased cycle consisting of compiling, disassembling, reassembling, interpreting, and concluding. The five-phased cycle included open coding, sorting and categorizing data where categories were developed, which resulted in themes (Yin, 2011).

Four themes emerged during the analysis of this case study: successful experience with technology, skill and knowledge development, lack of use prior to intervention/professional development and evidence of acceptance and integration. All themes occurred multiple times during both the face-to-face interviews consisting of teacher and administrator cases and archival data consisting of classroom observations conducted yearly during the 2013-14 and 2014-15 school years as part of program evaluation. The themes were used to answer the three research questions for this descriptive case study (Table 4).

Table 4

*Emergent Themes from Research Questions*

| How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction? | How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction? | What evidence suggests that student-supported professional development for technology is responsible for the encouragement of teachers' technology integration into classroom instruction? |
|---|---|---|
| Successful Experience with Technology | Successful Experience with Technology | Successful Experience with Technology |
| Skill and Knowledge Development | Skill and Knowledge Development | Lack of Use Prior to Intervention/Professional Development |
| | | Skill and Knowledge Development |
| | | Evidence of Acceptance And Integration |

Participants revealed that students included in technology professional development had the biggest impact on teacher technology acceptance and integration. Mary stated, "I probably would not be using technology as much as I am if the students had not been included in professional development. They can do so much more with technology than I ever thought possible." Linda concurred, stating, "Student-support has been crucial to my acceptance and classroom use." In addition, participants' acceptance and integration of technology increased as teachers accepted and understood that they did not have to be technology experts. Participant's felt that someone in the classroom would be able to solve any technology issue that arose.

Overall, participants felt as if student-supported technology professional development did increase teacher technology acceptance and integration. Every teacher participant commented on their newfound confidence and desire to integrate technology into classroom instruction. All

participants discussed the difference in student independence, rigor, and creativity demonstrated through technology integration in classroom instruction. Further, the participants voiced their willingness to participate in future student-supported technology professional development based on the positive impact it has had on their teaching and student learning.

**Theme One: Skill and Knowledge Development**

Theme one clearly identifies that technology skills need to be better developed to maximize usage. This relates to the TAM component: perceived ease of use. James suggested the following regarding student technology skills and knowledge:

> In my opinion, the kids have been way more comfortable with technology than the teachers. The problem was never the kids; the kids were willing to problem solve and figure it out. The teachers lacked skills and experimentation, and if they would have been comfortable enough to let the kids figure it out—experiment—it would have been fine.

Despite noting that student-supported technology professional development increased teacher acceptance and integration of technology, James also pointed out, "Eventually, technology integration would have occurred due to student-driven exploration."

Margaret believed that after receiving student-supported technology professional development, both teacher and student confidence in utilizing technology improved. She expressed:

> I am very comfortable using technology in my classroom. Well, my kids have progressed a lot. If you were to have walked in at the beginning of the year and watched them log-in, it would have taken forever. But now, because they know how to, they can get on the computer.

Classroom observations of Margaret supported this stance. In October 2013 and January 2014, she employed basic, step-by-step activities that the students followed. In contrast, the third observation of her, conducted in March 2014, consisted of a student-led activity where students showcased their technology skills. Regarding her personal progression with technology, Margaret stated, "I have always tried to use technology in the classroom, and I use it at home. Prior to this, I had my students play educational games online, which they easily navigated without my help." Margaret further supported this by rating question 11 which stated: *It is easy for me to become skillful at using the Internet for classroom instruction,* with a four, somewhat agree.

Margaret also discussed that her acceptance of technology was impacted by fear; she thought that she had to know everything about technology prior to integrating it into the classroom. Student technology skills were not considered. She stated:

> Prior to student-supported technology professional development, I never thought that I could learn technology while my students were learning. I always thought that if I were going to teach them to use something like PowToon's™, I had to know how to do it myself first. I learned that I can learn with them, and that it all works out. My kids and I are able to now work together. If there is something that I do not know how to do, one of them will know.

Elizabeth shares the sentiment that teachers and students need to acquire technology skills together to ensure success in technology integration. She said, "I see the need every day for technology in the classroom. When I use technology with students, I know that one of us will know how to solve any issues that come up." She also mentioned that acquiring technology skills has resulted in her being better prepared; thus, it has been good for her job. "I have found

that I have to be more prepared: I need things loaded, I need them up, and I need them ready to go," she explained. "That way, I am not hunting for that page or hunting for what I need. I am a better teacher today then I was before student-supported professional development." However, on the survey, Elizabeth noted that she neither agreed or disagreed with question two: *Using the Internet in my classroom can improve my performance.* Elizabeth further revealed how acquiring technology skills and knowledge has changed classroom instruction when she said:

> I find that it does actually go quicker, like I said, because I am able to use the iPad™ and walk around and still project what the students need to see. I am teaching them right when everybody else learns. I just stop and teach them the level that they need. So, I felt it has sped up my classroom instruction.

Observations conducted in October 2013 recorded that Elizabeth logged on to her computer, but it took about 40 seconds for her to turn on the projector and another 70 seconds for her to fumble with the remote while trying to get the image from the computer to the overhead projector. She moved through the rest of the activity without any issues arising. During the observation conducted January 2014, Elizabeth and her students demonstrated technology skills such as logging on and iPad™ fundamentals. Additionally, she was able to switch between input modes on the overhead projector.

**Theme Two: Lack of Use Prior to Intervention/Professional Development**

Prior to student-supported technology, there was a limited technology acceptance and its actual use in the classroom. As observed by James, "We had two computer labs and an iPad™ lab prior to student-supported technology professional development. The teachers were taking the students to the lab and just letting them play games." James observed that having a computer laboratory was helpful for both the teacher and the students:

> Before student-supported technology professional development, I did not observe the teachers doing much with technology. There were a few—when I say few, I mean one or two—that did something like typing; basic skills. I did not see that it was anything that could not have been done with paper and pencil.

James stated, "Prior to professional development, I rarely saw a teacher use technology other than using the overhead projector." He added, "Technology is important in curriculum, but it was rarely being used before PD."

Barbara concurred, stating, "Initially there was hardly ever any technology being used. The carts were sitting there not being used. It was sad." Regarding the difference in acceptance and technology integration after student-support, she continued, "Partnering with student-supported technology professional development has resulted in technology usage during whole group and small group instruction and throughout many learning activities."

Observations of Mary conducted in October 2013 and January 2014, prior to student-support, indicated that she used technology to project a worksheet on the board. Each student had a copy of the worksheet and reviewed the answers with her. She felt that using the overhead projector and a document camera were easy tasks for her; thus, that comprised the extent of her efforts to integrate technology into her classroom.

Patricia described her technology experience thusly: "Prior to this, I had few basic technology skills. I have taken some technology courses through professional development classes at a local university, but have not done anything with them. I have not implemented technology much before this." In addition, she stated, "Prior to student-supported technology professional development, I hardly ever used technology. I did use it when I had to."

Despite saying that she had limited technology skills, Patricia implied that she was willing to integrate technology into classroom instruction if it was beneficial to student learning. Patricia noted this on the survey as she rated question six: *I find the Internet useful in my teaching,* with a four, which is somewhat agree. During classroom observations of her conducted in October 2013 and January 2014, technology integration was not occurring. Both observations consisted of students merely copying notes that Patricia wrote on the board. All observations of her conducted after student-support included technology integration.

Patricia's familiarity with technology and lack of experience working with students and technology is similar to Linda's. In her interview, Linda discussed that she had average technology skills in terms of personal use, but no experience using it in the classroom with students. During observations of Linda conducted in October 2013, prior to student-supported technology professional development, technology integration did not occur. Linda demonstrated how to solve math problems on the whiteboard. Some students listened, while three were off task. Thus, I inferred that prior to student-supported technology professional development, there was limited technology integration, and the majority were teacher-led activities. Patricia recalled, "I did not use technology very much before student-supported technology professional development." Therefore, most—if not all—participants are now more inclined to integrate and accept technology in the long run.

Despite the various backgrounds and experiences discussed by the participants, it was evident that all participants used technology for personal needs, but seldom used it for instructional purposes prior to student-supported technology professional development. Questions number 23 asked: *Number of years using the Internet___/Number of years using the Internet in classroom instruction,* which concluded that participants had anywhere from three to

nine more years of personal usage then in the classroom. Patricia expressed how she felt prior to student-supported professional development saying,

> Knowing how to use technology at home is not the same as using it in the classroom. Using technology in the classroom use to be scary. I use to think, what would happen if it didn't work? I would have lost all that instructional time.

In addition, all participants reported that they had received some form of technology professional development prior to this descriptive case study; however, that did not result in an increase in technology acceptance or usage during classroom instruction.

**Theme Three: Successful Experience with Technology**

The student-supported professional development enabled teachers to experience successful technology integration. Thus, perceptions of technology being effortless and good for their job occurred. This theme addressed the TAM components perceived ease of use, usefulness, intent to use, and actual use because participants discussed perceptions and accomplishments during technology integration. James, one of the administrators, noted, "After student-supported professional development, teachers were in awe of the things students could do and the level of learning that occurred when they were provided with technology professional development." Barbara agreed, saying that after student-supported technology professional development, "We used the iPads™ daily. It was used as a small group center, and then they were also used for basic instruction during the whole group." She went on to discuss the increase in rigor that was based on technology integration.

Mary believed that there was an increase in productivity because she was able to observe the impact of technology integration on student learning and instruction. She rated question Four, which was: *Using the Internet in my classroom can increase my productivity,* with a four,

somewhat agree. Furthermore, she discussed how technology usage improved accountability in the classroom. “I feel like it has increased productivity a lot. I have used it for reading centers while I am doing a small reading group,” she said, adding, “And they’re held accountable by having something to show for their center time.” Not only did Mary point out the ways that technology had benefited reading instruction, but she also discussed the effects during mathematics instruction.

> As far as math, I feel like using the lessons and then letting the kids listen to the lessons has given them that extra little bit of instruction they may have needed. I can see where, in the future, it would be advantageous to have them pacing at their own levels, which I could not have done without technology in the classroom.

After receiving student-supported technology, observations of Mary that occurred in October 2014 included various levels of technology integration into classroom instruction. Students were observed working in three stations where learning included activities from Depth of Knowledge levels three and four. Station activities included students working in groups or independently. Thus, Mary used technology as a tool to increase classroom rigor.

Patricia also had her own observations with regard to maximizing the use of classroom hours. “I feel like it’s helped my time management because I can have students do things on technology while I’m working with other students… I know all my students are learning,” she said. Patricia further discussed her past and current technology usage stating, “I would not say that I had a great deal of experience, but I would say that I use way more than I did a few years ago. I find it easier to troubleshoot with my students.”

During observations conducted in Patricia's classroom in March 2015, students independently logged on and worked with technology while learning and covering classroom content. This differed greatly from the first two observations of her. Further, students worked on a virtual book report and as part of it, they created an animated video describing a specific scene from the book. While students worked, Patricia told them, "Remember that you have more options available than we would have if we did not use the laptops." Thus, technology had provided the class with additional platforms and outlets to showcase learning. Patricia stated, "I am able to do so much more in the classroom than I could before student-supported technology professional development." She further proved this as she rated question two from the survey, which read: *Using the Internet in my classroom can improve my performance,* with a four, somewhat agree.

Like previous participants, Margaret also credited technology integration for helping her students become more proficient at finding solutions when she said:

> I noticed it has helped them become better problem solvers, not just how to use technology, but in general. It has helped them to be better communicators because they help each other with issues on the computer, which then carries over to the regular curriculum. It has made me a more effective teacher because it allows my students to see materials in different format. They are also able to present their work in a different format.

Margaret was also quick to note that the introduction of technology into the classroom made learning more accessible and advantageous. "It has helped time management," she observed. "I do not have to take the time during content to teach them how to do it. They already know." She rated question one from the survey, which stated: *Using the Internet in my*

*classroom can enable me to accomplish tasks more quickly,* with the highest rating of a five, strongly agree. Additionally, she observed that her students had expanded her own familiarity with technology. She stated, "They will also explore with it and discover new features, which they happily share with everyone else."

Margaret stated that after student-supported technology professional development, she felt "as if the rigor has increased after I started using technology more in the classroom with students." Observations of Margaret conducted in October 2013, prior to student-supported technology professional development, demonstrated technology acceptance and integration, but lacked rigor. The level of technology integration was basic, as it was similar to an activity that could be completed using paper and pencil. Both Margaret and her students were using laptops. Margaret was demonstrating how to set up a document, which would contain the students' weekly spelling words written first in a sentence and then in a paragraph. Once she was done explaining and demonstrating, Margaret closed her laptop and walked around the room checking student progress.

In October 2014, Margret was observed while integrating technology into classroom instruction. Students created an animated video independently. Once the videos were published, the link was copied and placed in the students' weather book. During the observation, it was noted that her students needed limited assistance. Margaret stated, "Technology in the classroom has been great for me. The students are almost always on task now and rarely need to be redirected. Before, I was spending a lot of time redirecting and getting students focused." Through interviews and classroom observations, it can be concluded that Margret views technology integration as being positive with regard to increasing problem-solving skills, communication, and classroom management.

In reference to current technology practices, Elizabeth discussed the important role usage played in her classroom by stating, "Students are able to be creative, innovative, and problem solve due to the use of technology while learning. They have more access to information." Further, she offered the following about how her teaching changed based on student-supported technology professional development:

> This is technology that has been exposed to me to utilize, and so I feel like it has improved my teaching. Providing hands-on experiences, showing the kids how to use it, how it all connects, and how it all works increases productivity in my classroom.

In January 2015, Elizabeth was observed with the primary focus being the integration of technology in classroom instruction. This observation clearly demonstrated the effect of technology in classroom instruction as it enhanced rigor, creativity, and academic content standards. Elizabeth worked with the entire class on a retelling project. She had placed four picture cards on each table. The students took a picture of each card in order, wrote a retelling sentence, and recorded their voice reading their writing. The last step was to upload finished pieces of work into Google Classroom™. At the end of the lesson, Elizabeth stated, "I still cannot believe my students can do projects like this. I would have never tried to teach them something like this. I did not know they had the skills to be so successful using technology."

She further explained the benefit associated with students being able to read their own writing and listen to themselves by stating, "My students are catching most of their own reading and writing mistakes as a result of using technology daily." For this reason, it was concluded that technology influenced student learning in Elizabeth's classroom.

Linda also mentioned that technology made research easier. She cited the help of survey engines used to gather input from the students. According to her, "Once the

students have been introduced to various technology items, we were able to do it with other content areas including science. I've been able to take what they have learned and move it into ELA."

Additionally, Linda discussed the effect that technology has had on mathematics stating, "We've also done various things with math; you know making surveys with Survey Monkey™ and pretty much everything you taught us during professional development." Linda clearly identifies a shift in her teaching. She added that her class had also "started doing vocab squares every week where students are able to demonstrate higher-level learning. Before, it was just paper, pencil, and at the level of recall." Linda supported this by rating question five on the survey, which was: *Using the Internet in my classroom can enhance my effectiveness while teaching,* with the highest rating of a five, strongly agree.

During an observation conducted in March 2014, Linda's students worked on an online, high-rigor activity. The students e-mailed Linda when they completed specific components of the activity. She then checked the teacher portal and provided the student with immediate feedback. Technology was used as a tool to discuss student work right away and increase rigor.

Indeed, these participants validate the effect technology has made in the classroom, which was noted through interviews and observations collected as archival data as part of program evaluation collected yearly during the 2013-14 and 2014-15 school years. Despite the fact that participants know technology integration is effective, there is still a need for them to experience its benefits so that they can move toward acceptance and then integration of technology into classroom instruction.

**Theme Four: Evidence of Acceptance and Integration**

Technology has indeed become a factor in the classroom, and the participants had different ways of dealing with technology in terms of how they use it to teach students. According to James, one of the administrators, "A lot of teachers are willing to use it now, after receiving student-supported technology professional development,." He continued, "There was definitely an increase in acceptance and integration. The elementary teachers went from standard, old-time education processes to actual, some of them, technology use all the time."

Prior to student-supported technology professional development, James clearly stated that technology integration was minimal. He described integration before student-supported technology professional development saying, "Well, 98% of the time, it was pen and paper and lots of worksheets, drilling stuff into their head, and not upper-level critical thinking. Now students are learning problem-solving skills, and upper-level critical thinking is constantly occurring."

James also noted changes in teacher attitudes and integration after technology professional development. "Teachers were walking around sharing what they were doing while using technology in the classroom. They were very proud." He further discussed particular activities he observed saying, "One teacher, whom I had never seen use technology during instruction, had the students making virtual books where they created the picture, wrote their own text, and recorded their voice reading the text."

Barbara, the other administrator, was also quick to note that the teachers had accepted the presence of technology in the school because it seemed progressive. She stated, "The acceptance and usage of technology by teachers and students has increased. The understanding of the role technology plays in student learning has increased." Barbara also discussed the importance of

the changes in academics after teacher participants received student-supported technology professional development. She said that technology had "enhanced student learning and is engaging." Barbara further explained the increase of technology acceptance and integration by saying, "Teachers' ability to understand that they do not have to know everything about technology prior to usage in the classroom has been impacted. They now understand that both the teachers and the students will figure out any issues that occur as a team."

Mary revealed that she'd had a mental block with regard to incorporating technology into her classroom. She stated, "Before student-supported technology professional development, I was full of fear. There was fear there. That was the first emotion. Now, I am like, 'Give me more." To further support this stance, she rated question 17 on the survey, which stated: *I always try to use the Internet in as many cases or occasions as possible during classroom instruction,* with a five, strongly agree. Mary confirmed that her increased confidence level would impact her teaching when she stated:

> I would definitely use technology again in my classroom now that I have had some training where it is hands on. I have a student-support system right within the classroom now. It gives me that confidence to know if I do not know the answer, that they might know [it].

Throughout observations of Mary conducted during the 2013-14 and 2014-15 school years, she always exhibited technology integration. Examples included using the overhead projector, iPads™, laptops, the Internet, specific applications, and programs. An example of Mary's acceptance and integration occurred during an observation conducted in March 2015. Both Mary and her students were using technology, and she effectively modeled the platform.

The lesson started as a teacher-led activity and then transformed into a student-led one. Collaboration amongst all stakeholders occurred throughout the lesson.

Patricia discussed how using technology had specifically impacted the way in which she teaches students to write, saying:

> Instead of maybe having them use as much pencil and paper, I have them create stories. Like on Educreations™ or something like that so they are illustrating and writing, but it is not so much pencil and paper because they also get to create and explore.

Throughout classroom observations of Patricia, a trend resulting in an increase in technology integration was revealed. The first two observations of her conducted in October 2013 and January 2014 noted that technology integration was not observed. However, in March 2014, October 2014, and January 2015, Patricia was observed using technology in the classroom, and in March 2015, her students were using devices throughout the observation.

In October 2013, technology was not integrated during my observation of Linda. However, in January of 2014, after receiving one session of student-supported technology professional development, technology had been integrated. Linda used an overhead projector connected to a laptop to project a game. She was in charge of the mouse and directed the activity.

Then in March 2015, observations of Linda portrayed a different level of technology acceptance and integration: Her students had created a virtual book. Linda's familiarity with the technology device was demonstrated by her ability to answer student questions accurately and clarify student technology struggles before answering. When troubleshooting, she provided

guidance to encourage students to problem solve independently. Her students were actively engaged: The room was quiet, every student had a laptop, and they were creating text from a story web. Per Linda's instructions, each page was completed individually and included student-generated text and drawings or pictures retrieved from the Internet. Additionally, students recorded themselves reading their text. Upon completion, each one published his or her book and shared a link to it with the class on Google Classroom™. Students were then able to navigate the platform and upload pictures with limited questions. These three observations clearly indicate an increase in technology acceptance and integration. Linda revealed the following about the impact of technology integration on her students: "I am in awe of the things my class is doing." On the survey, Linda rated question six, which read: *I found the Internet useful in my teaching,* with a five, strongly agree.

Margaret demonstrated her willingness to accept and use technology when asked to participate in this type of professional development. Prior to participating in student-supported professional development she stated, "I love to use technology and would enjoy sharing my knowledge and experiences with the students." She went on to say that she always researched ways to integrate technology, but had limited experience in the actual usage during classroom instruction. During the interview, she stated, "I learned so much through student-supported technology professional development. I knew stuff before, but nothing compared to what I can do now." She continued, saying, "My students are now doing amazing projects and are able to demonstrate higher-level thinking all the time."

Likewise, Elizabeth also maintained that technology helps during whole-classroom instruction when she said:

> I use the iPads™ with the Apple TV™ to be able to walk around the classroom and monitor what each child is doing while I am still turning the pages. I am still directing the students, and I am still pointing to everything they need. That speeds up the productivity of the students because I am more accessible to help them, rather than being stuck at my desk working at the computer.

She further explained the increase of her ability and willingness to accept and integrate technology in classroom instruction after receiving student-supported technology professional development saying:

> Now I schedule the time to use it weekly. I feel like the students are helping keep me on target to use that technology because I tell them what times we have it, and then they make me stay on track to use that technology.

Prior to student-supported technology professional development, Elizabeth pointed out her success with navigating digital worlds for personal use. Despite her enthusiasm, she admitted that she rarely integrated technology into her classroom. She stated, "Knowing how to use technology at home and how to use it at school are two very different things." However, this changed after student-supported professional development as she rated question 18 on the survey, which read: *I expect my use of the Internet in my classroom instruction to continue in the future,* with the highest rating of a five, strongly agree.

Observations of Elizabeth in October 2013 did support her ability to adapt and accept digital worlds, but she demonstrated limited knowledge of how to integrate them. She was observed providing students with verbal cues as to how to navigate Google™. She gave direct instruction; thus, each student searched for the same word and copied a specific definition that was pasted onto a document. Each student was then coached on how to locate an image to

represent each word. Visuals to support learning were provided through the overhead projector. Despite each student using a laptop, the majority of the lesson was teacher-led.

All three observations of Elizabeth included technology integration, but at various levels. The first two observations incorporated teacher-led technology experiences. A shift from teacher-led technology experiences to student-led experiences transpired after student-supported technology professional development and prior to the third observation. That being said, technology acceptance and integration was occurring in her classroom.

From the four trends identified, it is evident that all three research questions were answered (Table 5).

Table 5

*Research Question and Theme Alignment*

| Research Question | Theme |
|---|---|
| Question One | One and Three |
| Question Two | One and Three |
| Question Three | One, Two, Three, and Four |

**Research Question One**

The first research question, "How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction?" This question was designed to establish the role that student support plays in teacher acceptance and technology integration. Teacher perceived ease of use, usefulness, and intent to use was addressed through archival data consisting of classroom observations that were conducted in the 2013-14 and 2014-15 school years as part of program evaluation, the survey, and interviews.

Teacher participants noted that student-supported professional development impacted their perceived ease of use, usefulness, and intent to use technology. Additionally, they felt that it was good for their respective jobs and that it did not take as much effort as they previously perceived that it would. James stated, "Teachers are discussing the positive changes in academic rigor, behaviors, and critical thinking. One teacher has even discussed improvements in mannerisms and respect." He further stated, "Student-supported professional development has made technology integration easier for teachers and has provided teachers with a sense of ownership." James also pointed out that "technology was occuring about 2% of the time. This program has drastically increased usage."

Margaret and Elizabeth discussed how skill development increased their perception of technology being easier to utilize. They further mentioned that the development of technology skills also increased students' ability to use technology; thus, providing evidence that student-supported professional development leads to technology utilization in the classroom being effortless. Patricia also discussed that using technology in the classroom became easier than it had been before student-supported professional development; however, she also pointed out that it is not completely effortless. "I would say it is easier," she explained. "It's not as easy as I would like it to be. It is not as natural as I want it to be. But, I am not giving up."

Mary further discussed how she perceived using various forms of technology in her classroom by stating, "I had never used the Apple TV™ until you showed me and my students how to do that. We actually did use it with a lesson we were doing. The lesson was better." Mary added, "I did not use my Apple TV™ before student-supported technology professional development. It just collected dust." Linda added that student-

supported professional development impacted her ease of use to the point that she was "helping other teachers."

Twelve survey questions addressed the TAM component of perceived ease of use. An example is Question Seven: *Learning to use the Internet in my classroom instruction is easy for me.* On the 5-point Likert scale with 5 being "strongly agree," the overall rating was 3.6, which would be closest to "somewhat agree." Mary, Margaret, and Linda rated this question as somewhat agree or strongly agree, while Patricia had given it neither agree or disagree and Elizabeth stated somewhat agree. In the same manner, Question Eight, which also addressed perceived ease of use, had an overall rating of 3.6; while Elizabeth rated it with a two, somewhat agree, Patricia, Margaret, and Linda all had given it a four or five. Question Eight was: *I find it easy to find what I need or want to integrate into classroom instruction from the Internet.* All questions that focused on perceived ease of use were rated overall at a 3 or higher; therefore, it was concluded that participants did not disagree with technology acceptance.

The TAM component of perceived usefulness, which addresses a person's belief that using technology is good for their job, correlates to many of these impacts. James noted this when he said, "I am in classrooms all the time. Student-supported technology professional development has improved classroom management, independent thinking, and the level of instruction, rigor. Technology integration in classroom instruction occurs at least 60% of the time."

Administrator Barbara also made similar comments. She mentioned, "I am in classes a lot. Student-supported technology professional development has increased the amount and rigor of technology in the classroom. Technology usage has increased." Likewise, Linda noted how

technology integration was good for her job when she stated, “My students have benefitted a lot from this experience. They demonstrate a higher understanding of content now. Their standardized assessment scores were much higher than previous years. I credit some of this to technology integration.”

All of the participants viewed technology integration as a primary factor in the expansion of academic rigor, thus improving job performance. Elizabeth supported this claim when she discussed that her students have started self-correcting, which she perceives as a result of technology integration. Mary pointed out that her students primarily worked at a depth of knowledge levels three or four during technology integration. Furthermore, she referenced improvements in both mathematics and reading, by saying:

> I feel like we have utilized it for math lessons. We have also used it for enrichment in the science and social studies areas. I feel like we are able to do that a little bit more than I normally would have been able to do.

Mary addressed the non-academic benefits with regard to why technology integration was helpful to her job. She said, “Communication among students, problem-solving, and their willingness to help each other has increased since I have integrated technology into classroom instruction.” She also noted the impact on instruction by stating, “I feel like all of this has helped a lot with our instruction in many of the academic areas.”

Ten questions on the survey discussed the TAM construct of perceived usefulness multiple times. Question One provided an example by asking: *Using the Internet in my classroom can enable me to accomplish tasks more quickly.* Participants rated this question with a three or higher, which is neither agree or disagree, somewhat agree, and strongly agree. Another question that addressed perceived usefulness was Question Six: *I find the Internet useful*

*in my teaching.* The overall rating for this question was 3.8, which is still closest to somewhat agree. Linda rated this question with a five, strongly agree, while Mary, Patricia, and Margaret had given it a four, somewhat agree. The lowest score for this question was noted by Elizabeth with a two, somewhat disagree. The overall ratings for perceived usefulness were rated higher than perceived ease of use, but both were rated between 3 and 4.

Data analysis indicated that teachers perceived student-supported technology professional development to have an impact on their technology acceptance and integration. Participants still experienced some struggles with technology; therefore, they did not find it to be completely effortless. However, utilization continued because of the perceived benefits to student learning. Additionally, teacher participants commented that the more they used it, the easier it became.

Intent to use technology addresses a person's calculated goal towards actual technology usage. Linda noted the impact student-supported professional development has had on her intent to use technology as she foresees her technology integration to continue. The interview discussion included the following statement:

> I will always use technology when there is a feature that I can implement. I use technology multiple times a day. During a school day, I use technology more for classroom instruction than anything else. I have always been able to use technology, but now I know I can use it even more. I plan to continue to implement technology, especially into more subject areas.

This sentiment was echoed by other participants, as they pointed out that they also expected to continue utilizing technology during classroom instruction. Intent to use was noted in Question 18, which received the overall highest rating on the survey with a rating of 4.6 (between "somewhat agree" and "strongly agree"). Question 18 asked: *I expect my use of the Internet in*

*my classroom instruction to continue in the future.* Mary, Elizabeth, and Linda rated this question with a five, strongly agree, while Patricia and Margaret had given it a four, somewhat agree. Thus, it was deduced that all participants expect to continue accepting and integrating technology into classroom instruction.

Additionally, all participants expressed an increase in the usefulness of technology. They discussed increases in their perceptions, thus making technology easier to integrate into the classroom. Moreover, all participants intended to continue utilizing technology during instruction. While I had anticipated that the participants would find technology integration useful, I had not expected that they would be willing to integrate without a full understanding of the device or platform. Participants noted that they no longer felt the need to be technology experts before utilizing technology in the classroom.

**Research Question Two**

Answering the question, "How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction?" provided an understanding of changes in technology integration. This question addressed a person's genuine technology usage, which is a component of the TAM. Archival data consisting of classroom observations conducted during the 2013-14 and 2014-15 school years as part of program evaluation, open-ended interviews, and the survey were used to answer this question.

Participants provided clear evidence to support how student-supported professional development impacted teachers' actual use. Linda and Elizabeth discussed that utilization enabled them to provide immediate feedback to students. Elizabeth further explained that she could immediately clear up misconceptions, which does not always occur during traditional teaching methods. She explained that many of the technology applications provided her with

immediate feedback on student progress, understanding, and learning. Therefore, she began utilizing technology more during her classroom instruction.

Margaret emphasized the importance of skill development, which she felt was a result of student-supported technology professional development. She discussed how the reduction in time consuming skills, such as logging in, led to actual use. She stated, "Some things used to take forever. I got to the point where technology just was not worth it. This all changed after student-support."

James, Mary, Margaret, and Elizabeth all noted that academic rigor increased as a result of technology usage during classroom instruction. James stated, "Without student-supported professional development, teachers would have never observed the rigor students are capable of." He explained, "While watching student-supported professional development, I saw students pointing out things to teachers and taking on the instructor role. Student-support increased rigor. The students wanted more." He focused on student-supported professional development as the primary factor impacting teacher actual use. James stated, "In terms of teachers, student-supported technology professional development has impacted their technology usage and acceptance. A lot of teachers are willing to use it now."

**Research Question Three**

As the researcher, I needed to answer: "What evidence suggests that student-supported professional development for technology is responsible for the encouragement of teachers' technology integration into classroom instruction?" The participant interviews produced the richest data on the participants' views, and thus addressed the impact of student-supported technology professional development on their acceptance and integration of technology usage. Evidence was provided though face-to-face open-open ended interviews, archival data consisting

of classroom observations conducted during the 2013-2014 and 2014-15 year as program evaluation, and the survey.

Administrators James and Barbara discussed the lack of technology usage prior to student-supported professional development. Specifically, James pointed out technology usage rose from 2% to about 60% at his school as a result of student-supported professional development. Barbara added that "the iPads™ went from just sitting in the cart—no one ever used them—now they are in classrooms all the time." Mary further supported this claim, as she discussed her daily use during reading instruction as a result of student-supported professional development. Elizabeth also began scheduling weekly technology integration.

Data analysis revealed that participants continued integrating technology during classroom instruction. This was observed during classroom observations that were retrieved through archival data collected during the 2013-14 and 2014-15 years as part of program evaluation. Technology integration did not occur in the first two observations of Patricia, but the subsequent four involved technology integration at various levels. Classroom observations revealed that there were no devices integrated during classroom instruction in two of the participants' classrooms in October 2013. This number reduced to one in January 2014, and then to zero during all other observations.

Despite the fact that the survey did not address how technology was being integrated, it did include Question 23, which addressed: *Number of years using the Internet* and *Number of years using the Internet in my classroom instruction.* The data concluded that participants had used the Internet overall for an average of 8.8 years. Interviews revealed that despite Internet usage prior to this study, there was limited integration of it occurring in the classroom. This was supported by participants concluding that they had only used technology for an overall average

of 3.8 years during instruction. James also supported this during his interview by stating that technology integration is still occurring in classrooms.

## Summary

Data provided in this chapter provided insight about the impact of student-supported technology professional development. Participants shared their experiences before and after student-supported technology professional development. Data included participants discussing the ways in which their teaching had changed in terms of technology integration. Student-supported technology integration played a role in developing participants' acceptance as it pertained to perceived ease of use, perceived usefulness, intent to use, and actual technology utilization.

Six observations of all teacher participants were retrieved through archival data conducted during the 2013-14 and 2014-15 school years as part of program evaluation. All teacher participants were subject to an interview and a survey. Both administrator participants observed each participant at least three times and took part in an interview. James observed each participant six times during the 2013-14 and 2014-15 school years. Each teacher participant reported that his or her technology acceptance and integration increased as a result of student-supported technology professional development.

Interviews and observations of Patricia and Linda concluded that technology integration and acceptance prior to student-supported technology professional development was limited. After receiving student-support, all participants reported that their acceptance and integration of technology had increased. Mary, Margaret, and Elizabeth demonstrated an increase in academic rigor during and after student-supported technology professional development. They also shifted from teacher-led to student-led technology integration.

James reported that all teacher participants demonstrated drastic increases in technology accept and integration into classroom instruction by stating:

> Teachers that participated in student-supported technology professional development have continued to integrate technology into their classroom instruction. Some have not explored or implemented anything past the learning that occurred in student-supported technology professional development, but there is a subset of those teachers that have taken it further. The subset is small.

He further explained that despite technology being implemented, not all participants were demonstrating growth in terms of technology integration. James stated:

> The other teachers that did accept and integrate technology into classroom instruction are still doing the same things they were taught and have not extended their learning or integration past what they learned while participating in student-supported technology professional development. Therefore, I think that acceptance or comfort level impacts technology integration into classroom instruction.

While the data showed an increase in participants' technology acceptance and integration, all three research questions were answered by their perceptions and archival data consisting of observations conducted during the 2013-14 and 2014-15 school years as part of program evaluation. This summary included the opinions and beliefs of the participants, thus laying the groundwork for themes that developed throughout this case study. A summary of the findings, discussion, implications, limitations, and recommendations for future research pertaining to technology integration in context to student-supported technology professional development is discussed in Chapter Five.

# CHAPTER FIVE: CONCLUSION

## Overview

As stated at the beginning, this study was conducted keeping in mind the benefit that technological integration can provide on student achievement (Machado & Chung, 2015). Despite increasing support of researchers, there has remained a lack of technology integration into classroom instruction over the past decade. This may be attributed to the inadequate efforts by schools to prepare teachers to accept and use technology for such purposes (DeNisco, 2014; Morgan, 2014; Navidad, 2013; Schnellert & Keengwe, 2012; Tamim et al., 2011). This case study built on the existing literature regarding technology professional development by filling in the gap on empirical research about elementary student-supported technology professional development.

The purpose of this study was to examine teachers' acceptance and integration of technology in the classroom in the context of a student-supported professional development model. There is a need for such a model, particularly at the elementary level. This study offers an effective one for school personnel to adopt as part of their efforts to enhance the use and acceptance of technology for classroom purposes by examining long-term development solutions as opposed to current, short-term approaches. This chapter includes a summary of the findings and themes that developed through data analysis. I have addressed the findings in relation to Davis' (1989) Technology Acceptance Model and the review of literature in Chapter Two. Delimitations and limitations of research are noted. Furthermore, recommendations for future research are explained.

## Summary of Findings

Through observations retrieved from archival data conducted during the 2013-14 and 2014-15 school years as part of program evaluation, interviews and surveys, the following four themes emerged: skill and knowledge development, lack of use prior to intervention/professional development, successful experience with technology, and evidence of acceptance and integration. The themes were used to answer the research questions presented in this case study.

### Research Question One

How will the integration of a student-supported professional development model impact teachers' perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction? Participants discussed their increased ease towards technology use and integration into classroom instruction and stated that they accepted it over time. Specifically, Mary noted that, "I was scared of integrating technology at the beginning of professional development." However, she said, "After student-support, it become easy to use technology in the classroom."

All seven participants were asked about the impacts of perceived ease of use, perceived usefulness, and intent to use technology in classroom instruction based on a student-supported professional development model. The five teacher participants felt that they had integrated technology more after student-support than during previous years, and the administrator participants echoed this sentiment. All participants also discussed an increase in rigor, time management, and a shift from teacher-led to student-led technology opportunities. Additionally, teacher participants said that prior to participating in professional development, they primarily used technology in the classroom for administrative purposes.

The participants also indicated that they were less concerned after integration of student-supported professional development about lacking knowledge about certain aspects of

technology. Rather, if they lacked a technology skill, then either a student would be familiar with it or the class would figure it out as a team. All participants felt that it is imperative to include students in technology professional development.

Despite the fact that all of the participants discussed increased levels of technology acceptance and integration into classroom instruction after student-support, James noted after the conclusion of professional development, "most of the teachers did not integrate technology past the level of what was taught during professional development." However, he added, "there is a subset of those teachers that has taken it further. The subset is small." In lieu of this, he further emphasized that the level in which participants have accepted technology and integrated it into classroom instruction had increased as a direct result of including students in technology professional development. "Teachers are more comfortable," he suggested, "and enjoy technology more after receiving student-supported technology professional development."

**Research Question Two**

How will the integration of a student-supported professional development model impact teachers' actual use of technology in classroom instruction? The integration of a student-supported professional development model resulted in an increase in technology usage in the classroom based on the findings. All seven participants acknowledged that before integration of the program, use of technology was not very prevalent for the purposes of classroom instruction. Afterwards, they acknowledged a significant increase in their use of technology in the classroom, as well as that of their colleagues. Furthermore, it could be observed that there was an increase in the number of observations where students and teachers were using technology in the classroom, and a decrease in the number of observations where no technology was being used

over the course of the study. This indicated an increase in the use of technology in the classroom, as well as an increase in teachers' comfort with using technology.

Opportunities to provide immediate feedback during technology integration, skill development, and the increase in academic rigor all impacted actual utilization. Immediate feedback enabled participants to clear up instructional misconceptions immediately. The importance of skill development increased actual use improving time management and user perceptions of their ability to use technology. Additionally, an increase in academic rigor resulted from student-supported technology professional development.

**Research Question Three**

What evidence suggests that student-supported professional development for technology is responsible for encouraging teachers to integrate it into the classroom? Participants reported that after student-supported professional development for technology, they learned better uses for technology. Additionally, participants were able to better plan and recall how to use certain aspects of technology through the support of the students. The teachers also reported that they planned to expand the use of technology into additional subject areas.

Looking at the results of the study, there are several notable effects of the integration of student-supported technology professional development. After integration, the use of technology in the classroom was more prevalent, and in particular, it's use for instructional as opposed to administrative functions increased. Teachers became noticeably more comfortable with technology over the course of the study, and students were more independent as a result of its integration.

## Discussion

Data evaluation revealed that participants' technology acceptance and integration increased as a result of student-supported technology professional development. Furthermore, the data indicated that participants felt that academic rigor, student problem solving, and communication increased with the integration of technology. This confirmed the review of literature on the benefits of technology integration in classroom instruction (Morgan, 2014; Navidad, 2013; Pamuk et al., (2013); Tamim et al., 2011). All seven participants noted the increase in technology integration after student-support. Participants also demonstrated acceptance by noting that they did not feel as if they needed to be technology experts prior to integrating technology into the classroom. I will begin by discussing the findings of this case study as they pertain to the theoretical framework. Then, I will relate conclusions to previous research discussed in the review of literature.

### TAM and Student-Supported Technology Professional Development

This study focused on the ways in which a student-supported technology professional development model encouraged changes in acceptance and use of technology among participants. As previously discussed, the theoretical framework that this study is based off of is TAM, which in turn is based on the theory of TRA. TAM focuses on direct influences on technology use, which concludes: If perceived ease of use is improved or perceived usefulness improves, the result will be actual use of technology in the classroom. A study by Naeini and Krishnam (2012) of Malaysian elementary students using computer games noted this connection. In it, a significant positive correlation between perceived ease of use and usefulness, and actual use of technology was indicated. However, this study did not focus on the use of technology by teachers for instructional purposes.

Based on the results of this study, several reasons are suggested (as it relates to the theoretical framework) for why student support and professional development translate to increased integration of technology in the classroom. For example, one participant stated that she accepted technology because she understood the important role that it plays in student learning. Further, she recognized the changing norms around her as being a result of technology professional development, which led to her change in attitude.

The findings indicate that professional development has the effect of increasing the likelihood that teachers will accept technology in the classroom. O'Koye (2010) reached similar conclusions by examining the effect of professional development through the use of a coach on technology integration in the classroom. The study used a small sample size of 14 teachers, with data collected via participant interviews and surveys, much like this study did. Participants credited changes in technology integration in the classroom to support provided from the technology coach. The authors concluded that teachers who worked with technology coaches demonstrated a significant increase in feelings of efficacy towards technology use in the classroom. Another study by Blackmon (2013) utilized survey data from middle school teachers that were asked to rate nine professional development methods. Of all nine methods, peer support or mentoring were perceived to be the most effective.

In addition to changing the perceived norms as they related to technology use, technology professional development also had the effect of improving its perceived usefulness. Participants interviewed indicated that they learned "better uses" for technology than they previously employed. Several of them noted that they felt comfortable using technology for purposes outside of instruction, such as administrative functions. However, after technology professional development, they had a greater understanding and were more comfortable using it for a wider

variety of functions and subjects. The implication is that participants identified a greater scope of use for technology, and as a result, were more likely to accept it. Linton et al. (2013) concluded similar results, which led to increases in technology integration and student achievement. However, they did not focus on support provided by students.

From the participant standpoint, student support had the effect of improving their perceived ease of use and usefulness of technology in the classroom. Several participants noted that technology was easier to use in the classroom with student support because teachers realized that they did not have to know every function because the students would provide assistance if needed.

As it relates to the use of students as mentors for technology in the classroom, some studies have examined the use of student technology teams in schools. Brooks-Young (2006) examined student technology teams in two middle schools to address lack of professional technology personnel. At both schools, students were trained to handle maintenance issues with software. The result was that at least one student in each classroom had the skills to fix or refer out technology issues that might occur, taking some of the burden from the teachers.

Breiner (2009) conducted a study on a similar program utilized at a middle school. In this program, some students were taught to provide technology assistance to teachers, rather than just serve as troubleshooters. As a result, those students were able to provide first-hand technology training to teachers.

Another study by Corso and Devine (2013) looked at the use of college students as technology mentors at a community college. The institution integrated a student technology mentor program, which was designed to support technology professional development as well as the integration of technology in the classroom. The program started with five students and

expanded to 40. The community college identified the program as a successful tool to support technology integration. These studies differ from this case study in the educational levels of the students and the manner in which students were used to facilitate the integration of technology in the classroom.

In terms of whether the student-supported technology professional development model was successful at the elementary school level at increasing the integration of technology in classroom instruction, there is no literature that examines this effect. The majority of relevant research on this topic pertained to either the efficacy of a student-support model or a professional-development model, but not both, and not at the elementary school level.

With regard to perceived usefulness, participants noted that the use of technology helped them better manage their time, be more efficient, and increase student engagement. The implication was that by utilizing student support for technology, teachers recognized the larger benefit from technology to their professional objectives and became more likely to accept it (Williams et al., 2014). Hyland and Kranzow (2012) concluded that technology integration is more efficient and increases time management, which concurs with this study. However, Hyland and Kranzow (2012) did not focus on students as a support system during technology professional development. Furthermore, research conducted by Esteve et al. (2015) supported increased student engagement results from technology access in the classroom; but unlike my case study, it only focused only on IWB access.

To summarize, the findings indicated that student support and technology professional development have the benefit of improving perceived ease of use and usefulness of technology by participants. As a result, the actual use of technology was increased. This supports the literature, which has demonstrated a correlation between perceived ease of use, usefulness, and

actual use. This also supports the findings of Aypay et al. (2012), who concluded that pre-service teachers' use of technology was highly influenced by TAM. Furthermore, Fishbein and Azjen (1980) suggested that when people view technology as being favorable, they are more likely to both acquire and utilize it.

**Technology Integration in the Classroom**

As stated earlier, teachers desiring to meet the needs of their students need to understand and use technology in classroom instruction (Aviles & Eastman, 2012). As such, there is an onus for an effective model of technology professional development. The literature suggests that technology integration had a positive impact on student learning. Research had shown that the use of technology in the classroom resulted in higher levels of student engagement and achievement (Morgan, 2014; Navidad, 2013; Tamim et al., 2011).

One such study, conducted by Hyland and Kraznow (2012), examined the perceptions of both teachers and students in the use of technology to develop critical thinking and self-directed search. The results of the study indicated that both students and faculty members felt that e-materials had a positive influence on students' learning behavior involving critical thinking and self-directed learning. Unlike my case study, they utilized closed- and open-ended surveys as their primary method of data collection. Furthermore, Hyland and Kraznow focused on the use of e-texts and e-libraries and conducted their study at a private, post-secondary institution, as opposed to an elementary school.

Blanchard et al. (2016) conducted a study investigating ongoing technology professional development (TDP) administered to 20 mathematics and science teachers. Data analysis resulted in the following: participant increases in technology comfort level, higher assessment scores,

substantial academic gains, and an increase in graduation rate. Unlike my case study, which focused on elementary school teachers, Blanchard et al. focused on high school teachers.

Hayden et al. (2011) conducted a similar study focusing on a structured professional development program known as iQUEST. It concluded that student academic performance demonstrated significant gains as a result of classroom technology integration. Different from my study, Hayden et al. (2011) enhanced technology integration through a trained adult mentor and focused only on science.

The above findings align with those of the current case study. Among the results, participants reported that after integration of student-supported technology professional development, participants were impressed by the students' ability to work independently, solve problems, and help each other when a technology related issue arose. Participants also noted that the use of technology seemed to benefit students' ability to think critically while solving problems and be more productive. Additionally, participants discussed that students wanted to learn more about different aspects of the technology.

**Technology Professional Development**

Regarding the effect of professional development on technology use, studies have found that teachers who receive effective technology professional development are more likely to integrate technology into the classroom. More specifically, researchers have found a positive correlation between professional development and technology use in the classroom, indicating that effective technology professional development is predictive of technology use (DeNisco, 2014; Ertmer et al., 2012; Badri et al., 2015). However, none of these studies have analyzed the degree to which professional development impacts technology use; rather, they only addressed only the perceived relationship and attitudes.

A study conducted by Badri et al. (2015) examined the correlation between technology professional development and technology use in the classroom. The results showed a significant positive correlation between the two, indicating that professional development is predictive of technology use. The study utilized survey data from secondary teachers. Another study by Gerard et al. (2012) suggested that classroom teachers who received professional development to help them understand how technology enhances and relates to curriculum were more successful at integrating it into their classrooms than were teachers who did not receive the professional development. Similar to this case study, technology professional development led to an increase in technology usage in the classroom; however, neither of these studies focused on student-support during technology professional development. In this study, technology integration primarily resulted from teacher's perception of technology becoming effortless and good for their job. Participants discussed technology was easier to use after student-supported professional development. Additionally, participants also pointed out that academic rigor increased, immediate feedback became possible, problem-solving skills increased, and technology skills were developed.

A number of factors have been found to contribute to the lack of integration of technology in the classroom, which professional development addresses. This includes inadequate preparation for the teacher to use technology for classroom instruction. A study by DeNisco (2014) found that 46% of kindergarten through 12th grade teachers stated that they lacked the skills to use technology effectively in the classroom, despite the fact that 93% of those surveyed reported that technology had a positive effect on student engagement. A study by Howley et al. (2011) found that teachers felt as though they had been inadequately prepared to provide technology opportunities for students. Another study by Asodike and Jaja (2012) in

Nigeria found that while most primary schools had at least one desktop computer per classroom, the majority of teachers felt that they did not have adequate computer skills, which they attributed to a lack of training. This indicates that although teachers recognize the benefits of technology integration, many lack the knowledge or understanding to do so in a classroom setting.

The findings of this study support these claims. Several teachers reported that before this program was integrated, they were comfortable using technology on their own. However, they were unsure how to integrate it into their teaching. After technology professional development, they noted that they were able to use the technology in the classroom. Additionally, teachers reported that among the major impediments to technology integration was the fact that they were not comfortable using it with students. From a theoretical standpoint, this supported the TAM, which suggests the connection between perceived ease of use and actual use of technology. After being trained to use technology in the classroom with student-support, teachers perceived that it would be useful; therefore, they choose to integrate it into classroom instruction.

Expanding on this subject, while there are past studies that have examined programs for technology professional development, most have looked at ineffective programs in order to understand what does work. Elements that have been noted as being effective include ongoing professional support and technology coaching and mentoring (Duran et al., 2011; Gayton & McEwan, 2010; Koh & Neuman, 2009; Lutrick & Szabo, 2012; Neuman & Cunningham, 2009; O'Koye, 2010). Another component that researchers support is an understanding of technology operation and application within professional development (Potter & Rockinson-Szapkiw, 2012). Linton & Geddes (2013) supported this claim by noting that instructional device and software

training resulted in an increase in teacher confidence with regard to the use of technology in the classroom.

Regarding the link between student support and technology use in the classroom, most studies have examined student technology leadership at the middle school and college level, but not at the elementary school level. Furthermore, these studies have focused on the use of students as mentors for teachers to perform certain tasks with technology and found these practices to be an effective method of technology integration (Breiner, 2009; Brooks-Uong, 2006; Corso & Devine, 2013).

Looking at the elementary school level specifically, there is evidence to support the potential success of student-support during technology professional development. Past studies have suggested that elementary school children, having grown up around technology, are more competent in using it (Bait, 2011; McAlister, 2009). Participants reported that a primary factor of their ability to integrate technology in the classroom was student knowledge. One participant noted that she felt the students helped teach her because they retained different pieces of information, and vice versa. Additionally, it was reported that student confidence with utilizing technology was never an issue; rather, the concern was the participants' lack of confidence. Participants in this case study further discussed the fear they had prior to student-supported professional development. After the intervention, participants reported that they no longer felt they had to be technology experts. Participants noted if they lacked the skill or understanding, then a student would provide needed guidance, thus increasing technology integration in classroom instruction.

## Implications

The purpose of this descriptive case study was to study teachers' technology acceptance and classroom integration in the context of a student-supported professional development model. Additionally, the desire was to better understand the role of student-supported technology professional development. All seven participants reported technology acceptance and integration increased after student-supported technology professional development. Therefore, it is imperative to point out the benefits of student-supported technology professional development to classroom instruction and achievement. As a result, the following implications originated from data collected from participants.

### Implication One

This study addressed the need for an effective model for supporting the teachers' acceptance and integration of technology in the classroom. In particular, it added to the literature by addressing this need at the elementary school level. There is an empirical gap in research about elementary student-supported teacher technology professional development. However, research does support secondary and collegiate students in this capacity (Breiner, 2009; Corso & Devine, 2013; Liu et al., 2015; Pierce, 2012).

Data collected from interviews, the survey, and archival data consisting of observations collected yearly during the 2013-14 and 2014-15 school years as part of program evaluation resulted in increases in participants' technology acceptance and classroom integration after involvement in student-supported technology professional development. Overwhelmingly, after student-supported technology professional development, participants noted that they were more comfortable using technology. This correlates with findings from Williams et al. (2014), which

indicated that technology that is perceived as being useful will be integrated into classroom instruction.

Furthermore, findings have implications at the organizational level and could benefit educational institutions in understanding the necessary aspects for implementing a program that would effectively advance the use of technology in the classroom. The findings could also provide a benefit from a policy perspective, as it helps policy makers better understand how technology can be used to enhance educational outcomes.

For educational institutions, this study indicates the need for a student-supported professional development model for successful integration of technology in the classroom. Additionally, the findings demonstrated a need for a long-term model of technology professional development with additional follow up for facilitating successful technology integration. Finally, the findings confirm that a student-supported model can be successful at the elementary school level. School administrators may want to include these elements into the design of any future programs intended to increase the use of technology in classroom instruction.

From a policy perspective, the findings from this study support previous studies that indicated technology use in the classroom can benefit learning and academic achievement. Based on the findings, policy makers may find it beneficial to increase funding for technology based initiatives in schools or for further study of the effect and success of such programs.

From a theoretical standpoint, findings indicate support for the TAM and TRA as effective models of technology integration in the classroom. The results show that professional technology development and student support benefit the ease of use and perceived usefulness of technology for classroom instruction among teachers. The result is an increase in acceptance and actual use of technology in the classroom. For school administrators to develop an effective

program for technology integration, they must consider elements that promote such perceptions and subsequently result in the desired outcome: increased acceptance and use of technology.

Based on these findings, several aspects should be present for schools looking to implement programs to advance the use of technology in the classroom. A long-term program of support for teachers is important, as it allows them to gradually become more comfortable using technology in the classroom and incrementally increase the scope of use. I highlight the importance of technology professional development in some form to enable teachers to utilize technology in the classroom. Additionally, a program whereby students and teachers learn together to use technology is effective at all educational levels because it enables teachers and students to help each other when knowledge gaps arise.

**Implication Two**

The second implication from this study was the need for schools to utilize students as support for teacher technology professional development. Students have played many roles in supporting technology, including repairs and quick fixes, training, and mentors (Brooks-Young, 2006; Breiner, 2009; Corso & Device; 2013 Peto et al., 1989; Pierce, 2012). In this study, which featured student-supported technology professional development, participants stated that they no longer felt the need to know and understand every aspect of technology prior to using it in the classroom because if they did not know something, then a student would.

Members of Generation Z, which encompasses current elementary school-aged students, are technology savvy, access digital information easily, and are able to navigate digital environments with ease (Emanuel, 2013; Gibson & Sodeman, 2014; Hartman & McCambridge, 2011). Additionally, they accept technology shifts faster than previous generations (Bajt, 011; Gu et al., 2013; Krier, 2008). Research conducted by McAlister (2009) confirmed that students

are willing to try multiple techniques using technology in order to succeed. Wikia Technology (2013) collected data from 1,200 students and concluded that they display quick adaptive behaviors and use technology in more advanced ways than previous generations.

## Delimitations and Limitations

Delimitations in research focused on the boundaries of the study and on determining how the study findings could possibly lack generalization (Glatthorn & Joyner, 2005). Delimitations consist of the nature of the sample size, setting, and time frame (Glatthorn & Joyner, 2005). Limitations are considered probable weaknesses with the study (Creswell, 2013). Creswell identified limitations as inadequate measures, loss or lack of participants in the study, and small sample size.

### Delimitations

The delimitations for this study included the target teacher and administrator population and the sample. The target population consists of elementary teachers who participated in student-supported technology professional development and administrators that observed student-supported technology professional development at least three times in either the 2013-14 and/or 2014-15 school years. This study only included elementary teachers and administrators because there are no research studies focusing on elementary students acting in a support role for teacher professional development at this level. Previous research involving elementary students focuses on technology troubleshooting, but does not include them supporting technology for professional development to raise teacher acceptance and integration into classroom instruction. This study only focused on teacher technology acceptance and classroom integration, but not on student perceptions or views; therefore, data was not collected from students.

**Limitations**

The limitations within this study serve as a reference for determining the extent to which the findings can be applied to other schools (Creswell, 2013). Limitations that occurred in this study included: population, sample size, timeframe of study, and male-to-female ratio as it pertains to data analysis. The research population may not be representative of other populations in other school districts. The target population for this study had access to multiple technological devices, which eliminated access to device issues like not having a device for each student to use. The administration in the school district where this study was conducted supported technology integration in classroom instruction, but this may not have been the circumstance in other public school populations.

There are certain limitations that influenced the accuracy of the results. Among the most important considerations is the limit of the sample to a single school district in one geographical area. It is possible that the particular school district and location may have different experiences or cultural attitudes towards technology from the general population. That, in turn, could impact the outcome of the integration of such a program. The use of a single institution for observation and the lack of comparison to other institutions that utilized a different approach for technology integration make it difficult to analyze the effectiveness of a student-supported technology professional development model in comparison to other approaches, as well as identify specific aspects of the program that were effective.

Another issue included the small sample size, which tends to be an issue in case studies. The school at which this study took place had 26 teachers, of which only 15 attended student-supported technology professional development and five agreed to participate in this study. Of the four administrators that observed student-supported technology professional development at

least three times during the 2013-14 and/or 2014-15 school years, only two agreed to participate in the study. This small sample size can make it difficult to draw conclusions that can be attributed on a wider scale.

Additionally, the length of the study, which extended over the course of two school years, may have caused some teachers and administrators to not want to participate. Furthermore, the use of a single institution for observation and the lack of comparison to other institutions and approaches made it difficult to analyze the effectiveness of a student-supported technology professional development model. Further, it became difficult to identify specific aspects of the program that worked best.

Finally, the male-to-female ratio, which is an aspect that cannot be controlled for, may have impacted the results. The majority of data was gathered from females due to the location chosen for the study. Past studies have suggested that technology behavior varies between males and females; therefore, gender differences may affect the results and compromise the generalizability of these conclusions to male teachers. In analyzing the results, the open-ended nature of this case study approach has some limitations, as it means that the interpretation of the findings is less clear cut and open to differing individual perspectives.

## Recommendations for Future Research

This case study added to the literature regarding teacher acceptance and integration of technology in the classroom by examining the subject in the context of elementary level education and a student-supported professional development model. However, the application of the findings of this study is limited by the small sample size and specific population evaluated, from both an age and geographical standpoint.

To deal with the limitations discussed above, there are some measures that may be taken in future examinations of this subject. Future studies should attempt to utilize a larger sample size in order to broaden the generalizability of the findings. This may be done by utilizing a multi-case case study, which would allow for data to encompass a wider scope of participants, rather than limiting the observations to a single school. This would also allow for change over time to be evaluated more effectively, as a greater number of individuals would likely remain in the study given the ease of responding.

It may also be beneficial to explore this subject using a quantitative approach instead of a qualitative one. Using a quantitative approach, one could explore the change in the amount of class time spent using technology or the number of subjects taught with technology being the primary tool for instruction. Future studies may also look more closely at how elements of teachers' backgrounds (i.e., experience or subject taught) impact the integration of technology in the classroom. This might mitigate, to a certain extent, issues of gender ratio by singling out specific teacher qualities. These strategies may make the results generalizable on a wider scale and more conclusive.

With regard to how the topic pertains to the effectiveness of a student-supported technology professional development model, future studies might evaluate the impact of such a model for other age groups, such as middle school, high school, or college level. It might also be beneficial to explore aspects of similar models at different schools, both public and private, to identify the effectiveness of individual parts of the model. In addition to exploring the effectiveness of a student-supported model on the integration of technology in the classroom, it may also be interesting to examine how this model impacts students' academic performance, which can be examined using questionnaires.

## Summary

This descriptive case study was conducted for the purpose of examining teachers' acceptance and integration of technology in the classroom in the context of a student-supported professional development model, particularly at the elementary school level. The expectation based on the theoretical framework was that a student-supported professional development model would improve the teachers' ease of use and increase the acceptance and actual use of technology in the classroom. Based on the literature relating to the subject matter, the expectation was that a professional development model, particularly one relating to student-support, would advance the acceptance and integration of technology in the classroom.

The finding of the study indicated that teachers were more likely to utilize technology in the classroom for the purposes of instruction after the integration of a student-supported technology professional development program. Furthermore, lining up with the theoretical framework, it seemed that this outcome was due to improved recognition among teachers regarding the perceived ease of use of technology. This chapter included a discussion of findings and implications, as well as suggestions for future research.

The findings of this study, combined with that of the literature, highlight the benefits and importance of student-support during professional development on the acceptance and ability of teachers to integrate technology in the classroom. The review of literature discussed success with the implication of students as mentors and professional development instructors, but research did not focus on elementary students taking on these roles. The significant difference from previous research and this study is the use of elementary student-support during technology professional development.

Participants documented that technology integration into classroom instruction was important; however, the majority of them noted limited use prior to student-supported technology professional development. After student-support, all participants discussed their increase in not only technology integration in the classroom, but also acceptance of it. Additionally, data revealed that all participants have continued to use technology in the classroom. The findings from this study have the potential to provide an additional technology professional development model.

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# APPENDIX A

## TEACHER INTERVIEW QUESTIONS AND SCRIPT

Hello, my name is Jenny Michelle Owens Whitt. I am an Ed.D candidate at Liberty University. I am inviting you to participate in a descriptive case study focusing on teacher technology acceptance and classroom integration in context to a student-supported professional development model. Throughout this descriptive case study, you will be identified by a pseudonym that I generate in order for your responses to be confidential. I will be recording this interview, which you have already provided consent. I am required to keep a transcript of the recording for a minimum of three years. This interview will be transcribed and you will be provided with a copy to review for accuracy. At that time, you can clarify responses and make changes. Once your edited copy is returned to me, I will delete all previous copies. In addition, I will keep the final copy in a password-protected computer used for research and a password-protected thumb drive, which will be secured in a locked file cabinet that only I have the key to. Before we begin the interview, I would like to inform you that this is voluntary; therefore, you can stop participation at any time. You have the right to decide not to answer any questions. If you decide to stop participation, your data will be destroyed and will not be used in this study. I recommend that you answer the questions in a truthful manner and to the best of your ability. If at any time I feel that you are experiencing discomfort, I will stop the interview.

**Audio Recoding: Destruction**

You have the right to withdraw participation from this study at any time. In order to withdraw, you need to notify me that you no longer wish to be part of the study and that you would like all data associated with you destroyed, to include your audio recording, and not used in this study. When this is received, I will destroy all data collected from you. There are already

specific questions established; however, additional questions might emerge throughout the interview.

**Definitions:**

In this descriptive case study, technology will be defined as using the Internet on an iPad™ or laptop in a classroom environment as an instructional and learning tool. Student-supported professional development will be defined as teachers receiving and participating in nine sessions of technology professional development with the students in their classroom.

1. Please describe your teaching experience, beginning with the number of years you have taught.

2. Please describe your educational background, technology training and implementation prior to participation in student-supported professional development.

3. What impact has student-supported professional development had on your ability to use technology in your classroom?

4. Please describe your comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development.

5. How often do you use technology during classroom instruction to do a task when there is a feature to help you perform it?

6. To what extent has student-supported professional development impacted your future use of technology classroom instruction?

7. To what extent has student-supported professional development impacted time management while using technology in your classroom instruction?

8. To what extent has participating in student-supported professional development

provided you with a great deal of experience using technology during classroom instruction?

I appreciate you taking the time to complete this interview. Your responses will be used throughout this case study. Do you have any questions that you would like to ask me?

## APPENDIX B:

## ADMINISTRATOR INTERVIEW QUESTIONS AND SCRIPT

Hello, my name is Jenny Michelle Owens Whitt. I am an Ed.D candidate at Liberty University. I am inviting you to participate in a descriptive case study focusing on teacher technology acceptance and classroom integration in context to a student-supported professional development model. Throughout this descriptive case study, you will be identified by a pseudonym that I generate in order for your responses to be confidential. I will be recording this interview, which you have already provided consent. I am required to keep a transcript of the recording for a minimum of three years. This interview will be transcribed and you will be provided with a copy to review for accuracy. At that time, you can clarify responses and make changes. Once your edited copy is returned to me, I will delete all previous copies. In addition, I will keep the final copy in a password-protected computer used for research and a password-protected thumb drive, which will be secured in a locked file cabinet that only I have the key to. Before we begin the interview, I would like to inform you that this is voluntary; therefore, you can stop participation at any time. You have the right to decide not to answer any questions. If you decide to stop participation, your data will be destroyed and will not be used in this study. I recommend that you answer the questions in a truthful manner and to the best of your ability. If at any time I feel that you are experiencing discomfort, I will stop the interview.

**Audio Recoding: Destruction**

You have the right to withdraw participation from this study at any time. In order to withdraw, you need to notify me that you no longer wish to be part of the study and that you would like all data associated with you destroyed, to include your audio recording, and not used in this study. When this is received, I will destroy all data collected from you. There are already

specific questions established; however, additional questions might emerge throughout the interview.

**Definitions:**

In this descriptive case study, technology will be defined as using the Internet on an iPad™ or laptop in a classroom environment as an instructional and learning tool. Student-supported professional development will be defined as teachers receiving and participating in nine sessions of technology professional development with the students in their classroom.

**Definitions**

In this descriptive case study, technology will be defined as using the Internet on an iPad™ or laptop in a classroom environment as an instructional and learning tool. Student-supported professional development will be defined as students receiving and participating in nine sessions of technology professional development with their classroom teacher.

1. Please describe your professional and educational background.
2. Please describe technology usage throughout the elementary school prior to student-supported technology professional development that started in the 2013-14 academic school year.
3. Please describe your perceptions of teacher comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development that began in the 2013-14 academic school year.
4. Please describe your perceptions of student comfort level using technology in classroom instruction and if this changed after participating in student-supported professional development that began in the 2013-14 academic school year.

5. Please describe how often and at what level you observe technology usage during classroom instruction in a classroom where student-supported technology professional development occurred?
6. Please describe how often and at what level you observe technology usage during classroom instruction in a classroom where student-supported technology professional development was not conducted?
7. To what extent has student-supported professional development impacted teacher technology acceptance and integration into classroom instruction?

I appreciate you taking the time to complete this interview. Your responses will be used throughout this case study. Do you have any questions that you would like to ask me?

## APPENDIX C:

## TECHNOLOGY ACCEPTANCE MODEL SURVEY

NOTE: This survey was modified to target classroom instruction with permission from Davis' (1989) based off of his survey used to evaluate user perceptions towards technology systems.

5 = Strongly Agree
4 = Somewhat Agree
3 = Neither Agree or Disagree
2 = Somewhat Disagree
1 = Strongly Disagree

1. Using the Internet in my classroom can enable me to accomplish tasks more quickly_____
2. Using the Internet in my classroom can improve my performance_____
3. Using the Internet in my classroom can make it easier to do my tasks_____
4. Using the Internet in my classroom can increase my productivity_____
5. Using the Internet in my classroom can enhance my effectiveness while teaching _____
6. I find the Internet useful in my teaching _____
7. Learning to use the Internet in my classroom instruction is easy for me_____
8. I find it easy to find what I need or want to integrate into classroom instruction from the Internet_____
9. My interaction with the Internet during classroom instruction is clear and understandable_____
10. I find the Internet to be flexible to interactive with when integrating it into classroom instruction_____
11. It is easy for me to become skillful at using the Internet for classroom instruction _____

12. I have fun interacting with the Internet in my classroom instruction _____
13. Using the Internet provides me with a lot of enjoyment during my classroom instruction _____
14. I enjoy using the Internet in my classroom instruction_____
15. Using the Internet in my classroom instruction bores me_____
16. I always try to use the Internet during classroom instruction to do a task whenever it has a feature to help me perform it_____
17. I always try to use the Internet in as many cases or occasions as possible during classroom instruction_____
18. I expect my use of the Internet in my classroom instruction to continue in the future_____
19. Using the Internet in my classroom instruction can take up too much of my time when performing many tasks_____
20. When I use the Internet in my classroom instruction, I find it difficult to integrate the results into my existing work_____
21. Using the Internet for classroom instruction and data collection exposes me to the vulnerability of computer breakdowns and loss of data_____
22. I have a great deal of experience using the Internet during classroom instruction _____
23. Number of years using the Internet_____ /Number of years using the Internet in classroom instruction _____

**APPENDIX D: IRB APPROVAL**

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

8/17/2016

Jenny Michelle Owens Whitt IRB Approval 2594.081716: A Descriptive Case Study: Elementary Teachers' Technology Acceptance and Classroom Integration

Dear Jenny Michelle Owens Whitt,

We are pleased to inform you that your study has been approved by the Liberty IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project. Sincerely,

**G. Michele Baker, MA, CIP**

*Administrative Chair of Institutional Research*

**The Graduate School**

*Liberty University | Training Champions for Christ since 1971*

## APPENDIX E: Invitation to Participate:

RECRUITMENT NOTICE:

TO PARTICIPATE IN A DOCTORIAL RESEARCH PROJECT

Date:

[Recipient]

Dear [Recipient]:

As a graduate student in the Department of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Education degree. The purpose of my research is to inviting you to examine technology acceptance and classroom integration in context to a student-supported professional development model. I am writing to invite you to participate in my study.

If you are a teacher whom participated in student-supported technology professional development provided by me during the 2013-14 and/or 2014-15 school year and will willing to participate, you will

- Complete an on-line survey conducted through Survey Monkey®, which should take approximately five minutes
- Participate in an approximately 20 minute Face-to-Face Open-Ended Interview

If you are an administrator whom observed student-supported technology professional development provided by me in the 2013-14 and/or 2014-15 school year, and will willing to participate, you will

- Participate in an approximately 20 minute Face-to-Face Open-Ended Interview

Your participation will be completely anonymous, and no personal, identifying information will be required.

To participate, complete the Informed Consent and return it to me via e-mail. You will then receive the Participation Survey and a place where you can suggest a time and date we can meet to conduct the Face-to-Face Open-Ended Interview.

The attached consent document contains additional information about my research. Please sign the consent document and return it to me.

*Sincerely,*

Jenny Michelle Owens Whitt

Liberty University Doctoral Candidate

## APPENDIX F: INFORMED CONSENT

The Liberty University Institutional
Review Board has approved
this document for use from
8/17/2016 to 8/16/2017
Protocol # 2594.081716

INFORMED CONSENT FORM
A DESCRIPTIVE CASE STUDY: ELEMENTARY TEACHERS' TECHNOLOGY ACCEPTANCE AND
CLASSROOM INTEGRATION

Jenny Michelle Owens Whitt
Liberty University
School of Education

You are invited to participate in a research study of teacher technology acceptance and classroom integration in the context of a student-supported professional development model that occurred during the 2013-14 and 2014-15 school year. Both teacher and administrator cases will be selected in this descriptive case study. Teacher cases were selected because of participation in student-supported professional development during the 2013-14 and/or 2014- 15 academic school years. Administrator cases were selected based on observations of student- supported technology professional development in the 2013-14 and/or 2014-15 academic school years. Please read this form and present any questions you may have before agreeing to be in the study.

Jenny Michelle Owens Whitt, a student/doctoral candidate in the School of Education at Liberty University, is conducting this study.

Background Information:

The purpose of this study is to examine teacher technology acceptance and classroom integration in the context of a student-supported professional development model.

Procedures:

If you agree to be in this study, you will be asked to do the following based off of student-supported professional development that you previously received:
1. Answer technology usage and demographic questions to include educational background and experiences during a voice recorded interview lasting approximately 20 minutes, and
2. Answer a 23-question, 5-minute survey focusing on technology usage (teacher cases only).
3. I will retrieve teacher observations conducted during the 2013-14 and 2014-15 school year that focused on technology integration. All observations were conducted by me as part of program evaluation and district technology integration into classroom instruction (teacher cases only).

Risks and Benefits of Participation:

- The risks are minimal and no more than one would encounter in everyday life.

The benefits to participation are:

- Cases in the study will receive no direct benefit. The professional development occurred in the past.

The benefits to society are:

- The possible benefits to society is the contribution to the current and future research of an effective technology professional development model resulting in teacher technology acceptance and integration in classroom instruction. If this technology professional development model is effective then the benefits would be to school districts, teachers, parents, and students.

Compensation:

You will receive no compensation for taking part in this study.

Confidentiality:
Any information collected in this study is considered confidential and will be disclosed only with permission from the case or as required by law. The information collected from you will be coded using a pseudonym. The information that has your identifying features, such as your name, will be kept separately in a password-protected thumb drive to which only the researcher has access. One document identifying cases and their pseudonyms will be stored in a separate password protected thumb drive to which only the researcher has the password. Interview audio recording will be conducted using pseudonyms, and records will be secured. Once transcribed, audio recordings will be deleted. All data will be stored for three years then it will be destroyed.

After the results are published or discussed, no identifying information will be included. You will be referred to by the pseudonym provided by the researcher.

The records of this study will be kept private. In any reports published, information making it possible to identify a subject will not be included. Research records will be stored securely, and only the researcher will have access to the records.

Voluntary Nature of the Study:
Participation in this study is voluntary. Your decision whether or not to be a case will not affect

your current or future relations with Liberty University or your current school district. If you decide to be a case, you are free to not answer any question or withdraw at any time without affecting those relationships.

How to Withdraw from the Study:

If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data collected from you will be destroyed immediately and will not be included in this study.

Contacts and Questions:

The researcher conducting this study is Jenny Michelle Owens Whitt. You may ask any questions you have now. If you have questions later, you are encouraged to contact her at jwhitt9@liberty.edu or 816-592-9871. You may also contact the research's faculty advisor, Dr. Jennifer Courduff, at jlcourduff@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, you are encouraged to contact the Institutional Review Board, 1971 University Blvd, Green Hall Suite 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this information to keep for your records.

Statement of Consent:

I have read and understood the above information. I have asked and received answers to my questions. I consent to participate in the study.

__ The researcher has my permission to audio-record me as part of my participation in this study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

## APPENDIX G:

## TECHNOLOGY PROFESSIONAL DEVELOPMENT WEEKLY SESSION CONTENT

| Week | Content |
|---|---|
| Week 1 | • iPad™ Introduction<br>• iPad™ Quick Fixes<br>• Weekly Assignment: Familiarize self with the iPad™ |
| Week 2 | • Review Quick Fixes<br>• iPad™ App Introduction<br>• Curriculum and App Connection<br>• Weekly Assignment: Use at least one App in classroom instruction to support curriculum |
| Week 3 | • iPad™ App Review<br>• Google Classroom™ and Curriculum Connection<br>• Google Classroom™ Introduction<br>• Google Classroom™ Log-in<br>• Weekly Assignment: Teacher will create a Google Classroom™, allow students access, and post at least one assignment that supports curriculum. Have students complete the assignment and post in Google Classroom™. |
| Week 4 | • Google Classroom™ Review<br>• Connecting Curriculum and Google Classroom™<br>• Google Classroom™ Assignment and Upload Activity<br>• Weekly Assignment: Teacher will post at least one assignment that supports curriculum in Google Classroom™. Have students complete the assignment and then post in Google Classroom™. |
| Week 5 | • iPad™ Quick Fixes Review<br>• Curriculum and Educreations™ Connection<br>• Introduce and provide instruction on the use of the App Educreations™ to include drawing, uploading a picture, recording voice, and saving finished project.<br>• Weekly Assignment: Teacher and students work together to upload a picture, type a sentence, record voice, and save. In addition, the teacher will provide the researcher with ideas as to how projects using Educreations™ can be used to support curriculum and in classroom instruction. |

| | |
|---|---|
| Week 6 | • Curriculum and Connections to Educreations™ discussion<br>• Review Educreations™ focusing specifically on how to use.<br>• All participants and students create a project with at least three pages using the App Educreations™.<br>• Introduce options for uploading finished projects using Educreations™ into Google Classroom™.<br>• Weekly Assignment: The teacher participant will create a lesson where students create a project using Educreations™. The participant will create an assignment in Google Classroom™ that includes the student uploading their Educreations™ project into Google Classroom™. |
| Week 7 | • Curriculum and Questioning Using Technology: emphasizing options for generating questions and discussions using technology.<br>• Introduce Announcements as Discussion Board in Google Classroom™<br>• Establish classroom rules and expectations while in an on-line discussion board forum<br>• Weekly Assignment: After completing a lesson, the teacher participant will generate and participate in a discussion board with students. |
| Week 8 | • Curriculum and Google™ Presentation Introduction<br>• Curriculum and Google™ Presentation Connection<br>• Google™ Presentation Instruction: How to use it?<br>• Weekly Assignment: Teacher participant will create an assignment in Google Classroom™ where the student is required to create and then upload the Google™ Presentation into Google Classroom™. |
| Week 9 | Discussion: Review Curriculum and Technology: How can technology be implemented in the classroom to enhance learning and curriculum? Discuss ideas for future technology use in classroom instruction. |

# APPENDIX H

## TECHNOLOGY ACCEPTANCE MODEL SURVEY PERMISSION FOR USE

**Copy of E-mail from Dr. Fred Davis** (May 27, 2016)

Jenny,
You have my permission to modify and use the survey I developed for your research. The only suggestion that occurs to me is that researchers usually average the numerically coded values for the answers to perceived usefulness and perceived ease of use questions, respectively, to compute overall scores or ratings for these constructs.

Best wishes,

Fred Davis

**Copy of E-mail from Jenny Michelle Owens Whitt to Dr. Fred Davis** (May 27, 2016)

Dr. Davis:
I am seeking permission to use a modified version modified version of the survey developed by you for assessing user perceptions of technology systems in my dissertation. I was wondering if you could provide me with guidance on this journey? I know that you are a very busy man; therefore, I would be appreciating any guidance that you might offer. I have provided the purpose for my study and a copy of my survey below.

Thank you for taking the time to read my e-mail.
Jenny Whitt

Purpose Statement: The purpose of this descriptive case study is to examine teachers' technology acceptance and classroom integration in the context of a student-supported professional development model at an elementary school located in northwestern Missouri.

Survey Questions:

**TECHNOLOGY ACCEPTANCE MODEL SURVEY**
**(Modified to target classroom instruction)**

5 = Strongly Agree
4 = Somewhat Agree
3 = Neither Agree or Disagree
2 = Somewhat Disagree
1 = Strongly Disagree

1. Using the Internet in my classroom can enable me to accomplish tasks more quickly_____

2. Using the Internet in my classroom can improve my performance_____
3. Using the Internet in my classroom can make it easier to do my tasks_____
4. Using the Internet in my classroom can increase my productivity_____
5. Using the Internet in my classroom can enhance my effectiveness while teaching _____
6. I find the Internet useful in my teaching _____
7. Learning to use the Internet in my classroom instruction is easy for me_____
8. I find it easy to find what I need or want to integrate into classroom instruction from the Internet_____
9. My interaction with the Internet during classroom instruction is clear and understandable_____
10. I find the Internet to be flexible to interactive with when integrating it into classroom instruction_____
11. It is easy for me to become skillful at using the Internet for classroom instruction _____
12. I have fun interacting with the Internet in my classroom instruction _____
13. Using the Internet provides me with a lot of enjoyment during my classroom instruction _____
14. I enjoy using the Internet in my classroom instruction_____
15. Using the Internet in my classroom instruction bores me_____
16. I always try to use the Internet during classroom instruction to do a task whenever it has a feature to help me perform it_____
17. I always try to use the Internet in as many cases or occasions as possible during classroom instruction_____
18. I expect my use of the Internet in my classroom instruction to continue in the future_____
19. Using the Internet in my classroom instruction can take up too much of my time when performing many tasks_____
20. When I use the Internet in my classroom instruction, I find it difficult to integrate the results into my existing work_____
21. Using the Internet for classroom instruction and data collection exposes me to the vulnerability of computer breakdowns and loss of data_____
22. I have a great deal of experience using the Internet during classroom instruction _____
23. Number of years using the Internet_____ /Number of years using the internet in classroom instruction _____

# APPENDIX I:

## SAMPLE OBSERVATION NOTES

**Objective:** Technology Inclusion in Classroom Instruction
**Setting:** (Classroom/Teacher/Subject)
**Observer:** Researcher
**Role of Observer:** Participant Observations
**Time/Date:**
**Length of Observation:**

**Technology Inclusion Observation Description:**
**Example 02/11/2015:** Students were working on making a weather book. As part of the weather book, students were creating an animated video describing the process of either rain, freezing rain, or how snow can change into rain (vice versa) before it hits the ground. The animated video was created using PowToon. Once the videos were published, the link was copied and placed in the students' weather book.

Teacher: "grab your computers. You need to log-n get your PowToons and work on it. Your job today is to log back end, look it over, and then finish it. By the end of lass we will publish PowToon, log into your weather book, and place the link in your weather book."

**Reflective Notes:**
**Example 10/2013:** This was a scheduled technology implementation observation. Teacher commented that she could show a video, show a picture, and use the elmo and that was the extent of her technology usage. The teacher is not comfortable with technology. Each time the screen went blank, time out period, the teacher made a reference about technology. "Technology is so confusing." "I am sorry, I just don't know why it keeps doing that." "How can I fix this." "I should have just copied this." "I have other things to do. This is why I do not use technology."

**Example 10/2014:** The teacher was able to guide students through fixing minor issues such as turning the volume down and up and home key fixes, but the teacher was unwilling to explore with anything that was not in her comfort level. The item the teacher would not handle was turning the volume on. This skill was covered multiple times during the previous PD where the iPad was introduced. The teacher did not check to make sure that students were where they were suppose to be while working with the iPads. There was no direct content link to the iPad activity. The researcher was under the impression that the iPad was used to keep students focused and occupied while the teacher worked in small groups.

**Example 02/2014:** The teacher did ask the researcher one question for clarity. The teacher asked a specific question about the voice recording on educreations. The teacher asked if clearing the recording on one page would clear all of the recording? The teacher easily asked, answered and redirected questions about the technology side of the assignment. Student demonstrated independence. They were able to complete the tasks observed by the researcher with limited support from the teacher.
(Modeled after Creswell, 2008, p. 224)

## APPENDIX J:

## SAMPLE REFLECTIVE JOURNAL

August 16, 2016 (Note to Self): To ensure my bias does not interfere with data analysis, I will use data that is a direct reflection of each participants' views and not my own experiences (Creswell, 2013). In order to do this, I will employ specific safeguards, such as member checking and acknowledging my personal experiences so that I ensured that the study remains focused on the participants' (Creswell, 2013).

September 4, 2016: Reviewed data analysis procedures. Need to reread all data to familiarize myself with what the participant is saying, what they did, and what occurred during observations. Address personal bias.

October 3, 2016 (Note to Self): Member checks occurred, which consisting of the review of interview manuscripts and findings. I also asked specific prepared questions and did not interject any of my opinions. Peer reviews and reflective notes were used as tools to reduce potential influences of my bias on any data collected and analyzed.

November 1, 2016: Finish second round of coding. Look for: Sort data and categorize. Remember that NVivo software does not code. It notes frequency. I need to label and code. Code each participant as an individual and then as a whole for reoccurring themes.

February 2017: Four Themes

# APPENDIX K:

# PRIMARY THEMES AND SUBTHEMES

| Primary Themes | Subthemes Related to Primary Themes |
|---|---|
| Skill and Knowledge Development | • Skill Developed to Maximize Usage<br>• Student Skill and Knowledge (Pre)<br>• Student Skill and Knowledge (Post)<br>• Teacher skill and Knowledge (Pre)<br>• Teacher Skill and Knowledge Post<br>• Student Need to Acquire Skills<br>• Student and Teacher Confidence Improved<br>• Teacher Fear of not Enough Skills<br>• Teacher and Student Skills Need to Increase<br>• Skills Change Classroom Instruction<br>• Technology Skills |
| Lack of Use Prior to Intervention/Professional Development | • Experience<br>• Prior to Student-Supported Technology<br>• Primarily Played Games<br>• Computer Lab for Fun Only<br>• Limited Technology Acceptance<br>• Limited Technology Usage (Classroom)<br>• Primarily Overhead Projector<br>• Unused Technology Throughout School<br>• Basic Technology Skills<br>• Personal Usage, but Limited Classroom<br>• Prior Technology Professional Development Not Integrated into the Classroom |
| Successful Experience with Technology | • Experience<br>• Resulted from Student-Supported Professional Development<br>• Perceived Usefulness<br>• Perceived Ease of Use<br>• Intent to Use<br>• Actual Use<br>• Teachers Impressed with Students<br>• Daily Usage Increased<br>• Enhanced rigor and Creativity<br>• Impact on Student Learning and Instruction<br>• Improved Accountability<br>• Increased Productivity<br>• Cross-Curriculum Impacts<br>• Various Levels of Technology Integration<br>• All Students are Learning<br>• Students on Task<br>• Troubleshooting with Students<br>• Student Independence<br>• More Options to Display/Complete Work<br>• Increased Problem-Solving, Communication, and Classroom Management |

| | |
|---|---|
| | • Accessible and Advantages<br>• Student and Teacher Expanded Technology Skills<br>• Content Easier: Ex. Research<br>• Improved Teaching<br>• Effects of Technology |
| Evidence of Acceptance and Integration | • Prior to Student-Supported Technology<br>• Creating Animated Videos<br>• Technology Usage in the Classroom<br>• Carts no Longer Sitting Unused<br>• Technology Used to Instruct Students<br>• Teachers are willing to Use Technology<br>• Increase in Student and Teacher Acceptance<br>• Prior: Technology Integration was Minimal<br>• Post: Problem-Solving Skills and Upper-Level Critical Thinking Demonstrated<br>• Changes in Teacher Attitudes (Proud)<br>• Acceptance of Technology Due to Being Progressive<br>• Virtual Books: Creating Pictures and Text and Reading the Text<br>• Understanding of the Role Technology Plays in Student Learning<br>• Engaging<br>• Enhanced Student Learning<br>• Teachers went from Fear to Give Me More<br>• Continued Usage Past Student-Supported Professional Development<br>• Confidence Boost<br>• Technology: Overhead Projector, iPads, laptops, Internet, specific apps, and Programs<br>• Model: Teacher Lead to Student Lead<br>• Collaboration During Technology Integration<br>• Educreations<br>• Observations of Technology Integration<br>• Projects Demonstration Higher-Level Thinking<br>• Apple TV<br>• Weather Books (Science)<br>• Acceptance and Integration |