7-2015

# Teacher Perceptions of Factors Influencing Their Self-Efficacy with Using One-to-One Technology During Literacy Instruction

Michael Todd Methvin
*University of Arkansas, Fayetteville*

# Teacher Perceptions of Factors Influencing Their Self-Efficacy with Using One-to-One Technology During Literacy Instruction

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Education in Educational Leadership

by

Michael Todd Methvin
Roger Williams University
Bachelor of Arts in Corporate Communications, 1998
Missouri State University
Master of Arts in Educational Administration, 2006
Southwest Baptist University
Educational Specialist in Superintendency, 2012

July 2015
University of Arkansas

This dissertation is approved for recommendation to the Graduate Council.

_____
Dr. Ed Bengtson
Dissertation Director

_____
Dr. Jennifer Beasley
Committee Member

_____
Dr. Kara Lasater
Committee Member

## Abstract

Teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction were examined through a multi-site, multi-subject case study. An initial survey was administered to determine the self-efficacy level of a group of participants from a school district that was implementing a one-to-one technology initiative. From this initial data set, four participants with varying levels of self-efficacy were invited to participate in the second, qualitative, phase of the data collection process to better understand factors they perceived to influence these levels. Results revealed that teachers perceived their self-efficacy of one-to-one technology use during literacy instruction to be influenced by several factors including the overall value they assigned to technology and the level of technical and moral support they received. Common themes emerged that indicate more can be done to improve teachers' self-efficacy with one-to-one technology use, which may in turn increase district's return on their technology investment.

**Acknowledgements**

A special note of gratitude to my dissertation chair and academic advisor, Dr. Ed Bengtson, for your support and guidance throughout the program coursework and research process. You challenged me to think outside of my own framework and to reflect on my role as an educator in broader terms. I am also thankful to my dissertation committee, professional colleagues, and the other doctoral students in our cohort for your encouragement and assistance.

## Dedication

I would like to dedicate this work to my wife, Kristal, and our three children, Jacob, Makayla, and Kennedy. Words cannot express how much your love, support, and patience have meant to me when I had to spend many evenings and weekends working on course assignments or writings related to my research instead of spending precious time with you all. I love you and am so blessed that God has brought you into my life to remind me of what matters most in this world.

## Table of Contents


CHAPTER ONE - INTRODUCTION ..... 1

Problem Statement ..... 2

Purpose Statement ..... 3

Research Questions ..... 4

Overview of Methodology ..... 4

Rationale and Significance ..... 5

Role of the Researcher ..... 5

Researcher Assumptions ..... 6

Definition of Key Terms ..... 7

Organization of the Dissertation ..... 8

CHAPTER TWO – REVIEW OF THE LITERATURE ..... 10

Introduction and Overview ..... 10

Summary of the Literature ..... 11

Examples of Research Methods ..... 12

21st Century Learners ..... 20

Technology in Education ..... 21

Challenges to Technology Professional Development in Education ..... 35

Self-Efficacy as a Factor in Technology Use ..... 38

Conclusion ..... 41

CHAPTER THREE – METHODOLOGY AND DESIGN ..... 43

Introduction and Overview ..... 43

Goals of the Study ..... 43

Research Questions ..... 44
Theoretical Framework ..... 44
Epistemology: Post-positivism ..... 44
Theoretical Perspective: Self-Efficacy Theory ..... 45
Methodology: Multiple Case Study ..... 46
Methods: Explanatory Sequential Mixed-Methods ..... 46
Research Sample ..... 46
Overview of Information Needed ..... 48
Contextual Information ..... 50
Demographic Information ..... 50
Perceptual Information ..... 50
Theoretical Information ..... 51
Research Design ..... 51
Procedures ..... 53
Materials ..... 56
Data Collection Methods ..... 57
Survey ..... 57
Semi-Structured Interviewing ..... 58
Field Notes and Observations ..... 58
Data Analysis and Synthesis ..... 59
Analysis Process ..... 60
Ethical Considerations ..... 61
Risks and Benefits ..... 63

Issues of Trustworthiness ..... 63
Limitations and Delimitations ..... 64
Timeline ..... 65
CHAPTER FOUR – DATA ANALYSIS ..... 66
Research Questions ..... 66
Survey Results ..... 67
Selected Participants ..... 70
Research Question One ..... 72
Work-Related Factors ..... 74
Non-Work Related Factors ..... 79
Research Question Two ..... 85
Research Question Three ..... 88
Research Question Four ..... 91
Advantages ..... 91
Disadvantages ..... 94
Research Question Five ..... 96
Specific and Relevant ..... 97
Learning from Colleagues ..... 98
Adequate Time ..... 98
Summary ..... 99
CHAPTER FIVE – DISCUSSION ..... 102
Analytic Category 1: The Relationship Between the Value Teachers Assigned to Technology and Perceived Investment Required to Utilize it Effectively ..... 104

Analytic Category 2: The Relationship Between Perceived Technology Expertise and Actual Practice in the Classroom ..... 107
Analytic Category 3: Perceptions of Effective Professional Development Practices Related to Technology ..... 109
Limitations of the Study ..... 111
Implications ..... 111
Recommendations ..... 113
REFERENCES ..... 117
APPENDIX A: SURVEY INSTRUMENT ..... 124
APPENDIX B: INTERVIEW PROTOCOL ..... 127
APPENDIX C: CLASSROOM OBSERVATION PROTOCOL ..... 130
APPENDIX D: INFORMED CONSENT FORM ..... 131
APPENDIX E: INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL ..... 133
APPENDIX F: COMPARISON OF CASE STUDY PARTICIPANTS ..... 134

## List of Tables

Table 2.1. What do students use technology for?……...…..…. 28

Table 2.2. Least frequent technology uses……...……..29

Table 2.3. Most frequent technology uses…….29

Table 3.1. Types of information needed……49

Table 4.1. Survey results for each self-efficacy level……68

Table 4.2. Survey results for each self-efficacy level by gender……...68

Table 4.3. Participant characteristics…….72

Table 4.4. Sample initial data codes……..73

Table 4.5. Final data categories…….74

## List of Figures

Figure 2.1. Impact of time spent using computers on student GPA……..……30

Figure 3.1. Interactive design model of study showing alignment to Maxwell's five components…….…….....52

Figure 3.2. Diagram of study procedures……..…..……..55

Figure 5.1. Relationship between efficacy and value related to technology use…….……105

Figure 5.2. Relationship between value related to technology use and time invested in self-learning activities …….……...106

Figure 5.3. Model of factors that impact a teacher's value for technology..……...112

# CHAPTER ONE - INTRODUCTION

Technology plays a critical role in our society and impacts the way people conduct business, communicate with each other, innovate, share, and gather information. Our educational system has also been impacted by this trend. Technology impacts our schools in numerous ways from communication with stakeholders, to collection and sharing of data, and more recently it is being utilized as an instructional tool. In 2010, the U.S. Department of Education unveiled their National Education Technology Plan (NETP), indicating that their vision for the future of education in our country was powered by technology. The plan focuses on technology as the key component to success in five core areas: learning, assessment, teaching, infrastructure, and productivity (U.S. Department of Education, 2010).

Though the specific reasons are unclear, the current research suggests that technology is not being utilized in a way that impacts student achievement (Cheung & Slavin, 2011; Chang, Cornelius-White, McLean, Roworth, & Sell, 2012). The one possible exception to this is in the area of writing. Recent studies indicate that the quality of writing has increased in educational settings where one-to-one technology is being utilized as an instructional tool (Gulek & Demirtas, 2005; Silvernail & Lane, 2011). These settings are also the same classrooms where word processing programs for writing are being used by students more than any other technology resource (Lei & Zhao, 2007).

As school districts continue to spend more of their financial resources on instructional technology, the emphasis and surveillance of its impact on student achievement continues to increase. This increased scrutiny and emphasis on improved student achievement has caused pressure to be applied to administrators to help teachers leverage this new resource most effectively. The growing expectation to integrate technology in the classroom may come at a

cost. As school districts vie for financial funding, stipulations connected to quick implementation of emerging technologies is becoming more prevalent (In4Grants, 2011). This trend makes the decision of whether or not to using technology in the classroom one where teachers do not necessarily have significant input. This lack of professional discretion comes at a time when teachers are being held more individually accountable for the academic success of their students as measured on state created assessments, and may be less inclined to take risks with new instructional strategies and tools (Hamilton et al., 2009).

## Problem Statement

As educators, we are continuously armed with new technological tools, programs, and one-to-one capabilities intended to increase student learning. We have not yet been able to leverage these tools in a way that significantly and consistently impacts student achievement in a positive manner (Cheung & Slavin, 2011). Today's teachers have students in their classrooms who were born into a digital age and spend as much time each day connected to some digital communication device as they do sitting in a classroom (Sprenger, 2009). These new learners hold beliefs that technology is not only an integral part of their everyday lives, but also serves as a vital tool to maximize their learning potential (Oblinger, Oblinger, & Lippincott, 2005). However, teachers – many of whom were not born into this age of digital innovation – may be less inclined to implement these tools despite strong beliefs about their value due to a fear of not being able to effectively implement, troubleshoot, or create effective learning opportunities while using one-to-one technology as an instructional tool (Farah, 2011).

Research suggests that those who have a higher self-efficacy, a belief that they will succeed in whatever endeavor they are undertaking, are more likely to thrive in that particular activity (Bandura, 1997). While the literature has begun to address factors relevant to self-

efficacy of technology use during general instruction, very little work has been done specific to the emerging use of one-to-one technologies during literacy instruction. The problem, then, consists of identifying teachers working within a one-to-one technology environment and uncovering what factors they perceive influence their level of self-efficacy with technology use during literacy instruction.

## Purpose Statement

The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. It was intended to delve into an aspect of technology usage which previous studies had not addressed while providing information related to teacher perceptions of what factors give them confidence in trying new technologies that transform their current instructional practices versus what causes them to be less self-assured in their use of those same technologies.

Previous literature has suggested that one-to-one technologies have positive effects on student engagement (Manuguerra & Petocz, 2011; Terrion & Aceti, 2012). However, this analysis coupled with the growing sentiment that effective technology use is synonymous with effective teaching (Ertmer & Ottenbreit-Leftwhich, 2010) has not been enough to implore teachers to deeply embed 21st century tools into their instruction. In fact, the research suggests that despite a majority of classrooms having full access to technology, only a small percentage of teachers actually utilize computer technology during literacy instruction (NCES, 2000). This study is intended to contribute to the current literature by addressing the existing void in the research by looking deeper at instructional technology through the lens of one-to-one initiatives and literacy instruction.

## Research Questions

The overarching research question for this multi-site, multi-subject case study was: According to teachers, what factors influence their self-efficacy of one-to-one technology use during literacy instruction? Secondary questions for this study included:

(a) How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction?

(b) How are teachers currently using one-to-one technology during literacy instruction?

(c) What do teachers describe as the advantages/disadvantages of utilizing one-to-one technology during literacy instruction?

(d) What types of technology professional development do teachers perceive to be most beneficial to integrating one-to-one technology into literacy instruction?

## Overview of Methodology

The study utilized an explanatory sequential mixed methods design. This design initially used quantitative data collection method in the form of an online Likert-style perceptual survey to determine the self-efficacy level of a group of participants from a school district that was implementing a one-to-one technology initiative. The data from the survey were analyzed using descriptive statistics. From this initial data set, two participants with low levels of self-reported technology self-efficacy and two participants with high levels of self-reported self-efficacy were invited to participate in the second, qualitative, phase of the data collection process.

Qualitative data was collected from each of the four participants in the form of a semi-structured interview, an observation of classroom literacy instruction while they were using one-to-one technology, and textual analysis of any relevant organizational documents. The

interviews utilized a protocol in order to provide for consistent range of discussion between the participants and myself.

Upon completion of the data collection process, I conducted an in-depth analysis of each case in order to interpret and explain the quantitative and qualitative results utilizing coding and thematic analysis, within-case and cross-case thematic development, and cross-thematic analysis.

## Rationale and Significance

The rationale for this study stemmed from the need for understanding the relationship between technology implementation and teachers' stated needs and comfort levels with technology use. Discovering what teachers perceive as important to their own success in leveraging this resource can provide unique insight into what factors differentiate between those teachers who are most comfortable with the technology and those who are not.

Increased understanding of what teachers perceive as critical to their own success in utilizing one-to-one technology in a way that strengthens their literacy instruction may provide school administrators and technology vendors with direction for what types of resources teachers need in order to gain a tangible return on their technology investment. As teachers become more adept and proficient with technology, it may provide for increased innovative instructional practices that impact student learning in a way that has yet to be seen. If the technology can be directly connected to innovative instructional practices that impact student achievement then school investments in one-to-one technology may be targeted in such a way that maximizes the return on investment.

## Role of the Researcher

As the researcher, I bring to the table a variety of previous experiences and thus a distinct set of biases and opinions that must be taken into account during the design, data collection,

analysis, and presentation of the study results. I currently serve as an elementary school principal in a rural southwest Missouri school district. Prior to my current position I served as a middle school assistant principal in a nearby district, and as a business and computer teacher at another rural school prior to that. My experiences in education are interwoven with technological experiences that range from taking online courses as a student to teaching classes in web design and digital publishing. Prior to becoming a teacher, my professional experience outside of education included web-based marketing and advertising positions that have helped shape my disposition towards the value of technology in business, education, and society in general. My own comfort level and previous experiences with technology initiated my interest in completing this study. I acknowledge these previous experiences that help to provide valuable insight could also serve as a liability, biasing my judgment regarding research design and the interpretation of findings.

My occupational role or previous experiences had no impact on the subjects of this study as all participating teachers were from outside my current district, with whom I have no direct connection or previous relationship. This helped foster an unfettered flow of information from participants with no underlying inference of evaluation taking place, whether formal or informal in nature.

## Researcher Assumptions

Based on my previous experience in education and the technology industry, three primary assumptions were made regarding this study. First, technology has the capability to positively impact student achievement when placed in the hands of teachers who have a high-level of self-efficacy with technology use. This is based on my background with technology and previous findings that indicate a positive impact on writing quality by students who were taught by

teachers with high efficacy in using word processing programs (Lei & Zhao, 2007). Second, students who have access to technology in the classroom will remain more engaged during instruction. This is based on findings from previous research that suggests students are more engaged during instructional activities that utilize one-to-one technology (Klem, 2004; Manuguerra & Petocz, 2011; Terrion & Aceti, 2012). Finally, teachers who have greater self-confidence in their ability to successfully utilize technology, or have a higher level of technology self-efficacy, will be more likely to develop and implement innovative methods of using technology that positively impacts student achievement. This assumption is based on Albert Bandura's self-efficacy theory (1997) that suggests those people with higher self-efficacy – who believe that they can accomplish what they set out to do – are healthier, more effective, and generally more successful in their field of choice.

## Definition of Key Terms

To clarify terms used throughout this study, the following key terms have been defined:

*Integration*

Integration of technology occurs when technology is the central vehicle for instruction aimed at developing reading and writing skills as opposed to simply supporting or supplementing conventional literacy instruction or teaching how to use computer-based applications.

*Literacy teachers and literacy instruction*

Literacy teachers are those who have specific responsibilities to teach reading or language arts. That definition typically includes all elementary school teachers and teachers at the middle school level assigned to teach language arts. Literacy instruction is any instruction carried out by those teachers and aimed at increasing students' abilities to read and write.

*Professional development*

Professional development refers to the formal training a teacher receives toward the goal of developing new skills, knowledge, and competencies as they evolve in the field of education.

*Technology*

For the purpose of this study, technology refers to a wide variety of hardware and software, including, but not limited to, personal computers and computer applications, tablet computers, cellular phones, digital cameras and video recorders, presentation and editing software, databases, spreadsheets, and word processors that may potentially be used in an educational setting for teaching and learning.

*One-to-one technology*

One-to-one technology refers to the practice of providing each student with his or her own electronic device that is intended to be interacted with by a single user for the purpose of learning, researching, demonstrating, practicing, or creating. Examples of this include laptop and desktop computers, iPads and other tablet style computers, cellular phones, clickers, etc.

*Technology self-efficacy*

Technology self-efficacy will include expanded forms of technology rather than focusing exclusively on computers. This includes the use of tablets, learner response systems, and interactive whiteboards. For that reason the operational definition of self-efficacy for the purposes of this study will be "confidence in using digital technology in a learning context or classroom setting."

## Organization of the Dissertation

The next chapter is designed to give an overview of the current literature and further outline the foundational research that this study was built upon. Chapter three provides an in-

depth overview of the methods used in this study as well as the procedures for data analysis. Chapter four outlines the findings from the research and chapter five provides my interpretations of the findings, conclusions, and recommendations for further study.

# CHAPTER TWO – REVIEW OF THE LITERATURE

## Introduction and Overview

The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. Reading and writing is foundational to learning across all content areas, from science and math to social studies and music. Students who can effectively read and write are armed with the most fundamental and powerful tools to help ensure their success in the classroom and beyond. In today's classrooms, teachers are educating students who, through their everyday activities outside of school, are completely immersed in technology and are comfortable when utilizing it in almost any setting, particularly as a tool for communication. Teachers face the challenge of engaging a student audience that is accustomed to having information at their fingertips in the form of a Google web search or instant communication with family and friends via texting or video conferencing on their smartphone or tablet computer. Most teachers, however, were not born into the digital age and thus are not innately familiar with these technologies, nor understand how to utilize them in a manner that both improves the effectiveness of literacy instruction and keeps 21st century students fully engaged in the learning process.

The study sought to answer the following primary research question: According to teachers, what factors influence their self-efficacy of one-to-one technology use during literacy instruction? Secondary questions for this study included:

(a) How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction?

(b) How are teachers currently using one-to-one technology during literacy instruction?

(c) What do teachers describe as the advantages/disadvantages of utilizing one-to-one technology during literacy instruction?

(d) What types of technology professional development do teachers perceive to be most beneficial to integrating one-to-one technology into literacy instruction?

Exploring factors that teachers perceive to impart positive and negative influences on their confidence in utilizing technology during literacy instruction is critical in the 21st century world of education. This chapter analyzes three studies that offer insight into the types of research being done relative to the use of technology in literacy instruction and reviews the literature substantiating the importance of the research question. This literature is reviewed because (a) 21st century learners have unique instructional needs; (b) technology's growing role in education and life; (c) the link between student engagement and achievement; (d) teacher beliefs about technology; and (e) teachers' self-efficacy as a factor in technology use.

## Summary of the Literature

The findings of the study are intended to represent teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. With that objective in mind, I was interested in placing the study in the context of similar research relating to technology and literacy instruction. In a review of the literature, several studies were found that investigated technology through the broader context of general classroom instruction, while few studies relating specifically to technology use and literacy instruction were discovered. The following studies were included based upon both their inherent relevancy to the topic of technology integration during literacy instruction and the timely nature of their findings. Several other studies have been conducted relating to technology use during instruction in general, but these are the only studies tied directly to technological use during reading and

writing instruction. The review includes one national study of literacy teachers' perceptions on technology-related professional development along with two smaller regional studies that are less generalizable in their findings.

**Examples of Research Methods**

A mixed method study looking at a single elementary school in a rural southeastern part of the United States was designed by Kesler-McIntyre (2011), seeking to better understand teachers' beliefs about the role of technology during literacy instruction. The quantitative component of the study included a survey based on a Likert scale, collecting demographic information about the teacher participants as well as gaining an understanding of teacher perceptions of current technology integration in their classroom instruction. Twenty-one teachers from kindergarten through fifth grade were surveyed.

A cross-case analysis of three elementary classroom teachers over the course of 16 weeks comprised the qualitative component of the study. An analysis of each individual classroom teacher included at least three semi-structured interviews aimed at gaining insight into the participant's individual thoughts regarding technology integration into literacy instruction. The first interview was followed by three classroom observations and another interview.

According to the survey findings, 99 percent of teachers at the school believed they used technology during instruction, with 81 percent reporting to use technology frequently. Primary uses of the computer included accessing the internet while students gathered research and played instructional games. Teachers responding to the survey indicated that they felt it was important for students to become literate in a variety of technologies. They had a high level of efficacy with basic hardware and software applications, including the use of interactive whiteboards, word processing, and presentation programs. They were not, however, comfortable utilizing more

high-end instructional technologies like multimedia authoring programs, web publishing tools, or peer communication devices. Though the participants viewed their classroom as having full integration of technology in their instruction, they only exhibited regular use of the most basic technologies. The more complex applications that our students will need to compete for the jobs of tomorrow were rarely utilized.

Though the study reveals promising findings regarding the beliefs held by teachers regarding technology use in literacy instruction, there were several study limitations. The fact that only three teachers were observed and interviewed for the qualitative component of the study constitutes a limitation that does not make it easily generalizable to other settings. Also, the initial survey that was administered to gather baseline data on teachers' beliefs regarding the integration of technology in literacy instruction included data from non-literacy teachers. In total, 14% of respondents were exclusively mathematics teachers, which significantly skews the quantitative data collected as part of this study. The argument could be made that all elementary teachers are inherently literacy teachers, but a substantial portion of the surveys were completed by teachers who do not teach reading and writing on a daily basis. Finally, prior to the inception of this study the researcher taught at the site for 31 years which brings with it the potential for bias due to her familiarity with some participants. Despite these limitations, the study offers data that runs contrary to previous reports of technology not finding its way into literacy instruction (Cuban, 2001; Yeo, 2007). The participants of this study indicated not only a positive attitude about the role of technology, but also that they were utilizing much of the technological resources available to them.

In another study analyzing the use of technology during literacy instruction, Hutchison (2011) surveyed 1,441 literacy educators for the purpose of better understanding their

professional development needs relative to technology integration during instruction. The study was part of a larger survey that was designed to understand teachers' perceptions, challenges, and uses of information and communication technology, with Hutchison focusing on the types of professional development that teachers perceived to increase their use of technology during literacy instruction. The full survey was completed online and included 69 items using a Likert scale, 11 multiple-choice items, and eight open-ended items. Only those questions relevant to literacy instruction, along with the open-ended items, were used for this study. The open-ended response data was analyzed using qualitative methods.

Respondents were primarily U.S. literacy teachers who were also members of the International Reading Association (IRA). This particular population was selected because (a) it allowed the researcher to reach literacy instructors; (b) each state has an affiliate of the IRA allowing for a national sample, but with diversity in grade-level and teaching experience; (c) most of the state affiliates have e-mail distribution lists which made for easy dissemination of information about the survey.

Teachers in this study were asked to describe how professional development practices could be improved to increase their use of technology during literacy instruction. A majority of teachers (46.6%) believe that students benefit from technology integration to a large extent, while 40% believe that students benefit to a moderate extent. Nearly all teachers (81%) reported that they did not receive adequate training on how to integrate digital technology into literacy instruction.

Open-ended data were analyzed descriptively using the content analysis approach. The first step taken by the researchers was to read the responses to become familiar with the content then independently create a list of categories into which the responses seem to fit. Both

researchers then collaborated to develop a set of common codes from their independently created categories. For example, all responses linked to the need for more access to equipment during and after professional development would be coded as "technology access." An initial set of 31 codes was developed. The two researchers then independently coded sample data sets and compared their results to establish intercoder agreement, which was found to be at 91%. Discrepancies in coding were discussed and revisions were made in order to reach consensus.

The primary themes that emerged from the survey related to support, time, access, and knowledge. Support themes were found in 31% of all responses and included an overarching theme of four subcategories: (a) follow-up support; (b) on-going support; (c) individual support; and (d) small group support. The most prevalent response, accounting for 45.3% of the responses related to support, focused on the need for follow-up support. These responses specifically noted the need for follow-up support after professional development. Respondents noted the difficulty in implementing new technologies after a single training session because of frustration that sets in when a critical step is forgotten and follow-up support is not available.

Another form of support that accounted for 29.2% of all responses within this theme focused on the need for ongoing training. Teachers expressed a desire for multiple exposures to concepts over an extended period of time rather than sporadic and unsystematic professional development. One-time training sessions without follow-up support were noted as being much less useful. Teachers found that technology training needed to be both embedded and ongoing.

Another subcategory under the theme of support included individual support, which accounted for 14.5% of all responses within this theme. Teachers indicated that one-to-one instruction helps to eliminate the embarrassment and intimidation that they sometimes feel when asking questions during professional development activities.

The second most prevalent theme emerging from this study related to time, with 27% of respondents indicating that some aspect of time could enhance their professional development activities related to the integration of technology during literacy instruction. Sub-categories related to time included: (a) time to explore, practice, and prepare; (b) duration of professional development activities; (c) timeliness; and (d) time to implement.

Teachers in this study felt they needed more time to practice and implement new technological skills during and after professional development, with 45.4% of all responses related time indicating this need. Teachers indicated sessions were most beneficial when time was provided for creating products and connecting to curriculum.

The next subcategory relevant to time focused on the duration of professional development activities, with 25% of all time-related responses sharing this sub-theme. Teachers reported experiencing very brief training activities with little time to get their hands on the equipment that is available to them. They indicated the training is important enough that longer and more frequent training sessions would be welcomed.

The final sub-theme, with 13.1% of responses related to time, was time to implement what is learned during professional development aimed at the integration of technology into literacy instruction. This sub-theme followed two branches of thought, with one branch indicating the need for more time to apply their new knowledge in the classroom and another branch indicating a lack of time to add this technology on top of the instruction they are currently providing. Hutchison (2011) commented that the latter branch of thought assumes that "digital technology is an add-on to instruction rather than an integral part of the curriculum" (p. 47).

The third overarching theme revolved around the need for access to technology during and after professional development. This theme represented 25% of all responses and could be split into two sub-themes: access to necessary equipment and access to models and mentors.

Of the responses relevant to access, 43.2% of the responses were related to equipment access during and after professional development. Teachers noted the desire to have technology available for them to manipulate during training, rather than watching a trainer utilize the equipment. Other responses included frustration about the lack of immediate access to equipment in their classrooms following professional development or the filtering of web sites during the school day that were introduced during training sessions.

The second sub-theme related to access, represented by 56.8% of the responses relevant to access, revolved around having the opportunity to meet with someone who could model integration of technology into literacy instruction. Teachers shared that they want to see someone implementing the technology in a real classroom, while others would like to see sample lesson plans where the new technology was utilized.

The final overarching theme, included in 17% of all responses, was related to knowledge and could be broken down into three different sub-themes: (a) knowledgeable presenters; (b) opportunities to gain higher level knowledge; and (c) background knowledge. Teachers indicated that the presenters were often not any more knowledgeable about the technology than they were. This limited the training to basic skills rather than more complex applications of the technology and how it could be utilized in the classroom. Finally, teachers in this study reported the ideas on technology integration presented during professional development often provided no background knowledge, assuming that they were familiar with the program or equipment.

This study provides valuable insight into how teachers perceive professional development about technology used during literacy instruction could be improved. Like any other study, however, it does have its limitations. The survey utilized in this study was designed to inquire about the aspects of professional development that teachers would like to change. Perhaps some of the responses received could be attributed to the negatively framed inquiry tool and would have elicited a different response if it had asked about aspects of professional development in which they were pleased. Another consideration would be the population this survey attracted by soliciting responses from the members of the International Reading Association. This organization primarily consists of literacy teachers but does not necessarily reflect the average literacy teacher in America. A group of teachers that is actively involved in this type of organization might be considered to represent the upper echelon of literacy teachers, or those that are most passionate and involved in their field.

The final study evaluated for the purposes of this literature review was a study conducted by Ertmer, Ottenbreit-Leftwhich, and York (2006) which analyzed the perceptions of exemplary technology-using teachers regarding keys to successful implementation of technology during instruction.

Survey participants were selected from a sample of exemplary technology-using teacher award recipients from the last 15 years from five different organizations in the Midwest. These organizations were selected based upon the researcher's familiarity with the programs and organizations. They included the Michigan Consortium for Outstanding Achievements in Teaching with Technology, Michigan Association for Computer users in Learning, Ohio SchoolNet, Illinois Computer Educators, and Indiana Computer Educators. From the initial sample of 48 educators, 25 responded to the survey for a return rate of 52%. The final sample

included teachers who ranged in teaching experience from three to 32 years, with an average of 16 years. The majority of teachers were female (n=16) and had completed a master's degree (n=20). About half of the participants (n=12) had been teaching 13 years or less, and all rated themselves as having very high (n=16) or high (n=9) computer skills.

This survey instrument included six demographic questions, Likert-scale items consisting of 20 subcomponents, eight open-ended items, and one checklist item consisting of nine subcomponents. Likert-scale items asked participants to rate the level of influence each item had on his or her successes in utilizing technology in the classroom, from 2 for not influential, to 5 for very influential. Respondents gave a score of 1 when a specific item was deemed not applicable to them.

Teachers rated inner drive and personal beliefs as the top two factors influencing their successes and integrating technology into their instruction, with pre-service education ranking last in influence. Nine respondents gave pre-service education a score of 1, indicating it did not apply to their success. There was also a strong correlation found between the years of teaching experience and participants' perceptions of the importance of professional development, commitment to using technology, and the influence of previous success. The longer teachers had been teaching, the more important these factors were perceived to be in influencing their success with integrating technology into instruction.

The survey's findings suggest that the factors exemplary technology-using teachers perceive as most strongly affecting their ability to be effective technology users are intrinsic factors such as confidence and commitment, as opposed to extrinsic factors such as time or resources. This was supported by the teachers' written responses in which the single most influential factor described by respondents was their strong commitment to helping students

learn. The study was not specifically designed to determine which type of professional development approach was perceived as most beneficial to teachers, but respondents were asked to share their perceptions about which approaches have worked best for them. More than 76% of teachers (n=19) identified workshops, seminars, or conferences as their preferred approach to professional development.

One limitation lies in the survey instrument which received a Cronbach alpha of 0.76, suggesting that the survey was only moderately reliable. A more reliable instrument would serve to enhance the validity of the survey results. While this study is clearly limited by a small sample size, there is an obvious value in learning what factors have had a positive impact on teachers who best integrate technology in the classroom. One significant takeaway from this study is that those who best integrate technology into their instruction do so because of intrinsic reasons - because of their strong commitment to helping students learn. They believed that integrating technology was the most effective method to impact today's learners, and this is one instance in which research and practice align.

**21st Century Learners**

Today's students are bombarded with highly-engaging and collaborative interactions with technology outside of the school setting. The challenge for educators is to meet student expectations for their educational experience by providing engaging lessons using appropriate technologies. These experiences not only serve to provide essential skills for college and workforce preparedness but also serve to provide the entertainment factor that is necessary to keep today's students engaged.

This generation of students that has been born into an age of Internet connectivity, instant communication, and technology integration. They have been referred to as the Net Generation,

N-Gen, Internet Generation, Plug and Play Generation, Nintendo Generation, or the Digital Generation (Donnison, 2007). This generation of students spends an average of six hours a day connected to some digital communication device, often to several simultaneously (Sprenger, 2009).

In their research, Oblinger and Oblinger (2005) found that with N-Gen students the desire to collaborate and interact with their teachers and classmates overrode their desire to use technology. With these new learners, technology is merely a means to an end. They believe that technology is essential to learning because it is: part of their world, embedded in society, makes things faster, makes abstract concepts easier to grasp, allows them to research any topic, and connects them with others who can help them learn (Oblinger, 2005). Contrary to common perception that today's young people lack social skills due to technology-induced self-isolation, Oblinger (2005) found that today's students do, however, understand that technology is not the only factor in their educational success. They understand the vital role that teachers play in providing motivation for learning through the building of relationships. They also value the strengthening of social skills that comes through daily interactions with their classmates, which cannot be replicated through technology.

**Technology in Education**

Technology plays a vital role in our society. It has changed the way we communicate, conduct business, create, share, and gather information. Our schools are not an exception to this phenomenon. What began as a tool for performing administrative tasks, such as taking attendance and typing papers, has now become a vehicle for delivering highly-engaging instruction, identifying struggling learners, collaborating with other students and teachers from around the world, and integrating cross-curricular learning objectives into a single activity.

Technology is an omnipresent tool that continues to evolve from year to year and from day to day. When it comes to technology, the one constant is change.

Technology has been present in classrooms from the beginning of formalized education, serving in various forms as a vehicle to assist in the delivery of instruction. These early technologies included chalkboards, pencils, overhead projectors, and copy machines. But the computer and one-to-one devices in particular are unique in their impact on the educational field in that they are the first devices that the federal government has specifically targeted as a resource that is expected to be used by schools. The U.S. Department of Education identified technology as a key component to ensuring that our educational system provides students with the skills necessary to compete in the new global economy. In 2010, the Department unveiled their National Education Technology Plan (NETP), making clear that their vision for the future of education in our country was powered by technology. The plan focuses on technology as the key component to success in five core areas: learning, assessment, teaching, infrastructure, and productivity (U.S. Department of Education, 2010).

To further this point, the federal government has levied some significant funds to support the use of computers in classrooms. The U.S. Department of Education provides generous grants to state education agencies supporting the use of technology in K-12 classrooms. For example, in fiscal year 2009, the Department made a $900 million investment in education technology in elementary and secondary schools (Cheung, 2011). A survey conducted by the Department on the use of education technology in U.S. public schools found that in 2009 almost all public schools had instructional computers with internet access, and the ratio of students to instructional computers with internet access was 3.1 to 1 (U.S. Department of Education, 2010). A majority of public schools surveyed also indicated their schools provided various education technology

devices for instruction: LCD (liquid crystal display) and DLP (digital light processing) projectors (97%), digital cameras (93%), and interactive whiteboards (73%).

**Technology as an instructional tool.** With the ever increasing use of one-to-one technology as an instructional tool in classrooms around the world, the effectiveness of this approach to teaching and learning has come under increased examination. The existing findings on the subject are as wide ranging and disparate as the existing opinions on whether or not technology is positively impacting our society in general. The current empirical literature on the subject includes evidence that supports both sides of the argument, but when critically and holistically reviewed I believe that a conclusive stance on the matter can be reached.

The research supporting the increased academic achievement of students who are involved in one-to-one initiatives is ample. The philosophical position that all things related to instruction and learning must evolve and improve or become obsolete can also be easily defended. A proponent of implementing one-to-one technologies in the classroom could argue that a successful practitioner in any industry utilizes the most efficient and effective tools available. In education, those tools have been slow to evolve, but they have done just that. From black boards and chalk to whiteboards and dry erase markers, from one room K-8 school houses to web-enabled distance learning for doctoral students, the art and science of teaching continues to develop and change in the name of improving opportunities for student learning.

New instructional technologies are being made available each day that bring with them the possibility of delivering curriculum in different and potentially more effective ways. As educators, we are constantly looking for strategies to improve student learning and academic achievement. Whether that change comes in the form of cooperative learning, brain-based teaching strategies, or utilizing one-to-one technologies, educators are also being presented with

new and improved ways to help students learn. Most of these methods would be considered as supplementary with very few having the potential to be transformational in the way that one-to-one technology does.

In 2001, Harvest Park Middle School in California established its Laptop Immersion Program, equipping 259 students with laptops. The students were tracked in cohorts to evaluate the impact on achievement from year to year. The outcomes were significant with higher achievement in nearly all measures after just one year in the program (Gulek & Demirtas, 2005). The results from Year 2 and Year 3 also indicated a substantial difference in favor of laptop students in Grade Point Average-GPA, End of Course grades, percentage of students who met or exceeded grade level expectations in writing as demonstrated on district benchmark assessments, percentage of students scoring at or above the national average in both language and mathematics as measured on the norm-referenced California Achievement Test Sixth Edition (CAT/6), and percentage of students who met or exceeded state content standards in both language and mathematics on the California Standards Tests (CST).

In 1996, Microsoft Corporation partnered with Toshiba America Information Systems' Notebooks for Schools to launch the *Anytime Anywhere Learning Project*. The next year the program was fully implemented in 52 schools, and by 2000 over 800 schools and 125,000 students were participating (Gulek & Demirtas, 2005). An independent research organization, Rockman et al Research and Evaluation, based out of San Francisco evaluated the effectiveness of the program and found several positive outcomes of the program. Findings from the independent report included:

1. Laptops lead to more student writing and writing of higher quality
2. Laptop students spend more time engaging in collaborative work

3. Laptop students participate in more project-based instruction

Teacher outcomes included:

1. Teachers who use laptops utilize a more constructivist approach to teaching
2. Teachers who use laptops spend less time lecturing (Rockman et al, 1997).

Outside of the finding of higher quality writing being produced by students who use laptops, all of these outcomes are indirectly related to increased student achievement. Another heavily cited review on education technology was conducted by Kulik and Kulik (1991), who viewed computers as valuable tools for teaching and learning. Specifically, they claimed the following:

1. Education technology was capable of producing positive but small effects on student achievement (ES=+0.30).

2. Education technology could produce substantial savings in instruction time (ES=+0.70).

3. Education technology fostered positive attitudes toward technology (ES=+0.34).

4. In general, education technology could be used to help learners become better readers, calculators, writers, and problem solvers.

The nation's largest one-to-one technology initiative to date is the Maine Learning Technology Initiative (MLTI) that provided laptop computers to all 7th and 8th grade students and their teachers. According to teachers who participated in the program it has resulted in creating an environment that is conducive to higher student achievement. Teachers report that students, particularly at-risk and special needs students, were more engaged in their learning and more motivated to complete school work (Silvernail & Lane, 2004), both of which correlate positively to high student achievement (Willingham, Pollack, & Lewis, 2002). Principals have

also provided anecdotal evidence that the program has had a positive impact on student attendance, behavior, and achievement.

Silvernail and Lane (2011) found eighth grade student writing improved significantly after laptop implementation in middle schools as measured by the Maine Educational Assessment (MEA), the state's standardized assessment. MEA writing scores from the year 2000, two years prior to laptop implementation, were compared with the 2005 scores, three years after implementation. In 2000, only 29.1 percent of eighth-graders met the writing proficiency standard on the MEA while in 2005, 41.4 percent met the standard (Silvernail & Lane, 2011).

A secondary analysis of the 2005 data uncovered another relevant finding. The extent to which laptops were utilized in the writing process had a direct correlation to performance on the MEA writing assessment. This correlation does not necessarily mean that the laptops were the cause for the improved scores but that they were one variable that was manipulated between the two groups. Students were surveyed as to what extent they used the laptop during the writing process. Those who reported not using their laptop at all scored the lowest on the assessment with an average scale score of 532.0, while students who reported using it the most -- for both drafts and final copy -- scored the highest with a scale score of 538.8 (Silvernail & Lane, 2011).

This data raised the question of whether the laptops only helped students to write better when using the laptop. Since the MEA was administered to some students online and to other using the traditional paper and pencil method, it was possible to compare the scale scores for both. The data illustrated that scores for both methods of taking the test were nearly identical. Students who took the test online earned an average of scale score of 537.68 on the writing assessment while students who completed the assessment using pencil and paper earned an average scale score of 537.52 (Silvernail & Lane, 2011).

However, as is the case with many studies on educational technology, there are limitations that temper positive findings related to technology and achievement levels. Those who argue that the presumed benefits of using one-to-one technology in the classroom are overstated and heavily marketed by agenda-driven interest groups and education reformers, point to the fact that very few relevant studies have strict control groups and completely isolate student technology use as the variable responsible for any increased academic achievement. Despite the indications that writing improved in the MLTI laptop program, increased student achievement in mathematics, science, reading, or social studies were not apparent. This has been the case with the majority of studies examining the impact of one-to-one technology initiatives on student achievement (Chang, Cornelius-White, McLean, Roworth, & Sell, 2012).

Also, despite earlier research-based suggestions that the effectiveness of instructional technologies was increasing over time due to advances and improvements (Fletcher-Finn & Gravatt, 1995; Kulik & Kulik, 1987; Niemiec & Walberg, 1987), Cheung and Slavin's (2011) meta-analysis of over 85 studies between 1970 and 2010, based on 60,721 K-12 participants, compared the student achievement data when cross-referenced to technology use and found no trends toward more positive results in recent years.

Though the empirical evidence regarding the impact of instructional technology on student achievement is mixed, there is a clearer understanding of which methods of integrating technology are more effective than others. Unfortunately, according to Cheung (2011), "the technology approaches most widely used in schools...have the least evidence of effectiveness" (p. 17). This is consistent with the findings from Lei and Zhao's (2007) study of students in a technology-rich Ohio middle school that examined what technology uses were most effective in increasing student achievement as measured by Grade Point Average (GPA), what technology

uses were most popular with students, and how technology is actually being used by students. Lei and Zhao found that, in general, technologies were more widely used for inquiry and communication with others than for expression of ideas and construction. As illustrated in Table 2.1, a much larger number of students used technology for entertainment purposes such as surfing online for fun (58%) and playing computer games (48.1%) or for communication such as sending and receiving emails (65.8%) and chatting online (51.1%) when compared to those who used technology for construction purposes such as creating websites (11.3%).

**Table 2.1**

*What do students use technology for? (N=231)*

| Categories | Specific technology uses | Percentage of students (%) |
|---|---|---|
| Mixed | Do my homework | 81.4 |
| Inquiry | Search information for schoolwork | 71.4 |
| Communication | Send and receive emails | 65.8 |
| Entertainment | Surf online for fun | 58 |
| Communication | Chat online | 51.1 |
| Expression | Work with software, PowerPoint | 50.2 |
| Entertainment | Play computer games | 48.1 |
| Construction | Create websites | 11.3 |

Lei and Zhao (2007) found that technology uses which increased student GPA could be categorized into two groups. One group included specific subject-related activities such as using the Geometer's Sketchpad software for learning concepts of geometry or through the use of science probes. These types of activities were found to be focused on specific learning objectives while allowing students to grasp abstract concepts, work at their own pace, and develop deeper understanding. The second group includes technology that focused on student construction through activities such as creating websites, desktop publishing, and programming.

Table 2.2 shows the least frequent uses for technology as reported from survey data using a scale of 1-4 with 1 meaning "never" and 4 meaning "a lot." As shown in the table, learning

with science probes was the least popular activity along with other content specific and construction-related activities such as Learning with Aleks, Programming, and Desktop Publishing.

**Table 2.2**

*Least frequent technology uses*

| Specific technology uses | Mean |
|---|---|
| Learning with science probe | 1.69 |
| Telephoning teachers | 1.74 |
| Learning with Aleks | 1.87 |
| Programming | 1.90 |
| Desktop publishing (e.g., writing newsletters) | 1.93 |

As shown in Table 2.3, survey data shows that the most popular technology uses with students are using Microsoft Word for writing, searching information from the Internet, using Microsoft Word for taking notes, and emailing friends. After closer examination, it was found that students with increased GPA spent less time using Word to take notes. Lei and Zhao (2007) found through student interviews a clearer picture of why this was the case when:

> students reported that since the whole school had wireless Internet access, they liked to surf online, check their emails, talk to friends through Instant Messenger programs, and do this "all the time"; indeed some of the students were really good at "switching programs if the teacher comes." (p. 292)

**Table 2.3**

*Most frequent technology uses*

| Specific technology uses | Mean |
|---|---|
| Using Microsoft Word for writing | 3.53 |
| Searching information from the Internet | 3.41 |
| Using Microsoft Word for taking notes | 3.28 |
| Emailing friends | 3.18 |
| Using PowerPoint for presentation | 3.18 |

This idea that technology is not being used effectively in schools was further reinforced when they delved into the data to examine the impact of time spent using computers on student GPA. As illustrated in Fig. 2.1, after an initial positive correlation between computer use of up to three hours per day and increased GPA, it was found that students who spent more than three hours on the computer cancelled out the benefit and even replaced it with a deficit. The study indicated that too much exposure to computers may have played a role in students experiencing a lower GPA.

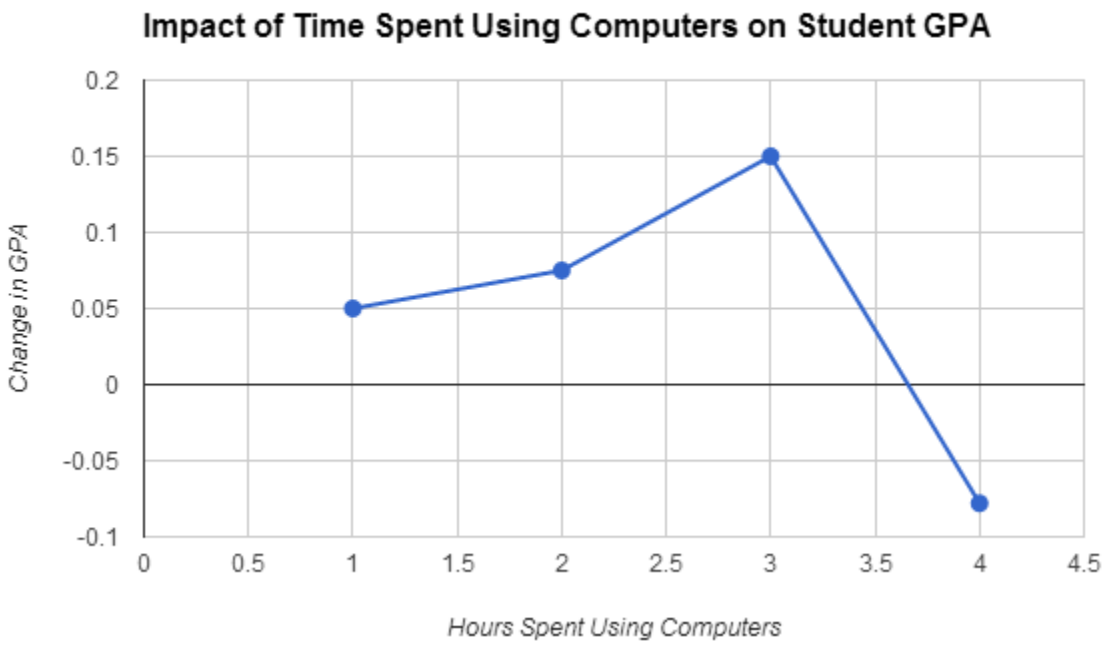


*Fig. 2.1*. Impact of time spent using computers on student GPA (Lei & Zhao, 2007)

The research is certainly mixed in its review on the effectiveness of technology as an instructional tool. The number of variables involved in assessing the role that any particular technology plays on increasing student achievement makes it difficult to generalize the results of most studies. Clark (1994) argued that "most of the studies which are grist for the meta-analytic mill are confounded because the teaching method is not controlled" (p. 24). Gulek and Demirtas

(2005) indicated that they found the same limitation in their study due to the fact that they did not collect any data about how specifically the laptops were used for learning. Because of this they are unable to estimate the effect that specific technology uses had on student achievement.

Not only is the teaching method not controlled in most educational technology research, but it is also extremely difficult to take into account the quality of the teacher participating in the study. In most cases the teacher involved in the study is somebody who volunteered to participate and take on the additional responsibility, time to prepare, and pressure to perform. These participants are typically the highest quality teachers and in nearly any scenario would have had students who outperformed their peers. Gulek and Demirtas (2005) echoed these concerns in their own study when stating the following:

> One limitation that might have a confounding effect on student achievement in this study is the teacher assignment into the Laptop Program. Participating teachers volunteer for the program. As with most field-based research in education, in the absence of random assignment into the program, the differences in student performance may partly be because of differences in teachers volunteering for the program (p. 30).

When thinking about technology as an innovation, Fisher (2006) cautioned against viewing technology as an agent of change. Rather, he argued that teachers must assume this role. As teachers increase their level of self-efficacy with research-based instructional methods they are more likely to be successful in their endeavor of improving student learning (Bandura, 1977). Unfortunately, the evidence suggests that this is not occurring in the majority of classrooms across the nation. In fact, most teachers are likely not aware of the research-based best practices much less incorporating them into their everyday instruction. Ertmer, Gopalakrishnan, and Ross (2001) suggests what teachers perceive as exceptional technology use is not supported by descriptions of best-practices as reported in the literature.

**Technology in literacy instruction.** With thirty million adults in our country possessing below-basic levels of English literacy, and another 63 million reading English at only a basic level, a staggering 44 percent of adults living in America could benefit from remedial literacy instruction (U.S. Department of Education, 2010). Our nation and others have taken notice of this destructive trend and are taking steps to focus on the improvement of literacy levels around the globe. Led by the United States, the United Kingdom, Finland, New Zealand, and Australia, the last decade has seen the launching of major educational technology initiatives with explicit literacy goals incorporated therein (Leu, 2000).

However, access to technology will not in itself make a positive impact on the literacy crisis our country faces. The *Technology and At-Risk Young Readers* (NCES, 2000) survey of access to computer technology in U.S. schools indicated that despite a majority of classrooms having full access to technology, only a small percentage of teachers actually used computer technology during literacy instruction. Unfortunately, the mere usage of technology will not solve the literacy crisis alone. Our teachers must utilize the technology in a manner that does more than augment our current instructional practices. Labbo and Reinking (1999) note that for a new technology to be effective in a literacy classroom, it must be accessible to students and teachers, used to enhance and transform traditional literacy instruction, and used to prepare and empower students for the future.

There have been several meta-analyses conducted over the last two decades relating to the impact of technology on reading instruction. Overall, according to Cheung (2011), the studies came to the similar conclusion that education technology had small to moderate effects on reading outcomes.

**Technology and student engagement.** The empirical literature suggests that the use of one-to-one technology increases student engagement (Klem & Connell, 2004; Manuguerra & Petocz, 2011; Terrion & Aceti, 2012), which has been highlighted as one of the strongest indicators of high levels of student achievement (Willingham, Pollack, & Lewis, 2002). Research on the association of student engagement with academic performance produces consistent findings. Behaviors such as being attentive, responding to teacher questions, exhibiting regular attendance, and displaying resilience when faced with challenging academic tasks are all connected with student engagement and all correspond positively to strong academic performance (Attwell, Orpet, & Meyers, 1967; Cobb, 1972; Finn & Rock, 1997).

Klem and Connell's (2004) study of longitudinal data for over 4,000 students over a five year span found that elementary and middle school students with high levels of teacher-reported engagement were more than twice as likely to succeed in school as average-rated students. These students demonstrated increased initiative in the face of challenges, appeared more interested during learning activities, and consequently received more support from their teachers in the process. As teachers search for methods to increase student engagement, the evolution of education technology has introduced several new tools that are showing promise in assisting with this matter.

The early research regarding the use of one-to-one technologies, such as clickers and iPads, has shown a positive correlation between their use and increased student engagement (Manuguerra & Petocz, 2011; Terrion & Aceti, 2012). Terrion and Aceti's research examined 200 college students and the use of clickers/personal response systems in a one-to-one setting during instruction in the classroom. The study results indicated that their use positively impacted student engagement and ultimately learning. This reinforces the results from several studies that

examined the effects of instructional technology on student achievement and found modest but positive gains for students when compared to traditional instructional methods.

**One-to-one technology initiatives.** As teachers search for methods to increase student engagement, the evolution of education technology has introduced several new tools that are showing promise in assisting with this matter. The early research regarding the use of one-to-one technologies, such as clickers and iPads, has shown a positive correlation between their use and increased student engagement (Manuguerra & Petocz, 2011; Terrion & Aceti, 2012). More and more schools are finding ways to fund one-to-one technology initiatives, whether through competitive grants, shifting of budgets away from textbook adoptions, or allowing students to bring their own devices to school. The question, then, is not whether our schools are going to invest in making these resources available, but whether our teachers will have the skill-set and inclination to utilize these tools in a manner that significantly impacts student learning.

**Teachers' beliefs about technology.** In order for teachers to regularly utilize technological tools in their everyday classroom instructional practices, they must believe there is value in the utilization of such tools. Barko and Putnam (1995) suggested that prior to teachers placing value on technological tools we must first expand their knowledge base, providing education and training about what tools are available. Unfortunately, evidence suggests that teacher-stated beliefs do not always correlate with their actual practices in the classroom (Ottenbreit-Leftwhich et al., 2010). In a study by Judson (2006), it was concluded that "there was no significant correlation between teachers' reported beliefs about instruction and their actual practice of integrating technology" (p. 590).

Anytime a new technological tool is introduced to teachers, they make a value judgment about how useful that tool would be in helping them complete their specific learning objectives.

The more value they assess to the technology, the more likely they are to utilize it in their practice (Ottenbreit-Leftwhich et al., 2010). Futhermore, when the training teachers receive is specific to their content area, they are better equipped to translate the new knowledge to their classrooms which causes teachers to be more likely to see value and strive to learn it (Hughes, 2005).

**Challenges to Technology Professional Development in Education**

The National Association of State Boards of Education (2001) highlighted the critical need for adequate professional learning in technology use in order to achieve enhanced learning opportunities for students. However, there are several challenges to professional development relevant to teacher efficacy with technology. Research suggests that developing skills alone is not enough to foster significant change in instructional practice if teachers do not have the will or resilience to apply them when faced with difficulties (Zeldin & Pajares, 2000). These skills must be coupled with a strong belief in their ability to navigate through technical challenges that may arise while utilizing technology. Albert Bandura (1997) has spent over 30 years studying the impact of self-efficacy and his research suggests that those people with higher self-efficacy – those who believe that they can accomplish what they set out to do – are healthier, more effective, and generally more successful in their field of choice. Schools that can create an environment where teachers have a positive self-efficacy towards their technology use are more likely to see this tool used in a way that benefits learning.

**Continuous innovation.** Teachers have indicated that early successful experiences have a strong influence on their self-efficacy with technology and the subsequent development of their technology integration abilities (Ertmer, Ottenbreit-Leftwich, & York, 2006). Unfortunately, the process of learning about technology is an ongoing one, where new advances are constantly

taking place and your knowledge base from yesterday can be rendered obsolete by tomorrow. This often results in teachers feeling like perpetual novices in the process of technology integration (Mueller, Wood, Willoughby, Ross, & Specht, 2008), which suggests the need for teachers to have strong self-efficacy for teaching with technology if it is to be utilized regularly.

Unfortunately, trying to keep up with the changes in technology can be an exercise in futility. Technology continues to evolve at an increasingly rapid rate due to the exponentially increasing capacity of computer chips. As noted in Ray Kurzweil's (2001) "The Law of Accelerating Returns," an analysis of the history of technology shows that "technological change is exponential, contrary to the common-sense 'intuitive linear' view. So we won't experience 100 years of progress in the 21st century—it will be more like 20,000 years of progress" (para. 1).

According to Duhaney (2000), the majority of respondents to a national survey of teachers indicated that they had some training in technology yet only 20% of teachers felt comfortable using a computer. Results of the survey also indicated that teachers were lacking knowledge on how to integrate technology in a way that fostered a meaningful and engaging learning environment. Farah's research (2011) went on to suggest that even teachers who held strong beliefs regarding the value of technology in educating today's learners could be slowed in their use of available tools due to fears of not being able to effectively troubleshoot technological issues if they were to arise.

**Connection to the curriculum.** Teachers need in-depth, sustained assistance not only in the use of the technology but in their efforts to integrate technology into the curriculum (Kanaya & Light, 2005). Research suggests that giving teachers access to new technological tools without professional development that makes clear connections to the curriculum does not lead

to transformational changes in instruction or consistent increases in student learning (Lei & Zhao, 2007).

Lei and Zhao's (2007) study of students in a technology-rich Ohio middle school examined what technology uses were most effective in increasing student achievement. The study found that technology uses which increased student Grade Point Average could be categorized into two groups. One group included specific subject-related activities such as using the Geometer's Sketchpad software for learning concepts of geometry or through the use of science probes. These types of activities were found to be focused on specific learning objectives while allowing students to grasp abstract concepts, work at their own pace, and develop deeper understanding. The second group includes technology that focused on student construction through activities such as creating websites, desktop publishing, and programming.

**Lack of time.** Another challenging hurdle that school systems must overcome related to technology professional development is the issue of time. In order for teachers to develop ways for technology to be meaningfully incorporated into the curriculum so that it impacts student learning, they must first become competent with the new technology to the point where they are no longer merely trying to master the hardware or software. As discovered through the Apple Classrooms of Tomorrow research project (Dwyer, Ringstaff, & Sandholtz, 1990) building efficacy with new technology takes time. The 1986 study funded by Apple Computer, Inc. was developed to provide teachers and students with constant access to interactive technology for learning. The study found that for observers hoping to see quick evidence of the efficacy of new technologies, the process can be both "frustrating and inconclusive" (p. 8). Neither of those descriptors is likely to result in other teachers readily wanting to become part of the change process.

## Self-Efficacy as a Factor in Technology Use

Teachers face the challenge of engaging a student audience that consists of what Prensky (2001) would refer to as digital natives who were born into the digital age of computers, video games, and the internet. They are accustomed to having information at their fingertips in the form of a Google web search or instant communication with family and friends via texting or video conferencing on their smartphone or tablet computer. Most teachers, however, are what Prensky (2001) would refer to as digital immigrants and thus are not innately familiar with these technologies. Helping teachers to feel comfortable utilizing these new instructional tools in a manner that both improves the effectiveness of instruction and keeps 21st century students fully engaged in the learning process is a challenge that school administrators continue to face.

Teachers have indicated that early successful experiences have a strong influence on the subsequent development of their technology integration abilities (Ertmer, Ottenbreit-Leftwich, & York, 2006). Unfortunately, the process of learning about technology is an ongoing one, where new advances are constantly taking place and your knowledge base from yesterday can be rendered obsolete by tomorrow. This often results in teachers feeling like perpetual novices in the process of technology integration (Mueller et al., 2008), which suggests the need for teachers to have strong self-efficacy for teaching with technology if it is to be utilized regularly.

Farah's research (2011) suggested that even teachers who held strong beliefs regarding the value of technology in educating today's learners could be slowed in their use of available tools due to fears of not being able to effectively troubleshoot technological issues if they were to arise.

**Defining self-efficacy.** Self-efficacy is a key component of Albert Bandura's (1977) social cognitive theory. Bandura (1986) defined self-efficacy as:

> People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses. (p. 391)

In education, self-efficacy of teachers has been linked to student outcomes that include increased academic achievement (Ashton & Webb, 1986; Moore & Esselman, 1992; Ross, 1992) and intrinsic motivation (Midgley, Feldlaufer, & Eccles, 1989). Hoy (2000) defines teacher efficacy as a teachers' confidence in their ability to promote students' learning. This study examined teacher perceptions of what factors influence their self-efficacy of one-to-one technology use during literacy instruction. Self-efficacy of technology integration, a specialized form of self-efficacy, has been defined by Pan (2008) as one's "confidence in using computer technology in a learning context or a classroom setting" (p. 36). For the purposes of this study, technology self-efficacy included expanded forms of technology rather than focusing exclusively on computers. This includes the use of tablets, learner response systems, and interactive whiteboards. For that reason the operational definition of self-efficacy for the purposes of this study will be "confidence in using digital technology in a learning context or classroom setting."

**Assessing Self-Efficacy.** Over the past thirty years, self-efficacy has become one of the most widely studied variables in the educational, psychological, and organizational sciences. Several different measurements have been developed to assess an individual's perceived self-efficacy in a wide variety of contexts. Three measurements that focus specifically on technology self-efficacy include the Computer Technology Integration Survey (Wang, Ertmer, & Newby, 2004), the Computer Self-Efficacy Measure (Compeau & Higgins, 1995), and the Online Technologies Self-Efficacy Scale (Miltiadou & Yu, 2000).

***Computer Technology Integration Survey.*** This assessment is intended to measure efficacy in the integration of technology during classroom instruction. The survey was

developed for use during a study intended to examine how vicarious learning experiences influence the self-efficacy of technology use in the classroom for a group of pre-service teachers. It uses a Likert-scale (from 1 – strongly disagree to 5 – strongly agree) and includes 16 items specific to confidence of technology use (Wang, Ertmer, & Newby, 2004). Factor analysis after initial use of the instrument resulted in a two-factor solution to explain the 55.36% co-variance among the items. The first factor accounted for 46.92% of the co-variance and consisted of 16 questions related to computer technology capabilities and strategies. The second factor accounted for 8.4% of the co-variance among the items and consisted of five questions related to external influences of computer technology uses. The survey earned a Cronbach alpha coefficient of .96, signifying that it is also highly reliable and appropriate for use in further research.

***Computer Self-Efficacy Measure.*** This scale was developed to measure an individual's beliefs about their ability to competently use computers in a business setting (Compeau & Higgins, 1995). The survey was developed for use during a study of a group of Canadian office managers and professionals intended to examine the role individual's beliefs about their ability to competently use computers had on how they determined to use computers. The measure is task-focused, as opposed to simple skills, and incorporates varying levels of task difficulty. It is comprised of ten questions which require a yes or no answer to determine the participant's confidence in completing a specific task using an unfamiliar computer software program. Questions resulting in a "yes" answer were then followed up with a Likert-scaled rating (from 1 – Not Confident at All to 10 – Totally Confident) for how confident they were in their ability to complete the task. One limitation for this survey includes the use of a hypothetical scenario that required respondents to use their imagination. Another limitation involves the introduction of

the learning construct in addition to self-efficacy for computer use, as respondents were give the scenario of how well they would perform when using an unfamiliar software program.

***Online Technologies Self-Efficacy Scale.*** This instrument measures online students' self-efficacy beliefs with communication technologies such as e-mail, Internet, and computer conferencing (Miltiadou & Yu, 2000). Content validity, construct validity, and reliability were established in order to validate this instrument. Factor analysis and correlational analysis revealed that all items could be collapsed into one scale, indicating that there is only one unified construct for self-efficacy. The Cronbach's Coefficient Alpha for the whole instrument was 0.95.

The survey includes 29, 4-point Likert-scaled items. For each item, students were asked to indicate their level of confidence ranging from "Very Confident," to "Not Confident At All." Each statement was preceded by the phrase "I feel confident..." Students were asked to select the option "Not Confident At All" if they did not know what the statement meant.

**Conclusion**

Studies regarding the relationship between technology and literacy instruction are limited in both number and scope. The majority of current research falls into one of two categories: (a) research examining teachers' self-reported beliefs and practices regarding the use of technology during literacy instruction, or (b) in-depth qualitative research on the general beliefs and practices of a select few teachers. The majority of the literature analyzes instruction through the lens of general technology use, without a focus on a specific approach to utilizing technology in the classroom.

There are also contradictions in the research that raise more questions than answers. Despite the overwhelming belief by teachers and educational leaders that technology is vital to the future of education in our country, the empirical evidence to support the positive impact in

student achievement is not there. This may be because we have not yet discovered the manner in which these new tools must be used in order to be most effective. Perhaps it is due to teachers receiving administrative pressure to use the technology despite their lack of belief in technology as a teaching tool. Or maybe technology is just not the most effective method for teaching and learning new skills. Regardless of the discrepancy, the more we understand what teachers believe has influence over their own self-efficacy with using one-to-one technology during instruction the better we are able to leverage the tool in a way that maximizes its potential.

# CHAPTER THREE – METHODOLOGY AND DESIGN

## Introduction and Overview

The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. It was intended to delve into an aspect of technology usage which previous studies have not addressed. The study sought to provide information related to teacher perceptions of what factors give them confidence in trying new technologies that transform their current instructional practices versus what causes them to be less self-assured in their use of those same technologies.

### Goals of the Study

It was my desire that the results of this study will allow educational leaders to hone in on specific types of professional development opportunities that would most benefit teachers in their instructional use of technology. Results from this study are intended to assist with the identification of factors that teachers perceive influence their use of technology, which will provide valuable insight to school district and building leaders who are responsible for creating an environment best suited for integration of new tools and current technologies. In addition, results of the study sought to identify what intrinsic factors cause teachers to be more or less prone to creating lessons that include technology as a central component of the learning activity.

Educational leaders and elected policy makers are charged with the responsibility of providing students with the best possible opportunities to compete in the global marketplace. This marketplace is constantly evolving and is thus requiring different skills from prospective workers. The information discovered as a result of the study has the power to inform educational stakeholders of ways to enhance the overall educational experience of students. Once factors affecting teachers' technology self-efficacy are identified, professional development

organizations, technology companies, educational leaders and policy makers can focus their efforts toward those factors as a way to provide teachers with the tools they need to enhance learning for students. Improving such experiences will better equip students to be successful contributors to today's global society (U.S. Department of Education, 2010).

### Research Questions

The overarching research question for this multi-site, multi-case study was: According to teachers, what factors influence their self-efficacy of one-to-one technology use during literacy instruction? Secondary questions for this study included:

(a) How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction?

(b) How are teachers currently using one-to-one technology during literacy instruction?

(c) What do teachers describe as the advantages/disadvantages of utilizing one-to-one technology during literacy instruction?

(d) What types of technology professional development do teachers perceive to be most beneficial to integrating one-to-one technology into literacy instruction?

## Theoretical Framework

### Epistemology: Post-positivism

Contrary to the positivist perspective that the researcher and the research participant always work independently of each other, the post-positivist researcher operates under the assumption that the background, knowledge, and theories of the researcher can play a role in what is observed of the research participant (Lincoln, Lynham, & Guba, 2011; Reichardt & Rallis, 1994), While generally taking a scientific approach to research, post-positivists do not

believe in outright and absolute cause and effect, but adhere to the philosophy that all cause and effect is a probability that may or may not occur (Creswell, 2013).

Post-positivist researchers strive to assume a learning role rather than a testing role (Agar, 1996). In much the same way, this study examined the perceptions and previous experiences of four teachers in order to gain a deeper level of understanding of what factors may have impacted their current level of self-efficacy in relation to technology use during instruction in a one-to-one environment.

**Theoretical Perspective: Self-Efficacy Theory**

Self-efficacy is a key element in Albert Bandura's (1977) social cognitive theory which is rooted in the belief that people can learn new information and behaviors by watching other people. Bandura (2001) explained that self-efficacy refers to an individual's beliefs in his or her capabilities to organize and execute the courses of action required to produce a given outcome. Essentially, this refers to one's confidence in their ability to be successful in a given situation. Bandura (1997) claims that there are three levels of "generality of assessment" (p. 49) to his self-efficacy theory:

> (1) the most specific level measures perceived self-efficacy for a particular performance under a specific set of conditions; (2) the intermediate level measures perceived self-efficacy for a class of performances within the same activity domain under a class of conditions sharing common properties; and (3) the most general and global level measures belief in personal efficacy without specifying the activities or the conditions under which they must be performed (Bandura, 1997, p. 49).

For the purposes of this study, an intermediate level initial survey, or one that measures perceived self-efficacy for a class of performances within the same activity domain under a class of conditions sharing common properties, was administered to all participants in order to purposefully select teachers to participate in more in-depth analysis during the qualitative phase of the study.

## Methodology: Multiple Case Study

Case study research intends to develop an in-depth understanding of an issue by examining the case as a specific illustration. This approach is ideal when the researcher has identified a clearly identifiable case with boundaries and seeks to provide an in-depth understanding of the issue (Creswell, 2013). This approach is often used while purposefully selecting multiple cases in order to gain different perspectives on the issue being studied (Creswell, 2013). This study examined multiple cases from multiple sites involving teachers who share the common traits of serving as literacy instructors in a one-to-one technology environment but have differing levels of self-efficacy with technology use.

## Methods: Explanatory Sequential Mixed-Methods

The explanatory sequential design is a mixed-methods approach that consists of two distinct phases. Initial data collection is done quantitatively and then followed up with a qualitative phase for more in-depth analysis (Creswell & Plano Clark, 2011). This design is typically used when the researcher desires to form groups based on quantitative results for the purpose of conducting further qualitative study or when participant characteristics collected from the initial quantitative results was used to guide purposeful sampling for the qualitative phase (Creswell & Plano Clark, 2011; Morgan, 1998; Tashakkori & Teddlie, 1998).

The initial quantitative phase of this study collected baseline demographic and self-efficacy data, while the second qualitative phase followed up on the initial data to achieve a more in-depth understanding.

## Research Sample

Preliminary quantitative data were collected from a sample of 30-50 teachers from a single suburban school district in the Midwestern United States that is currently implementing a

one-to-one technology initiative in their classrooms. This site was selected due to its recent adoption of a one-to-one initiative, with grades nine through twelve adopting the initiative during the 2012-13 school year, grades six through eight during the 2013-14 school year, and grades three through five during the 2014-15 school year. It was also chosen due to its close proximity to my residence, and its student demographics, which are fairly typical for a Midwestern school. The school district, Oak Grove School District (pseudonym), has a population of 4,236 students in grades kindergarten through twelfth grade. The population is approximately 91.5% White, 3.5% Hispanic, 2.7% Black, 1% Asian, and 1% American-Indian. Over 45% of the district's population qualifies for free/reduced lunch.

In terms of student achievement, the district is currently performing above average on both the literacy and mathematics statewide summative assessments. On the statewide literacy assessment, 58.7% of students in grades three through twelve earned a proficient score, which was 5.1% higher than the statewide average. On the mathematics summative assessment, 60.3% of third through twelfth grade students earned a proficient score, which was 5.9% higher than the statewide average.

The sample was collected from five of the district's elementary schools housing kindergarten through fourth grades and one intermediate school housing students in grades five through eight. The group included teachers of all levels of experience, ages, and genders, currently teaching in grades three through eight. Responsibilities for literacy instruction and one-to-one technology use in their classroom served as two common traits for all participants. All teachers willing to participate and meeting this criteria were administered the survey.

This sample was utilized to collect baseline data related to the research questions. The initial data collected from this sample were analyzed using quantitative methods and utilized to

purposefully select a secondary sample for further, more in-depth qualitative investigation through a multi-case study method. The secondary sample included two teachers with low self-efficacy and two teachers with high self-efficacy regarding their use of one-to-one technology during reading instruction. This multi-case study method examined the differences in what teachers with varying levels of reported self-efficacy with one-to-one technology perceive as factors that influence their self-efficacy.

Purposeful sampling was utilized to gather qualitative data from two different technology self-efficacy groups: those with high self-efficacy and those with low self-efficacy. This method lends credibility to the study and allowed me to investigate more deeply the differences between teachers with varying levels of technology self-efficacy and their perceptions of factors that influence their level of self-efficacy. Maxwell (2013) stated that one goal in purposeful selection "can be to establish particular comparisons to illuminate the reasons for differences between settings or individuals" (p. 98). Comparative designs such as this are often used in multi-case qualitative studies as well as in mixed-methods research (Maxwell, 2013).

## Overview of Information Needed

Demographic, perceptual, contextual, and theoretical data (Table 3.1) are needed to answer the research questions of the study (Bloomberg & Volpe, 2008). To gather demographic data participants were asked to complete a brief survey. The survey collected information related to participants' level of perceived self-efficacy related to one-to-one technology use during reading instruction along with demographic information related to participants' age, gender, ethnicity, level of education, and years of teaching experience. Information was also collected using observations, semi-structured interviews, and organizational documents (Creswell, 2013).

Table 3.1

*Types of Information Needed*

| **Type of Information** | **What the Researcher Requires** | **Method** |
|---|---|---|
| (a) *Contextual*<br>To provide context and background | Organizational background, history, and structure; mission; vision; values; organizational culture; leadership; staff and site description. | Document Review, Observation, Interviews |
| (b) *Demographic* | Descriptive information regarding participants such as age, gender, ethnicity, and level of experience. | Survey, Interviews |
| (c) *Perceptual* | Participants' descriptions and explanations of their experiences as this relates to the phenomenon under study | Interviews |
| *Research Question #1:*<br>What are teacher perceptions of factors that influence their self-efficacy of one-to-one technology use during literacy instruction? | Descriptions from participants of factors increase their confidence in using one-to-one technology during literacy instruction. | Survey, Interviews |
| *Research Question #2:*<br>How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction? | Descriptive information regarding participants' self-perceived level of expertise with using technology. | Surveys, Interviews |
| *Research Question #3:*<br>How are teachers currently using one-to-one technology during literacy instruction? | Details regarding the methods, frequency, and perceived impact of technology use within the participants' current instructional practices. | Observations, Interviews |
| *Research Question #4:*<br>What do teachers describe as the advantages/disadvantages | Participants' descriptions and explanations regarding the perceived advantages and | Interviews |

| | | |
|---|---|---|
| of utilizing one-to-one technology during literacy instruction? | disadvantages of using one-to-one technology during literacy instruction. | |
| *Research Question #5:* What types of technology professional development do teachers perceive to most increase their self-efficacy with regards to integrating one-to-one technology into literacy instruction? | Participants' descriptions and explanations regarding their perceptions of what forms of professional development have the greatest positive impact on their use of technology during literacy instruction. | Interviews |

**Contextual Information**

It is essential to understand the organizational climate and culture that the participants are working within, particularly in a case study, in order to better identify how behavior may be influenced by the environment (Bloomberg & Volpe, 2008). This information was collected primarily through organizational documents that were available to me such as employee handbooks and student handbooks outlining the hierarchical structure, history, vision, and procedures for implementing the one-to-one technology initiative.

**Demographic Information**

Individuals who teach at the Oak Grove School District represent a wide range of ages, experiences, and levels of education. Collecting and analyzing this information was necessary to "help explain what may be underlying an individual's perceptions, as well as similarities and differences in perceptions among participants" (Bloomberg & Volpe, 2008, p. 70).

**Perceptual Information**

The primary source of data collected for this study involved perceptual information. Bloomberg and Volpe (2008) indicate that this type of information is particularly important to a study of this kind where interviews are the primary method of data collection.

Perceptual information relies, to a great extent, on interviews to uncover participants' descriptions of their experiences related to such things as: how experiences influenced the decisions they made, whether participants had a change of mind or a shift in attitude, whether they described more of a constancy of purpose, what elements relative to their objectives participants perceived as important, and to what extent those objectives were met (Bloomberg & Volpe, 2008, p. 70).

It was important that the interview protocol was developed in a way that ensured the research questions were addressed and that there was opportunity to develop a comfortable level of rapport between participants and myself.

**Theoretical Information**

An ongoing review of relevant literature provided the theoretical information for this study. There is ample research focused on the quantitative impact of technology use on instruction, with limited evidence to support a positive impact on student outcomes. There is, however, evidence to support the concept that those who have a strong self-efficacy are more likely to succeed in whatever endeavor or activity they set out to perform. It is from this review of the relevant literature that this study was grounded.

## Research Design

The study was a multi-subject, multi-case study at a school district where a one-to-one technology initiative is currently being implemented. Data collection in a multiple case study typically draws from interviews, observations, and analysis of documents or audio-visual materials (Creswell, 2013) which allows for triangulation of data. This extensive means of collecting information does not automatically increase validity (Fielding & Fielding, 1986), but it

does reduce the risk of chance associations and systematic biases due to the use of a singular method of data collection (Maxwell, 2013).

Challenges associated with the multiple case study method center around the selection of cases and how many to select. The more cases that a researcher chooses to study, the less depth the resulting data collection will produce. According to Creswell (2013) researchers typically choose no more than four or five cases. This study utilized a method of research that helps to minimize these challenges, allowing for the selection of multiple participants from multiple perspectives in order to present the most in-depth view of the issue. Figure 3.1 illustrates the interactive model of research design utilized for this study.

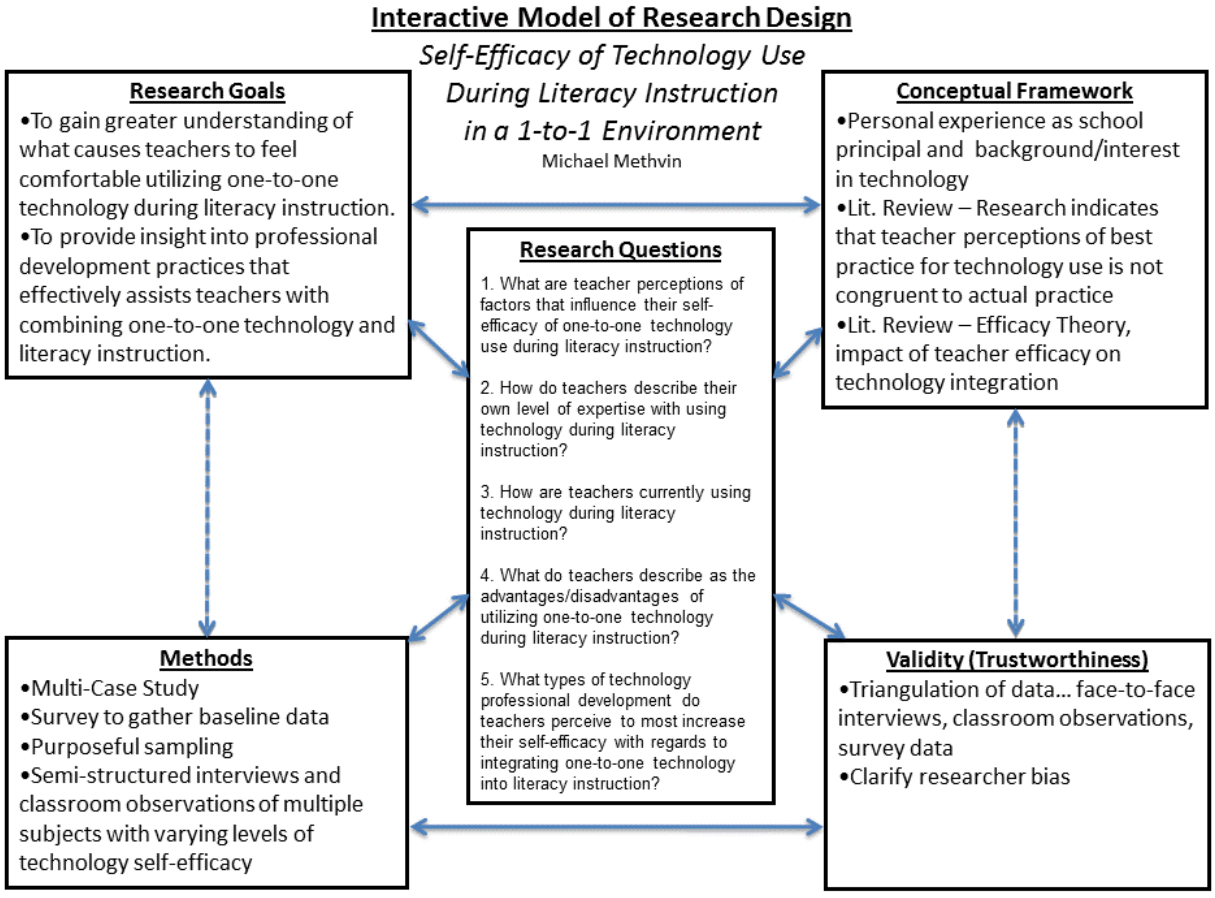


*Figure 3.1.* Interactive design model of study showing alignment of the five design components of Maxwell (2005).

An initial survey of all teachers was conducted to obtain demographic data and identify teachers who perceive themselves to have high or low-levels of efficacy with technology use during literacy instruction. From this initial survey, I was able to identify four teachers to participate in the qualitative portion of the study, two who reported high levels of self-efficacy and two who reported low levels of self-efficacy. These four participants were in their classroom while using one-to-one technology during literacy instruction and participated in a semi-structured interview. Observations were documented utilizing a classroom observation protocol. The results of the classroom observations and interviews were analyzed and coded using Atlas.ti, a computer-based qualitative analysis software, to highlight trends and themes that emerged.

**Procedures**

A web-based, Likert scale survey was disseminated to all teachers who currently teach literacy in a one-to-one environment. The participants completed the survey and the results were compiled to formulate a demographic snapshot of the participant pool The survey data was analyzed using descriptive statistics to measure the technology self-efficacy of each teacher for the purpose of purposeful sampling. Based upon this initial quantitative data, two teachers with high levels of self-efficacy and two with low levels of self-efficacy related to one-to-one technology use were invited to participate in the study. The four participants were interviewed individually on-site using the prescribed interview protocol. Results from the interview were transcribed by and analyzed using Atlas.ti qualitative analysis software to identify themes and patterns in the data. During the interview process, relevant building and district-level documents were collected for coding and thematic analysis.

After the interview process, each of the four participants were observed while employing one-to-one technology during literacy instruction with their students. I utilized a classroom

observation protocol and field note journal to collect anecdotal notes and record how the technology was used, the instructional method used and learning activity taking place, the role of the teacher, and the engagement of the students. Upon completion of the data collection process, I conducted an in-depth analysis of each case in order to interpret and explain the qualitative results utilizing within-case and cross-case thematic development and cross-thematic analysis. See Figure 3.2 for a procedural diagram.

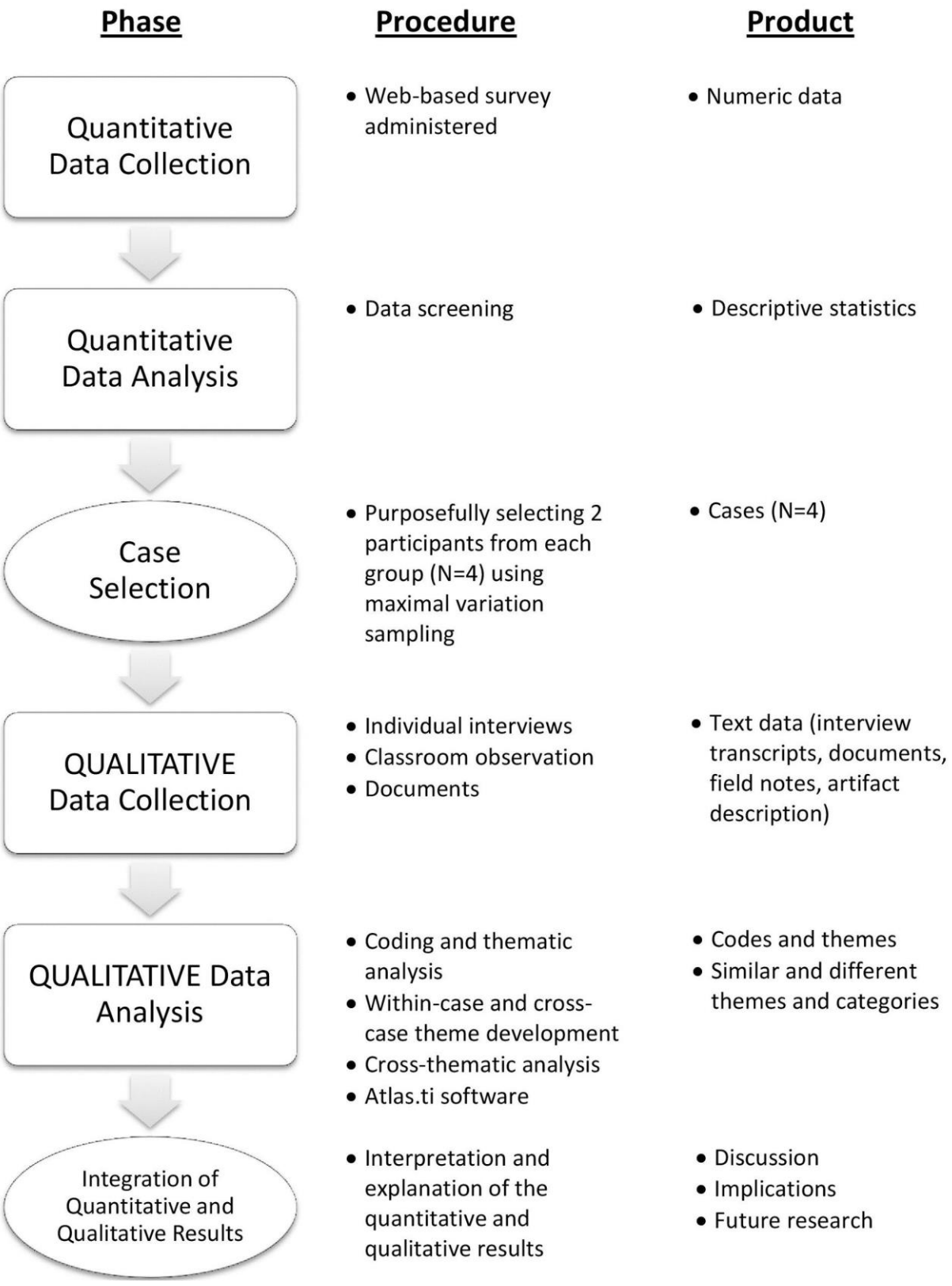


*Figure 3.2* - Diagram of study procedures

**Materials**

To examine participants with maximum variance in self-efficacy, a measurement tool must be selected that is both valid and reliable. The Computer Technology Integration Survey (Wang, Ertmer, & Newby, 2004), is an assessment intended to measure efficacy in the integration of technology during classroom instruction. The survey was developed for use during a study intended to examine how vicarious learning experiences influence the self-efficacy of technology use in the classroom for a group of pre-service teachers. It uses a Likert-scale (from 1 – strongly disagree to 5 – strongly agree) and includes 16 items specific to confidence of technology use. The instrument was determined to be both valid and reliable after a series of tests and revisions. A more in-depth description of the validity measures can be found within the study. Similar to the authors of the original survey instrument, this study was interested in measuring participants' abilities to use technology in strategic ways, so the items from the second factor were not used. This resulted in a 16 item Likert-style survey that served as a valid instrument for measuring a single construct. The survey earned a Cronbach alpha coefficient of .96, signifying that it was also highly reliable and appropriate for use in further research.

During the qualitative phase of the study, several materials were utilized for the collection of data. A digital recorder was used to review and transcribe the responses of each participant. Each interview followed the same interview protocol (see Appendix A). The interview protocol consisted of 31 questions beginning with general background and demographic information then moving to questions specifically connected to the research questions.

During the classroom observation portion of the data collection process, an observation protocol was utilized (see Appendix B). The interview protocol was designed to record the learning objectives, instructional materials used, student and teacher activities, and utilization of technology. Anecdotal notes were collected in a journal throughout the entire data collection process for reflection and further review.

## Data Collection Methods

Utilizing multiple methods and triangulation of data is critical to the credibility of any study (Creswell, 2007). The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. The primary data collection methods were semi-structured interviews and observations of technology use in the classroom. Data was collected and stored on my private computer in order to ensure that participant confidentiality was protected and all data was only accessible to me.

### Survey

Prior to conducting interviews and observations, the study commenced data collection through an initial survey that gathered baseline demographic information and measured participant levels of technology self-efficacy. Surveys offer an efficient, quick, and cost-effective means of collecting data from a set of respondents (Schuut, 2012). This method allowed data to be collected from teachers at six different schools without having to be on-site at each location.

It is important to note that the survey instrument was developed to measure self-efficacy of technology use in general, not specifically related to literacy instruction. The items presented in the survey apply to literacy instruction but could also be deemed as applicable to instruction in

other content areas as well. However, the primary purpose of the initial survey was to serve as a means to purposefully select four participants from a group of literacy teachers for further study. The qualitative phase of the study focused primarily on literacy instruction.

**Semi-Structured Interviewing**

To better understand teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction, interview data was collected from four participants using a purposeful sampling method. Relying on interviews as the primary method of data collection presents some unique challenges as it requires the cooperation of participants in order to obtain needed information, requires participants to be open and honest, requires me to possess strong interpersonal skills, and could present ethical dilemmas (Marshall & Rossman, 2011).

This study utilized a carefully developed interview protocol to effectively produce data that serves to answer the research questions. The interview protocol was pilot tested with teachers from a different district who are currently utilizing one-to-one technology during reading instruction. Results from this pilot test were not included in the final study, but feedback about usability and question clarity were utilized. This pilot test provided feedback about the structure of the interview questions and its ability to allow me to probe past surface level discussions and garner a deeper understanding of the participants' described experiences and perceptions.

**Field Notes and Observations**

Throughout the data collection process, field notes and observations were recorded to document data that the audio recorder did not reproduce from in-depth interviews, such as physical expressions, reactions or other unspoken observations that were potentially relevant to

the study. Maxwell (2005) stated that while interviews provide an "efficient and valid way of understanding someone's perspective, observation can enable you to draw inferences about this perspective that you couldn't obtain by relying exclusively on interview data" (p. 103).

I visited the classroom for each of the four participants to observe a reading lesson with typical usage of one-to-one technology. Data collected during this observation consisted of field notes documenting what the teacher was doing, what activities students were engaged in, how technology was being utilized, what specific reading activities were taking place, and notes about the classroom environment and overall learning climate.

## Data Analysis and Synthesis

Descriptive statistics were used to organize, summarize, and display the numerical data gathered from the initial survey. All data were stored in a secure location that was only accessible to me. Participant interviews were recorded digitally in an MP3 format and stored on my computer for transcription and analysis. Each recording was labeled and titled with easily identifiable nomenclature for future reference. Field notes and observations were recorded digitally via word processing software and stored on my computer. Each document was backed up through a secondary method on a web-based password-protected website that was also only accessible to me.

The coding of the data was also managed through digital means utilizing computer assisted qualitative data analysis software (CAQDAS). The specific software, Atlas.ti, is intended for the purpose of recording and analyzing qualitative data, identifying patterns and themes, and creating code lists. This code list, or codebook, included a comprehensive list of identified codes, their definitions, and example texts.

**Analysis Process**

The initial analysis of the data, or First Cycle coding, utilized generic methods for grouping and sorting data that pertains specifically to the research questions. Values Coding and Evaluation Coding were initially used to organize the data attained from field notes, analytic memos, document analysis, and participant interviews. Using these affective methods of analysis provided a way to focus on teacher perceptions relevant to their technology self-efficacy during literacy instruction while identifying common themes and prevailing concepts.

According to Saldana (2013), values coding is an effective method of exploring participant experiences in case studies which utilize both interview transcripts and field notes. He states that evaluation coding is appropriate for using qualitative data to "assign judgments about the merit, worth, or significance of programs" for the purpose of making judgments about and improving the effectiveness of programs (p. 119). This perspective was of value when examining which forms of professional development the participants perceived to have the greatest impact on their use of technology in the classroom.

Second Cycle coding was utilized to further analyze and organize the initial codes for the purpose of developing overarching themes and categories from the data. The primary method used during this process was Pattern Coding, as it provided for an effective way to group a larger set of data into a smaller number of sets and was appropriate for the development of major themes from the data (Saldana, 2013). This process involved developing meta-codes to create categories of similarly coded data, pulling together similar concepts and patterns. These categories were then used to form larger overarching themes which were used to construct an explanatory narrative using data-specific evidence to support any theoretical claims asserted by me.

## Ethical Considerations

This mixed methods study was conducted within the rules and regulations provided by the institutional review board (IRB) of the University of Arkansas. Evidence was provided to the IRB that all rights and privacy for each voluntary participant would be maintained and respected during the entire study. According to Creswell (2007) it is important that we are sensitive to ethical considerations throughout the course of the study, particularly as we "negotiate entry into the field site of the research; involve participants in our study; gather personal, emotional data that reveal the details of life; and ask participants to give considerable time to our projects" (p. 44).

It is believed that the benefits of participating in this study outweighed any potential risks. However, as human subjects, each participant had the right to individually weigh the associated risks and benefits and to use this information to make participation decisions (Bloomberg & Volpe, 2008). In addition, a number of safeguards were utilized to further protect participants from potential risks.

Prior to collecting data within the school, an application for Human Subject Exemption approval from the IRB of the Office of Research Compliance at the University of Arkansas was submitted and approved. In addition to seeking permission to collect research at the selected site, I also received informed consent from all participants within the study. All participants were assured of privacy and confidentiality through the use of pseudonyms and secured storage of data.

Ethical considerations that I took into consideration throughout the study included confidentiality, deception, and informed consent procedures. Confidentiality for each participant was ensured during the study by using pseudonyms in lieu of actual names. Also, all

data collected was stored on my personal computer in a password protected file or in a physical folder that was secured in a locked cabinet. The key and relevant passwords were accessible only to me.

I was intentional and transparent to all participants regarding the purposes of the study and the intended uses of all data collected. Once data was collected and analyzed, the results were shared with all participants involved in the study. This was done in order to minimize any apprehension on the part of the participants that the study was in any way evaluative. I made specific efforts to build rapport with the participants and create an environment of trust in order to gather the most authentic data possible.

Finally, informed consent procedures were discussed with all participants (see Appendix D). I shared the purpose of the study and the rights of the participant, which included confidentiality, anonymity in the reporting of data, and the ability to withdraw from the study at any time without penalty. The level of participant commitment in terms of time and resources were also provided to each participant, along with an opportunity to ask questions or choose to withdraw from the study.

## Risks and Benefits

Participants in a study may fear that being vulnerable and open about their thoughts will be used for evaluative purposes and potentially have a negative impact on them professionally. It was imperative that I built rapport with the participants and established a risk-free environment for sharing ideas and opinions. Participants were made aware of the data collection process and informed that all data collected during field observations or participant interviews would be kept confidential and would not be tied to any individual. The process of ensuring this confidentiality was imperative to obtain genuine descriptions and perceptive information from the participants.

Benefits of the study include that educational stakeholders would gain a clearer understanding of what affects teacher self-efficacy relative to technology use during literacy instruction. This information may be used to inform policy makers, school administrators, and instructional coaches about professional development practices that can be most beneficial in improving technology integration and eventually provide a clearer picture of the effectiveness of technology use in improving student achievement in reading and writing.

## Issues of Trustworthiness

To assist in the establishment of trustworthiness the study included both triangulation of data and member checking. According to Creswell and Miller (2000) triangulation of data is another sound validation strategy for a qualitative study. This process involves collecting data from a variety of sources to provide corroborating evidence that sheds light on a particular theme or subject. The study collected evidence from a variety of sources including participant interviews, field observations, document textual analysis, and survey data.

Member checking is the process of asking participants for their perspective on the credibility of the findings and interpretations as presented by the researcher (Creswell, 2013).

Lincoln and Guba (1985) consider this method to be "the most critical technique for establishing credibility" (p. 314). In this process, participants were asked to regularly provide feedback on the rough draft versions of my analysis of the data and development of overarching themes and interpretations in order to ensure the accuracy of the account.

## Limitations and Delimitations

Findings from the proposed mixed-methods study primarily focused on the analysis of data collected during the qualitative phase. The nature of qualitative research studies, particularly those that use the case study method, cause them to be focused on a small sample that make the results not generalizable to other settings. It is not the purpose of qualitative research to be generalizable across multiple settings, but to offer a perspective of a specific situation and provide an illustration or detailed description of the phenomenon being studied. In addition, the study was conducted in a single school district with teachers who encountered the same level of administrative support, professional development, and assistance from the district technology department. If the study had been conducted across multiple districts these variables would have greater variance and might have contributed to the overall findings.

Potential limitations to the sample stem from the isolated nature of the participant pool and the small number of cases studied during this qualitative portion of the study. This makes it difficult to "draw firm conclusions about the differences between the groups" (Maxwell, 2013, p. 98).

My biases towards technology create a limitation to the study. I currently serve as elementary principal in a rural southwest Missouri school district. Prior to my current position I served as a middle school assistant principal and as a business and computer teacher at two different rural school districts located a short distance from my current district. My experiences

in education are interwoven with technological experiences that range from taking online courses as a student to teaching classes in web design and digital publishing. Prior to becoming a teacher, my professional experience outside of education included web-based marketing and advertising positions that helped shape my disposition towards the value of technology in business, education, and society in general.

## Timeline

The study began in August of 2014 with the initial quantitative phase. The survey was administered to all teachers and data was collected and analyzed by the beginning of September. Four participants were contacted to participate in the second, qualitative phase of the study and permission from each participant was secured.

In October of 2014, interviews were conducted with each of the four participants, with classroom observations occurring during November. The data collection phase was completed by the end of November. Organization, coding, and analysis took place from November 2014 through February 2015 with the research and findings completed in March of 2015.

# CHAPTER FOUR – FINDINGS

The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. It was intended to delve into an aspect of technology usage, which previous studies had not addressed, while providing information related to teacher perceptions of what factors give them confidence in trying new technologies that transform their current instructional practices versus what causes them to be less self-assured in their use of those same technologies. To maintain confidentiality, pseudonyms were provided for each participant. A survey was initially used to quantify teachers' perceived levels of technology self-efficacy for the purposeful selection of four participants. Later, interviews and observations were conducted to explore their perception of factors that influenced those levels.

This chapter begins with a review of the research questions that guided this study. The participants' perceived technology self-efficacy levels are discussed. Identified themes related to teachers' perceptions of what factors influence their technology self-efficacy levels are described, and the relationships between those factors are addressed. The chapter includes discussion of similarities and differences that existed between and among teachers at varying levels of perceived technology self-efficacy.

## Research Questions

The overarching research question for this multi-site, multi-case study was the following: According to teachers, what factors influence their self-efficacy of one-to-one technology use during literacy instruction? Secondary questions for this study included:

(a) How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction?

(b) How are teachers currently using one-to-one technology during literacy instruction?

(c) What do teachers describe as the advantages/disadvantages of utilizing one-to-one technology during literacy instruction?

(d) What types of technology professional development do teachers perceive to be most beneficial to integrating one-to-one technology into literacy instruction?

**Survey Results**

The survey link was forwarded by each principal to all 112 members of the full-time, certified teaching staff. The overall response rate for the survey was 28%, with the intermediate school having a response rate of 25% and the five elementary schools having response rates of 20%, 24%, 31%, 33%, and 35%. For purposes of quantifying survey results, each of the 16 survey items had five choices using a Likert scale, which were assigned point values ranging from 1 to 5. The following point values were assigned to each descriptor: 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree. Participants' survey results were quantified into three categories using the aforementioned assigned point values: low-to-medium technology self-efficacy totaled within the point range of 16-59, medium-to-high technology self-efficacy totaled within the point range of 60-66, and very high technology self-efficacy totaled within the point range of 67-80.

Of the 31 completed surveys, 22.6% of the respondents scored in the low-to-medium range, 48.4% of the respondents scored in the medium-to-high range, and 29.0% of the respondents scored in the very high range (see Table 4.1).

**Table 4.1**

*Survey results for each self-efficacy level (N=31)*

| Categories | Percentage of respondents (%) |
|---|---|
| Low-to-Medium (16-59) | 22.6% |
| Medium-to-High (60-66) | 48.4% |
| Very High (67-80) | 29.0% |

Of the survey respondents, 83.9% were female, and 16.1% were male. Eighty percent of male respondents scored in the medium-to-high range, while 20% of male respondents scored in the low-to-medium range, and no male respondents scored in the very high range. Female respondents scoring in the low-to-medium range consisted of 23.1%, while 42.3% of female respondents scored in the medium-to-high range and 34.6% of female respondents scored in the very high range (see Table 4.2).

**Table 4.2**

*Survey results for each self-efficacy level by gender (N=31)*

| Categories | Percentage of female respondents who scored at level (%) | Percentage of male respondents who scored at level (%) |
|---|---|---|
| Low-to-Medium (16-59) | 23.1% | 20.0% |
| Medium-to-High (60-66) | 42.3% | 80.0% |
| Very High (67-80) | 34.6% | 0.0% |

Overall the responses to the survey illustrated a staff with a fairly high-level of self-efficacy related to technology use in their classrooms. The average score was a 63.7, which falls in the medium-to-high category. The district where the survey was administered has been immersed in technology use for the past several years during the implementation of the one-to-one technology initiative.

One interesting difference between male and female respondents in relation to self-efficacy levels was the larger percentage of females who were in the very high category. The discrepancy in self-efficacy levels may be due to the small number of male respondents, with only five of the 31 respondents being male. Four out of the five male respondents scored in the medium-to-high category, while one scored in the low-to-medium category. This small pool of male respondents makes it difficult to compare the data between male and female teachers.

Survey respondents had similar perceptions of their own abilities with technology use in the classroom compared to their ability to help students who were having difficulty with technology. The average score for the two items was 3.81 and 4.0 respectively. The only respondents who had differing opinions of their abilities in these two categories scored themselves slightly higher in assisting students who were having difficulty. Sixteen percent of respondents perceived themselves to be slightly more confident in their ability to assist students with technology versus their confidence in using it themselves in the classroom. The remaining 86% of respondents scored themselves exactly the same in both categories. This may be due to the perception that those activities requiring assistance by students would be the same technology-related activities created by teachers themselves. This could tend to make some feel more confident in their ability to help students troubleshoot since it was an activity they created themselves, and would have most likely only required skills the teacher already felt competent with using.

The survey question resulting in the highest ratings was related to teachers' confidence in their ability to regularly incorporate technology into their lessons when appropriate to student learning. The average response for all the respondents was 4.35 out of a possible 5 points on the Likert scale. The high level of teacher confidence with regards to this question may stem from

the wording of the question. This question focuses on the ability of the teacher to incorporate technology into lessons "when it is appropriate to student learning." If a teacher holds a low value for technology in general, this may skew their level of confidence in incorporating technology into their lessons because they only perceive it to be an appropriate tool for student learning in a select few circumstances.

The survey question with the lowest ratings was related to teachers' confidence in their ability to monitor student computer use during lessons. The average response for all the respondents was 3.81 out of a possible 5 points on the Likert scale. This concern was also expressed by the participants during the qualitative portion of the study and is outlined in detail later during this chapter.

**Selected Participants**

Ann Smith scored a 71 out of 80 possible points on the Computer Technology Integration (CTI) survey, which placed her in the "very high" category. She finished with an average score of 4.44 on each of the 5-point Like-scale items. Ann is a fifth grade English Language Arts teacher with 15 years of teaching experience, with all of those years taking place at either the fourth or fifth grade levels. She has her master's degree in curriculum and instruction.

At home, Ann is an avid user of technology with wireless internet access, a smartphone, laptop, an iPad, and a Chromebook. She regularly uses social media websites, such as Facebook and Instagram, and regularly uses the Internet to keep up to date on current news events. In the classroom, she has access to Chromebooks for every student and the teacher, a desktop computer, an interactive whiteboard, and a projector.

Beth Jones scored a 68 out of 80 possible points on the Computer Technology Integration (CTI) survey, which placed her in the "very high" category. She finished with an average score

of 4.25 on each of the 5-point Like-scale items. Beth is a sixth grade reading teacher with 11 years of teaching experience. She has her master's degree in educational administration.

Beth uses the internet at home on her iPhone, iPad, and Apple TV. She regularly uses the Internet to pay bills and to communicate with distant family members through Skype and Apple FaceTime. Thanks to the encouragement several years ago of her three teenage children, she is also an avid user of social media, including Facebook. In the classroom she has access to six iPads, 14 iPod Nanos, Apple TV, a desktop computer, five Kindle eBook readers, and a MacBook laptop.

Cindy Miller scored a 56 out of 80 possible points on the Computer Technology Integration (CTI) survey, which placed her in the "low-medium" category. She finished with an average score of 3.5 on each of the 5-point Likert-scale items. Cindy is a sixth grade English Language Arts teacher with 27 years of teaching experience. She has her bachelor's degree in education and 33 hours of master's level coursework, but she does not intend to pursue a master's degree.

At home, Cindy owns a laptop, an iPod, and an iPad which she primarily uses for email and school-related activities. In her classroom, she has Chromebooks for each student, a desktop computer, a laptop, a projector, and an interactive whiteboard

Debbie Baker scored 55 out of 80 possible points on the Computer Technology Integration (CTI) survey, which placed her in the "low-medium" category. She finished with an average score of 3.44 on each of the 5-point Like-scale items. Debbie is a 4th grade classroom teacher with eight years of teaching experience. She has her bachelor's degree in education and is pursuing her master's degree in TESOL (Teaching English to Speakers of Other Languages).

At home, Debbie does not own a television but does have an older smart phone and as of this year added internet service to complete her graduate coursework, pay bills, and video chat with distant friends on Skype.

Table 4.3 provides a summary of participants' characteristics with a breakdown of years of teaching experience, instructional level, technology self-efficacy rating, and average score per item on the CTI survey.

**Table 4.3**

*Participant characteristics*

| Participant | Years in teaching | Instructional level | CTI score | Avg. per item |
|---|---|---|---|---|
| Ann Smith | 15 | 4th grade | 71 | 4.44 |
| Beth Jones | 11 | 6th grade | 68 | 4.25 |
| Cindy Miller | 27 | 6th grade | 56 | 3.50 |
| Debbie Baker | 8 | 4th grade | 55 | 3.44 |

## Research Question One

Both the interviews and the classroom observations served to provide insight into teacher perceptions of what factors influenced their self-efficacy of one-to-one technology use during literacy instruction. Results from the interview were transcribed and analyzed using Atlas.ti qualitative analysis software to identify themes and patterns in the data. Table 4.4 provides a sample of the initial data codes.

**Table 4.4**

*Sample Initial Data Codes*

| Code | Meaning | Interview Source |
|---|---|---|
| ADM | Administrator support versus pressure | Ann, Cindy, Debbie |
| AGE | Participant age | Ann, Cindy |
| BH | Student behavior issues | Debbie |
| CBS | Collaboration between students | Debbie |
| CL | Career - late | Cindy |
| CM | Career - middle | Ann, Beth, Debbie |
| DEV | Ability to develop tech activities | Ann |
| DN | Digital natives | Ann, Beth, Cindy |
| EF | Efficiency of work | Ann, Debbie |
| FB | Feedback to students | Ann, Beth, Debbie |
| HTU | Home technology use | Ann, Debbie |

After the interview process, each of the four participants was observed while employing one-to-one technology during literacy instruction with their students. I used a classroom observation protocol and field note journal to collect anecdotal notes and record how the technology was used, the instructional method used and learning activity taking place, the role of the teacher, and the engagement of the students. Upon completion of the data collection process, I conducted an in-depth analysis of each case in order to interpret and explain the qualitative results utilizing within-case and cross-case thematic development and cross-thematic analysis. Table 4.5 provides a summary of the final data categories.

**Table 4.5**

*Final Data Categories*

| Sample Categories | Subcategories | Sample Codes Included |
|---|---|---|
| Administrator style | Administrator support | Admin support |
| | Administrator pressure | Admin pressure |
| Troubleshooting assistance | District support | Tech support, Professional development |
| | Teacher ability | Ability to troubleshoot, Ability to create tech activities |
| Perceived value of technology | Personal use | Home technology use, Technology value |
| | Instructional tool | Teaching others, Technology value, Social Skills |
| Risk taking | | Risk taking, Lifelong learners, Ability to troubleshoot, Ability to create tech activities |
| Career stage | | Age of teacher, Career late, Career middle, Digital natives |

**Work-Related Factors**

Analysis of the qualitative data relative to the first research question resulted in the emergence of two overarching themes. Factors which were perceived to impact teachers' self-efficacy of technology use during literacy instruction could be categorized into two broad

themes: work-related and non-work related. Factors presented in this section represent work-related factors identified during the course of the study. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

**Administrative support versus pressure.** Teachers' perceptions of building-level administrative support with regards to the integration of technology into their daily lessons were one work-related factor identified. Both participants with high-levels of technology self-efficacy indicated that their building administrator's approach was a factor in their comfort level when utilizing one-to-one technology in their classrooms. Debbie, who had a very low level of technology self-efficacy, stated:

> I like working with kids… but some of the policies of schools get me frustrated after eight years… Some of the hoops that we're forced to jump through with how we have to document technology use can be frustrating…. I've been in fourth grade the whole time. I like the age group. It's been an eMINTS classroom, I guess since I started. I wasn't ever trained in eMINTS, so it was kind of like I came in and, you know, they were like, you're a tech classroom. And that was never really defined for me.

Debbie went on to share that the district's approach to pushing technology out to teachers was more of a top down philosophy that resulted in some resistance with her internal desire to implement the technology:

> We're kind of forced to try it all the time. I don't like doing it on my own, to be honest, but I'm kind of forced into it whether, because they say "Here's the technology" or "Here's the app." I just kind of have to suck it up and say "OK, I'll try it."

The lack of a collaborative discussion between administrators and teachers about how to incorporate the technology as an instructional tool appeared to create some resentment from this particular teacher and undermined her level of autonomy in designing daily lessons.

Cindy, also with low technology self-efficacy, held similar frustrations towards her building administration as she stated:

> I would like for the administration to understand that it is not always appropriate…. We have spent all this money on computers, on networking on this and every other thing.

> And we keep hearing we need to get money for computers, we need this. No, you don't. You need to make sure that the computers that they are using are valuable.

Cindy went on to acknowledge the pressure that administrators may feel due to the significant financial resources being spent on acquiring technology. She indicated this pressure is then passed on to the classroom teachers in the form of mandates to use the technology regardless of whether the teacher believes technology is the best instructional vehicle for the particular learning objective. She stated:

> We've spent this money; therefore, you must. I think that is so stinking important, because if your administrators are just like, you've got to use these computers – and we've felt some of that push – I don't know how well that comes off…. And this statement has been made, "if your lesson plan is not using computers, you are doing something wrong." It's like – no.

Cindy's umbrage with how she perceived her administration had forced her use of technology, aligns directly with the perceptions of Debbie, her low self-efficacy colleague. These similar thoughts developed despite serving at different schools and under different administrators within the district.

Conversely, participants with high self-efficacy indicated they felt a supportive atmosphere from their building administrator relative to one-to-one technology use. Ann, a participant with high self-efficacy, described the support from her building administrator in a positive manner when she stated, "The support that I get from my administrator…is like, 'Here are these tools. What can we do? What other tools do you need? What can we do to help you?' Ann's sentiments are in stark contrast to those shared by Cindy and Debbie, the low self-efficacy participants. The supportive and collaborative approach described by Ann naturally created an environment where the teacher and administrator work together rather than in an adversarial manner that fosters animosity and resentment.

**District technology troubleshooting support.** The second work-related factor that participants felt had an influence on their technology self-efficacy was the perceived level of technology troubleshooting support they received from the district. Those with low-self efficacy felt that the level of troubleshooting support was not sufficient while participants with high-levels of self-efficacy held the belief that local technology support was strong. In her personal interview, Debbie, who had a very low level of technology self-efficacy, stated:

> Honestly, our district is very technology minded. But, I wouldn't say I've been offered a ton of support…. And, if I do have support it's the kind that comes from within…. Most of it honestly is me talking to the other two fourth grade teachers.

Debbie's statements illustrate her need to meet with people who share her grade-level perspective and can assist her in making connections between the technology and her curriculum. Previous research indicates giving teachers access to new technological tools without professional development that makes clear connections to the curriculum does not lead to transformational changes in instruction or consistent increases in student learning (Lei & Zhao, 2007).

Debbie went on to share her thoughts surrounding the additional work that is required on her part due to the technology resources in her classroom. She perceived the additional planning and technological set up required without enough support from the technology department was a factor in why her colleagues were leaving the school to pursue employment at other schools or in other grade levels:

> Fourth grade was the only classroom with technology for a long time. I felt like it was always an extra burden that no one considered that we have all this extra stuff to do. I mean, it kind of made me mad a lot of time. You know, like here you have to set up your computers or you need to figure this out because you have the technology. And honestly, I have been the only teacher to stay in fourth grade for longer than like two years. And I think a big part of it has been technology. I would say that it is a point of contention for me because I feel adamant you can't just throw technology at people, when we have all these other things to do, without support.

Debbie went on to state she felt the addition of technology in another grade-level within her building might help with the level of support they received. She perceived the lack of attention given to her technology needs was due to one-to-one technology only being available in a small fraction of classrooms within her school, which in turn kept the technology assistance from being a focus.

Cindy, another low technology self-efficacy participant, also perceived the technology support to not be adequate. She expressed similar perceptions regarding the lack of technology support when she stated:

> It is important that it works. Little details like, "Oh, we, we hadn't thought about twenty-seven children trying to access this thing at a time. So it takes fifteen minutes for their computers to all get in there." That is frustrating.

Her comments keyed in on a lack of preparation taking place prior to the launch of the one-to-one Chromebook initiative as opposed to a lack of training referenced by Debbie. These are two different areas of technology support, but both resulted in an equal level of dissatisfaction by the teacher responsible for implementing the technology.

Ann, a participant with high self-efficacy, held contrasting beliefs to those participants with low levels of self-efficacy. She felt the high-level of support she received was a contributing factor to her level of self-efficacy with technology use during literacy instruction. In her interview she stated:

> I really couldn't ask for anything more, I mean, as far as just support. The other day I had a Chromebook that wasn't doing what I needed it to do. I took a picture of the screen and texted it to our tech guy. I was like "I don't know what this is!" We're texting back and forth. In some schools you can't even had a phone out. Here they view your phone as a device. He couldn't view my screenshot that way, so he just came down and looked at it….

The contrast is stark between Ann's depictions of the level of technology support she received as compared to Cindy and Debbie, her low self-efficacy counterparts. Ann did, however, share a

similar perception that the time she was able to spend collaborating with her fellow teachers was extremely beneficial:

> I think the best comes from collaborating with other teachers and then just that awesome support. Like when I find something, I know that I can go to my principal he is like "Oh yeah! That's so cool! You need to tell so and so about that."

This culture of collaboration and sharing of ideas with her colleagues and her building-level administrator helped Ann to feel supported and optimistic about her ability to incorporate the-one-to-one technology into her lessons and about her job in general.

**Non-Work Related Factors**

In addition to the work-related factors outlined above, there were also several factors unrelated to work which were perceived by teachers to impact their self-efficacy of technology use during literacy instruction. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

**Perceived value of technology.** Teachers' personal value for technology was a factor unrelated to work that participants identified as influential in their level of technology self-efficacy. Both participants with high-levels of technology self-efficacy indicated they had a high value for technology and felt it was a factor in their comfort level when utilizing one-to-one technology during literacy instruction in their classrooms. Ann, who had a high level of technology self-efficacy, regularly used technology for her personal use. This technology included wireless internet, a Chromebook, a laptop, an iPad, social media websites, and an iPhone that she claimed rarely left her side.

Beth, who also had a high level of technology self-efficacy, regularly used technology for personal use in the form of wireless internet, a smartphone, social media websites, Skype for video conferencing with family members around the country, online bill paying, an iPad, and Apple TV. In her personal interview, she stated:

> We're doing our students a disservice if we are not teaching them how to use it [technology] correctly. Because they're going to use it. This is their world now. They need to know how to use it correctly. They understand Google, but they need to understand how to search for something correctly and find the correct information, the good information.

In addition to the value Beth placed on technology for the future success of her students, she also placed a high value on technology for her own personal and professional use. She felt the technology had value as an instructional tool in multiple ways:

> It can be huge a time-saver. I mean, there are times where you're getting ready to get interactive feedback right then, scoring tests…. When you've got some kiddos who need the speech to text. What a great resource we have now. And, he's not gonna stand out, because everybody's using them now. And that's a really awesome thing…. Information comes quicker. That has been really nice. Like for me…I need some background information immediately. That is a great resource to get them pulled into the lesson.

This sense of value placed on technology made the process of investigating how to use it effectively less of a burden than those participants who placed a low value on technology, as did both of the low self-efficacy participants.

In contrast, both Cindy and Debbie indicated their value for technology use in general was low and played a factor in their lack of self-efficacy with one-to-one technology use during literacy instruction. Debbie described her personal use of technology as limited to only what she deemed was absolutely necessary. She explained she did not own a television or a smartphone and did not use technology for entertainment purposes. She utilized technology primarily as a tool for activities such as paying bills online and for video conferencing through Skype with friends from different parts of the world. In her personal interview she stated:

> I'm actually not a big technology person. Which maybe has somewhat made it hard for me, um, wanting to implement, because I'm more natural. I didn't even get Internet service [at home] until this year because I have to take some online classes.

She went on to state that her experiences outside of her current classroom setting have played a role in shaping her attitude towards technology. During her personal interview she stated:

> I have done some teaching overseas, which was interesting because I've done anything from like, you know, chalkboards and no copiers and nothing in Africa, to China, where they moved me from room to room to room to room. You never knew what technology you'd have. So I've had some cool experiences…. It kind of puts things in perspective a little bit for you…. [laughs] I actually love chalkboards.

Debbie shared her perception that her lack of value for technology has impacted how she looks at her responsibility for implementing the district's one-to-one technology initiative. She stated, "I think because I don't love it, it felt like more of a burden."

Cindy, another participant with low technology self-efficacy, owns a laptop and an iPad for her personal use. She shared that she has little trust in the dependability of technology in her classroom. In her personal interview she stated, "I think eventually technology is gonna go kaputz, because something is going to happen where it's all going to go down and we'll lose everything." This mistrust in the dependability of technology caused Cindy to not invest herself in learning more about it and in creating lessons that utilized the one-to-one technology available in her classroom.

She went on to state she believed the value she assigned to the technology played a large part in her self-efficacy with using technology during her literacy lessons. She said, "I have to see value in it. I have to see value for the children. This has to be something that will help them educationally." This sentiment was directly in conflict with those thoughts shared by her high self-efficacy counterparts, Ann and Beth, who shared their perception that they had an obligation to prepare students for how to use the technology in order to help them succeed beyond the classroom.

**Risk taking.** Another factor unrelated to work that participants indicated had an impact on their level of technology self-efficacy was their aptitude for risk-taking. Those participants with high levels of technology self-efficacy were more inclined to step outside of their comfort zone and try something new. Ann, who had a high level of technology self-efficacy, stated in her personal interview:

> I'm not afraid. I'm not afraid to take risks. I'm not afraid of trying new things. If they don't work, I know that I'm not going to be in trouble for like, "You should have thought of that." It's going to be like, "Hey, you tried it!"

Ann demonstrated this willingness to take risks during the lesson that was observed by me when, during the middle of the lesson, she asked students to install a new extension to their web browser based upon a suggestion from one of her students. The extension enabled a split-screen view on the student Chromebook monitors, making the activity she had planned easier to complete without having to switch back and forth between two screens. Once the suggestion was made, she instructed students to visit the appropriate website to download and install the extension. She then moved about the classroom providing assistance to students who required it. Within just a few minutes, the extension was installed on each Chromebook and students were using the new approach.

Beth, another participant with high technology self-efficacy, echoed the sentiments shared by Ann when she stated:

> The bottom line is, and I'm not gonna lie, you have to just get into it yourself and not be afraid…. Because you almost get overloaded. There's so much out there and you have to kinda grab on to what do you think is gonna fit. "That sounds like a good idea. I'm gonna look into that more."

Beth went on to state during the interview that she felt her teenage daughters helped to keep her abreast of the latest applications and websites. When asked how often she spent time experimenting with new ways to utilize one-to-one technology in her classroom she answered:

> Constantly. I can be at a football game and say, "What is that?" And I look at them and I ask my kids in Sunday school. I mean, it's just constantly…. The other thing I do is periodically Google for top reading websites, top reading apps, top internet media apps…. And then the kids tell me things and they think that's the coolest thing when they've found one for me.

This willingness to spend her time outside of school hours to investigate new technology tools and applications for her classroom separates Beth and Ann from the low self-efficacy

participants. Neither Cindy nor Debbie was as comfortable as their high self-efficacy counterparts with taking risks and experimenting with technology. When speaking in her personal interview about the difference between herself and a colleague who she described as having high self-efficacy with technology, Debbie stated:

> I just usually go to him and say how are you doing this and get the ideas from him because he probably puts more time into technology and I just steal his ideas. But, I put more time into other things and I let him steal it.

Debbie explained her perception that personality type played a role in why those with high-self efficacy were more apt to spend time experimenting and trying out new ideas in class. When comparing herself and her colleague who she perceived to have high technology self-efficacy she stated, "He's just a different personality…. I like to think through things more and am probably more cautious to jump into things." This penchant for risk-taking was recognized as a factor in their level of self-efficacy by participants with both high and low levels of self-efficacy.

Debbie's lack of desire to "jump into things" also manifested itself as a perceived factor with technology self-efficacy when she explained her frustration related to the ever changing landscape of technology use in education today:

> It's changing so quickly it can be a frustrating thing, because as soon as you find one thing that works you realize that, "Oh, now Google Drive is out and Google Classroom is in." I mean, teaching in general feels like this to me now. [laughs] But especially maybe technology is the drive behind that, but especially when it's so fast paced that you can't really ever stop.

The process of learning about technology is an ongoing one, where new advances are constantly taking place and your knowledge base from yesterday can be rendered obsolete by tomorrow. This often results in teachers feeling like perpetual novices in the process of technology integration (Mueller et al., 2008), which suggests the need for teachers to have strong self-efficacy for teaching with technology if it is to be utilized regularly.

Cindy, also with low self-efficacy for technology, shared during her personal interview that she also was not inclined to voluntarily seek out new ways to utilize the one-to-one technology available in her classroom. She stated:

> I'm not good at discovering what I need…. If I hear about something that I think is beneficial, I do it. But there are all sorts of things out there that I hear about and, nah, mm-mm [shakes her head]. I'm not gonna waste my time on that.

The combination of her lack of value for technology in general and her self-perceived lack of ability to discover new and effective methods for using technology have resulted in a negative perception about her ability to successfully integrate technology in her classroom. This was further illustrated during her classroom observation when she expressed frustration about a technology-related activity not working the way she had envisioned. When the website link that students were to access from their Chromebooks did not work, she began trying to find an alternate activity and stated to me, "I am sure that somebody could find it and do it, but I do not have the knowledge." Cindy's lack of confidence and comfort with trying something new was in stark contrast to the sense of self-efficacy demonstrated by Ann during her classroom observation, where she altered her lesson to have students download a new extension for their Chromebooks and use it for the planned learning activity, based merely upon a student suggestion earlier in the day. Ann's confidence in her ability to take on this risk and troubleshoot any technology issues that may have occurred was congruent with her stated lack of fear for trying new things during the personal interview.

**Career stage.** The third factor unrelated to work that participants perceived to play a role in their level of self-efficacy with technology use was whether the teacher was in the early, middle, or late stages of their career. Participants with both low and high levels of self-efficacy indicated that they believed age or career stage was a factor. Ann, a 37-year-old participant with

high technology self-efficacy, shared that she assumed some of the more veteran teachers in her building had lower self-efficacy than she did. During her personal interview she stated, "This is going to be totally unfair. There are some teachers that are older than I am... I don't know... I would assume that maybe those ladies might not like using it." Though she was hesitant to share this idea, Ann was not alone in this perception.

Cindy, a 49-year-old participant with 27 years of teaching experience, shared the same sentiments about the factor an individual's career stage plays in their technology self-efficacy. During her personal interview she stated:

> Maybe somebody 25, who is this – what do they call that computer generation? …the digital natives! I'm not a digital native…. Are you going to talk to any, like, 20-somethings? That would be interesting. To see how their mindset is different from mine.

Though coming from opposite ends of the technology self-efficacy spectrum, both Cindy and Ann expressed this perception of career stage playing a role in a teacher's level of technology self-efficacy.

## Research Question Two

Analysis of the qualitative data relative to the second research question resulted in the emergence of both commonalities and discrepancies between participants' stated internal beliefs about their level of expertise with using one-to-one technology during literacy instruction and the results from their CTI survey. This section will discuss similarities and differences between and among teachers of both high and low technology self-efficacy levels and how they describe their own level of expertise with using one-to-one technology during literacy instruction.

Ann, a high self-efficacy participant, scored a 71 out of 80 possible points placing her in the "very high" category on the CTI survey. She described her use of one-to-one technology during literacy instruction as effective. She shared some of the practices she currently utilized

and described them as what she would expect in a one-to-one classroom. During her interview she stated:

> I think that, for it to be effective, there's been enough front-loading and modeling that the kids know what they're doing. There's not a lot of questions…. I also think that you're not using it just for the sake of using it. In my mind, yes, we have IXL, and yes, they can play a game on there for additional support. But, to me, that's not really, in my mind, using technology in the classroom…. To me, it's when you use Google Classroom, our whole team uses it, and it's awesome…. I can share the assignment with them online, they can digitally complete the assignment, and then I get to step back and be a facilitator.

Ann demonstrated this process in action during her classroom observation as she served in more of a facilitator role once the initial activity was completed and students were working independently on creating a writing piece. She provided feedback to individual students by embedding her comments directly into their writing assignment while they were simultaneously working on it.

Beth, another high self-efficacy participant, described her practices as effective when discussing her current implementation of one-to-one technology during literacy instruction. She stated during her interview:

> All the students are engaged, working independently, um, but doing it correctly. We can't just be playing on there. They still need a teacher to be walking around, monitoring them, giving them instant feedback…. We've got Google Classroom now and they can get instantaneous feedback.

Beth's confidence in her ability to utilize the technology in a way that kept students engaged in the learning process was in alignment with her initial survey data and her classroom observation. She scored a 68 out of 80 possible points on the CTI survey, which also placed her in the "very high" category. During her classroom observation students were engaged throughout the entire process and multiple technologies were utilized in a way that was specific to the curricular needs of the lesson.

Cindy, a low self-efficacy participant, scored 56 out of a possible 80 points on the CTI survey placing her in the "medium-low" category. She described herself as partially effective in her implementation of one-to-one technology during literacy instruction. During her personal interview she noted how she struggles to create new activities for her students when she shared, "I'm not good at discovering what I need." But she also described her own technology integration as being used when it is appropriate. "It's not forced. It is something that benefits the student," she added, "Technology for technology's sake is useless. That's what I resist doing." Her response was similar to that of the other low self-efficacy participant, in that she only uses the technology as a resource when she thinks it is necessary. Cindy's classroom observation reinforced this self-perception when the activity encountered technical difficulties and she was unable to circumvent the issue.

Debbie scored 55 out of a possible 80 points on the CTI survey, also placing her in the "low-medium" category. She describes herself as partially effective in her level of expertise related to implementing one-to-one technology during literacy instruction. Self-labeled as "not a big technology person," Debbie indicated she is still learning how to best use the tools available. She primarily uses her student Chromebooks for independent practice and shared that she does not "necessarily think that's the best or the only way" to use them. This response did not directly align with the classroom observational data, as students were effectively using the technology for a wide variety of instructional purposes. Students were not only using the Chromebook laptops for independent practice, but also for the creation of an assortment of products ranging from slideshow presentations to written essays.

## Research Question Three

Research question number three delved into how teachers are currently using one-to-one technology during literacy instruction. Analysis of the qualitative data relative to the third research question resulted in the emergence of both commonalities and discrepancies between participants' stated internal beliefs about their level of expertise with using one-to-one technology during literacy instruction and their observed use of these technologies in the classroom. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

During her classroom observation, Ann, a high self-efficacy participant, had all of her students on their Chromebooks within just a few minutes from when they walked into the classroom. After a brief group activity on the interactive whiteboard, Ann asked her students to take out their Chromebooks and log on. She then asked students to go to the Chrome web store and download a new extension for their Chromebook that would allow them to have a split-screen view in their browser. Students responded and followed her directions while she moved around the room helping troubleshoot with any students who were having difficulty installing the extension.

Students in Ann's classroom were then asked to open up three separate tabs in their browser in order to view the Google Classroom website, a Google Docs document, and a PDF file. They were to transfer information from the PDF file into the Google Docs document for the purpose of practicing proper use of comma rules.

Once students completed the comma rules assignment, they were to then return to an ongoing writing assignment that Ann had developed on the Google Classroom website. Students continued working on their narrative writing assignment in a collaborative Google Docs

document while Ann read their assignments from her teacher computer and gave students feedback by typing comments directly onto their document. Students were able to see her feedback comments instantly from their own Chromebooks and begin making revisions based upon her written comments.

Beth, also a high self-efficacy participant, used a very individualized approach to utilizing one-to-one technology during her literacy instruction. Her classroom had four students during the observation and after a brief choral reading activity where the students read aloud a poem from a website together, she then had each student working independently on their own device for five minutes at a learning station before they rotated to the next learning station. Students were well versed in her expectations and how to use the technology, which allowed Beth to work one-on-one with a single student on decoding skills.

One student was on the desktop computer reading a text passage and recording her voice through recording software. The student then listened to her own reading and made notes about words where she struggled or other elements of the reading that she felt were strong or needed improvement. She then repeated the process.

While this was taking place another student was working on an iPad tablet and another was on an iPod touch. Both students were playing different skill-building word games to improve reading fluency.

Cindy, a participant with low technology self-efficacy, used technology in her classroom to show groups of two to three students a video clip from a DVD on her laptop. While the rest of the class was working out of their textbook or on a worksheet, small groups of two to three students would move to a table where a single laptop was set up. At this table they would view a few minutes of a movie clip they were to use as a basis for their compare-and-contrast writing

assignment. During this time Cindy moved about the classroom giving feedback to students who were working on the worksheet.

After about 15 minutes, students were then instructed to open their Chromebooks and click on a link she had posted on their Google Classroom website. When students attempted to click they were unable to access the webpage. Cindy was unable to troubleshoot the problem and get students back online where they could access the webpage she had instructed them to visit. Cindy expressed her frustration to me and stated, "I am sure that somebody could find it and do it, but I do not have the knowledge." Students were then told to put their Chromebooks away and begin reading their library books for the remainder of the class period.

The other low self-efficacy participant, Debbie, also had Chromebooks in her classroom for each student. Prior to having students work on their Chromebooks she had students move to the front of the class and sit on the floor with her. She discussed what was going to take place during the next activity and had assigned each student to a specific task. These task assignments were posted on the interactive whiteboard for the entire class to see. She discussed with them what her expectations were for each activity and that during this time they would be working independently while she met with a small group of students at her table for a guided reading lesson.

Students then moved back to their tables and began working on the Chromebooks. Some students were working on revising a narrative writing assignment based upon comments that were inserted into the collaborative Google Docs document by either their teacher or by another student. Others were creating a slideshow presentation on Google Slides, another collaborative web-based program, about Grandparents Day. Another group of students were using their Chromebooks with headphones to listen to an eBook as it is read to them by a narrator. The

remainder of the students were reading an eBook on a website and taking a quiz about the book to assess their comprehension of the text.

The group of students that were meeting with Debbie at the guided reading table also had their Chromebooks out and she instructed them to open up in Google Classroom a previous assessment they had completed. The assessment was a collaborative Google Docs document, and Debbie had highlighted their incorrect answers in green. Students were instructed to revise those answers and resubmit the document when completed.

## Research Question Four

Research question number three delved into how teachers describe the advantages and disadvantages of utilizing one-to-one technology during literacy instruction. Perceived advantages of one-to-one technology use during literacy instruction could be categorized into two themes: efficiency and access to information. Perceived disadvantages primarily related to classroom management. This section will address similarities and differences in perceptions between and among teachers of both high and low self-efficacy levels.

### Advantages

Factors presented in this section represent participants' perceived advantages of one-to-one technology use during literacy instruction. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

**Efficiency.** Participants indicated that one area where they felt the use of one-to-one technology created an advantage over traditional methods was the efficiency of time and resources. Teachers have the ability to give immediate feedback to students in a meaningful and timely manner. Ann indicated the ability to view student writing assignments from her own computer through Google Classroom while students were simultaneously working on it allowed

her to provide immediate feedback to students regarding their writing. Using this method, as opposed to waiting until the paper copy of the draft was completed and submitted to her and then making revisions and meeting with each student face to face, allowed her to maximize her time. During her personal interview she stated:

> The way I look at it is, what's the difference if I'm up walking around the room conferencing or if I'm back there. Because back in the old days when I would conference with them, I would be doing good to conference with four students in a day. I can conference with all of them. I probably can read all of their stories because it's typed, so I'm not having to deal with handwriting. "What does this say? I don't even get this?" You know? Maybe not all of them, but I can get through the majority of them quickly.

Beth also felt that efficiency and feedback were advantages of using the technology during her literacy instruction. She shared, "It's also made it cheaper with the e−books. I can purchase one of those and I have access to six." She went on to state:

> It gives us immediate feedback. It's one thing when the teacher is telling them, and it's another thing when they hear it themselves. That's an excellent resource. I had one student, when they would read did this weird pitch. And I would try to tell him, but he didn't understand. And the first time he heard it, he never did it again. Never did it again. But he had to hear it for himself. So, he gets that instant feedback.

Beth went on to share that she felt it allowed her to be more efficient by maximizing the instructional time she had with students:

> With the Apple TV there is so much for phonics and word work and things like that and even for just a five-minute filler, I get a lot in. Having the technology, as before it might have been kind of wasted time, or that kind of stuff. Zero wasted time anymore because I have so much. I can't get it all in because I have so much.

Not only did Beth feel that it helped her to make the most of the instructional time she was allotted with her students as a time-filler activity, but she also saw it as a time-saver in other ways.

> It can be a time‐ saver. I mean, there is some where you're getting ready to get interactive feedback right then. Scoring tests. You know, those kind of things…. Information coming quicker…. Like for me in here, I need some background information immediately. That is a great resource, a way to get them pulled into the lesson.

Beth's perception of technology allowing her to maximize her time aligned not only with her fellow high self-efficacy colleague, but also with the low self-efficacy participants.

Debbie also saw benefits of efficiency in both time and resources. She shared that she was able to look for specific qualities in her student writing assignments easily and quickly when using Google Docs. She stated during her interview:

> In writing, it's been really neat because now, they do the writing process on the computer. And it's been a lot easier to really track what students are doing because I can pull up all their stories and just flick through and see, you know...If I say, "Highlight this in blue." I can quickly make a list of who needs it.

In addition to speeding up the process of identifying how well students are performing in a particular writing concept, Debbie also identified another advantage as the ability to make student handouts on the computer and provide students access to them digitally instead of making paper copies. This process is efficient not only in the amount of time spent making copies, but also in terms of resources and paper used.

**Access to Information.** The second main theme that emerged relative to advantages of using one-to-one technology during literacy instruction was ease of access to information. Ann, a high self-efficacy participant, stated in her interview:

> I think that they [students] don't get caught up on spelling, because there's spell‐check. We had that conversation today. "If your brain knows a big word but you don't know how to spell it, use that big word. You've got a computer, we'll figure out how to spell it!" But with writing, with paper‐pencil, there wasn't that tool. They had to get out a dictionary. They don't want to do a dictionary. But they have no problem opening a new tab…. In some ways, it helps them enhance their vocabulary a little. I know it sounds ridiculous; [jokingly] they can't spell anything because they've got spell check, but it enables them to take risks.

This perception aligns with how research suggests today's learners value the power of technology in their learning. Today's learners value technology because they perceive it makes abstract concepts easier to grasp and allows them to easily research any topic (Oblinger, 2005). Beth also indicated that technology allowed her students access to information in ways that

would not otherwise be possible when she shared how technology allowed her students to gain background information about a topic she was introducing or look up an unfamiliar word with the click of a button.

The low self-efficacy participants did not share the same perceived advantages as their high self-efficacy counterparts. Cindy indicated the ability to differentiate what students were doing was what she perceived as the primary advantage. She appreciated that technology allowed students to easily work at his or her own pace, and review a video lesson multiple times if they needed in order to grasp the concept.

Debbie, on the other hand, perceived the greatest advantage offered to be the power of collaboration. She highlighted the ability for students to view each other's work and make comments directly on the assignment in Google Docs. She also perceived the ability to easily show the entire class a writing assignment that one for their classmates had created without having to decipher sloppy handwriting as another major benefit that went along with the power of collaborating.

**Disadvantages**

Factors presented in this section represent participants' perceived disadvantages of one-to-one technology use during literacy instruction. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

**Additional Planning.** A disadvantage related to one-to-one technology use shared by participants with both high and low self-efficacy was related to additional planning required for using one-to-one technology in the classroom. Beth indicated the time spent up front to plan and make sure there were alternate activities in place in the case of a technical failure was the most prevalent challenge. During her interview she stated:

> It does take a lot more planning... you do have to. And then you have to back up, like last night we had a big family night and then we had prepared this great video presentation and the Internet wasn't working accurately. It didn't buffer correctly so, of course, you have to back up and you just roll with that.

This line of thought was also found on the low self-efficacy side, as Debbie shared her own frustrations with the same challenge:

> For a long time, I felt like it was always an extra burden that no one considered that we have all this extra stuff to do…. It made me mad a lot of time. Like here you have to, you know, setting up your computers or you need to figure this out because you have the technology. And honestly, I have been the only teacher to stay in 4th grade for longer than like two years. And I think a big part of it has been technology.

Both high and low self-efficacy participants identified this as a disadvantage of one-to-one technology use in their classrooms. Both Cindy and Debbie indicated there was not an adequate amount of time afforded them during the school day to dedicate to acquiring new technology knowledge, while Ann and Beth also shared they spent more time investigating new tools outside the school day. The ever changing landscape of technology as an instructional tool (Mueller et al., 2008) combined with the perceived lack of time available during the work day to prepare and learn may lead participants to dedicate significant time outside of their contracted day in order to discover the most effective methods to incorporate one-to-one technology and acquire a level of efficacy where they can teach students how to use the tools and troubleshoot any technical issues that may arise.

**Student Behaviors.** Another common disadvantage that both low and high self-efficacy participants discussed was related to student behaviors. Participants indicated their students' ability to access information that was not appropriate or was not on task created some classroom management challenges. Cindy, a low self-efficacy participant, shared her frustration with the issue:

> They don't miraculously become wonderful focused students because they have a computer in front of them… The disadvantage is you've got 27 computers out there and

> what the heck are they doing? They're kids. Some of the guys are much smarter than I am on computer electronics. And they can sneak anywhere anytime. And that's the big disadvantage – I don't know what they're doing.

Debbie, the other low self-efficacy participant, also felt the same concerns about student behaviors when implementing one-to-one technology during her literacy instruction. During her personal interview she stated, "Behavior-wise there are more behavior problems that can happen with it. Like, the teacher next to me has had lots of behavior problems with the computers – directly related to the computer. Stealing it, getting on sites they shouldn't." Debbie's perceived lack of control over what students were doing on the computer aligned with the feelings expressed by Cindy. However, the low self-efficacy participants were not alone in their identification of behaviors as a challenge that comes with using one-to-one technologies.

Ann experienced some of the same issues in her classroom as well. "You know kids are kids. You'll always have the one that's Googling something that he's not supposed to be Googling. We had one student last year that was always Googling inappropriate things." Though the expressed behavior management challenges would tend to contradict what the research says about technology as a strong tool for increasing student engagement (Klem & Connell, 2004; Terrion & Aceti, 2012; Manuguerra & Petocz, 2011), this perceived disadvantage may be directly linked to how it is primarily being utilized in their classrooms – for independent practice. In all four participant classroom observations, the technology was utilized in an independent manner with students on their own to practice a skill or create a document. Without direct teacher supervision and monitoring, the described off-task student behaviors may tend to develop more frequently.

### Research Question Five

Research question number five examined what types of professional development teachers perceived to be most beneficial to integrating one-to-one technology into their literacy

instruction. Analysis of the qualitative data relative to the fifth research question resulted in the emergence of three overarching themes: specific and relevant training, learning from colleagues, and the need for more time dedicated to training. This section will address similarities and differences between and among teachers of both high and low self-efficacy levels.

**Specific and Relevant**

The first theme relative to professional development that emerged from analysis of the qualitative data was the desire for training that was specific to a particular program or content area. Participants with both high and low levels of technology self-efficacy indicated this was something they deemed valuable when participating in technology trainings. Ann, a high self-efficacy participant, shared during her personal interview:

> I'm looking for courses that have like specific programs because I've got to get online and look at what's a tool for this. That would be most beneficial to me and somebody is saying "Here is this workshop on… and how to use…" Something just on specific programs. Like I know a couple of our teachers are presenting on Google Classroom. I already know that, but if I didn't then ... Just specifics.

Both low self-efficacy participants echoed those sentiments. Cindy and Debbie indicated they felt a focus on specifics would serve to make their professional development experiences more valuable. Debbie shared that she was dissatisfied with the professional development she was currently receiving in her district because she perceived that it was "not attached to the actual learning implementation" that was taking place in her classroom.

When asked what type of professional development activities she found to be most beneficial, Cindy answered:

> When you can do an activity with me. And I mean one activity, not twenty and say, "Here, we're gonna do these twenty things and then you get to choose." No. You know, one maybe two... This is good; give me all the details about this. Don't overload me with fifteen different things because my brain can't process that.

This perception held by participants of both high and low levels of self-efficacy falls in line with previous research that suggests transformational changes in instructional practices cannot occur without a direct connection to the curricular content being taught (Lei & Zhao, 2007).

**Learning from Colleagues**

The second theme related to professional development was the commonality between both low self-efficacy participants in their perception that learning in a small setting alongside their colleagues increased its likelihood of being perceived as beneficial. Both Debbie and Cindy expressed their preference for learning in small groups with their colleagues. During her personal interview, Debbie shared:

> The stuff that I love the best really is just talking to my co-workers because I think they know what's going on in our classroom. Because we really teach the same – in a similar way. And so if I have time to sit with them and maybe a teaching specialist who says, "Hey, I put a little more time looking into how this works and how you could best implement it."

Cindy also shared her perception that this type of learning was most beneficial to her. During her interview she stated that she and her grade-level colleagues regularly find a new approach that worked well and then "we share it immediately." This type of learning has connections to the previous theme in that it supplies information that is specific and relevant to teachers and can be immediately used in their classroom.

**Adequate Time**

The final theme that emerged relative to professional development was the need for additional time. Both of the low self-efficacy participants indicated this was something they perceived would make the training they received more beneficial to the integration of one-to-one technology into their literacy instruction. Cindy felt strongly that more time was needed; when asked if adequate time was given to trainings during the work day she stated, "Is there a word stronger than no? [laughter] I mean, could you put an 'explicative no' there? And just fill in the

blank with whatever you want? No. Will there be ever enough days? No." This strong perception of a lack of sufficient time dedicated to learning about new technologies was echoed, albeit to a lesser degree, by Debbie, the other low technology self-efficacy participant. Debbie indicated she also desired more time and support. She felt that providing technology support in her building was not a priority since her grade level was the only one in the building with Chromebooks. She said third grade classrooms were going to be adding Chromebooks soon and she hypothesized that the addition of another one-to-one grade level would increase the level of attention and time they would receive for technology learning.

Previous research suggests building competency with new technology requires time (Dwyer, Ringstaff, & Sandholtz, 1990) for teachers to move beyond simply mastering the software to using it in a way that transforms their instructional practice. The perception of both low self-efficacy participants in this study suggested the need for additional time dedicated to professional development on technology use. Neither Ann nor Beth indicated they perceived time as a primary boundary to effective professional development. Both participants indicated they spend a considerable amount of time outside of their contracted day researching and learning about new technology. Perhaps their inclination towards dedicating their own time outside of the school day towards learning more about the tools they have available influenced what they perceived as the most important factors relating to effective professional development.

## Summary

This chapter presented the findings uncovered by this study, organized according to each of the five research questions. Identified themes related to teachers' perceptions of what factors influence their technology self-efficacy levels are described, and the relationships between those factors are addressed. The chapter included discussion of similarities and differences that existed between and among teachers at varying levels of perceived technology self-efficacy.

The primary finding was that participants with both low and high levels of technology self-efficacy perceived the support from their administrator played a role in their level of self-efficacy with using the one-to-one technology available in their classroom during literacy instruction. High self-efficacy participants perceived their administrator and their technology support services demonstrated strong support for them, while low self-efficacy participants perceived a lack of support from both their administration and the technology support team. Low self-efficacy participants perceived administrative pressure to use technology in their lessons regardless of whether the teacher felt it was the best instructional tool for the situation.

The second finding was that both low and high self-efficacy participants perceived the level of value they placed on technology in general was a factor that influenced their self-efficacy. High self-efficacy participants expressed a strong value for technology not only at school but in their personal lives as well. This contributed to their willingness to self-learn, experiment, and takes risks with new strategies that incorporated the one-to-one technology resources available in their classrooms. Low self-efficacy participants indicated the value they placed on technology in general was low, and this contributed to the lack of experimentation and self-learning that occurred outside of the work day.

The third finding was that participants' perceptions of their own level of expertise aligned with their CTI survey results. Those who scored high on the CTI survey perceived their expertise to be strong while those who scored low on the CTI survey indicated they did not perceive themselves to have a high level of expertise relative to using one-to-one technology during their literacy instruction. These expressed perceptions of self-efficacy did not, however, unilaterally align with actual practice in the classroom.

The fourth finding was that the majority of participants similarly described the professional development activities that they perceived to have the greatest impact on their integration of one-to-one technology during literacy instruction. They perceived the most beneficial training to involve

learning from their colleagues about a specific and relevant tool or program in a small group setting. Participants expressed they appreciated this type of setting because their colleagues best understood what types of tools could be of benefit to student learning in their classroom and had actually used it in their own classroom setting.

# CHAPTER FIVE – DISCUSSION

Technology has become a common tool used in our schools, businesses, and in society in general. Advances in new technologies have changed the way we communicate, collaborate, and access information. When the U.S. Department of Education unveiled their National Education Technology Plan, their outline for the future included technology as a key component in several areas including learning, assessment, and teaching (U.S. Department of Education, 2010). Though the emphasis on the use of technology in the classroom as an instructional tool has become more prevalent, the research suggests technology is not being utilized in a way that has a significant impact on student achievement (Chang, Cornelius-White, McLean, Roworth, & Sell, 2012; Cheung & Slavin, 2011).

The purpose of this study was to examine teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. It delved into an aspect of technology usage which previous studies had not addressed while providing information related to teacher perceptions of what factors give them confidence in trying new technologies that transform their current instructional practices versus what causes them to be less self-assured in their use of those same technologies.

This research design used a mixed methods approach with the primary method of data collection taking place in the form of semi-structured interviews and observation of technology use in the classroom. Prior to conducting interviews and observations the study utilized an initial survey designed to measure self-efficacy of technology use in general for a group of teachers within the selected school district who were currently teaching in a classroom with one-to-one technology available. This initial survey data was used to collect baseline demographic data and determine which participants would be selected for further study in the qualitative phase of the

study. Participants were selected using purposeful sampling in order to examine participants with maximum variance in self-efficacy.

Participants included four teachers with one-to-one technology classrooms, two with low technology self-efficacy and two with high technology self-efficacy. Data from interviews and observations were coded, analyzed, and organized based upon the following overarching research question: According to teachers, what factors influence their self-efficacy of one-to-one technology use during literacy instruction? Secondary questions for this study included:

(a) How do teachers describe their own level of expertise with using one-to-one technology during literacy instruction?

(b) How are teachers currently using one-to-one technology during literacy instruction?

(c) What do teachers describe as the advantages/disadvantages of utilizing one-to-one technology during literacy instruction?

(d) What types of technology professional development do teachers perceive to be most beneficial to integrating one-to-one technology into literacy instruction?

These five research questions were largely satisfied by the findings presented in chapter four. The overriding finding in this study was that teachers perceived their self-efficacy of one-to-one technology use during literacy instruction to be influenced by the overall value they assigned to technology and the level of technical and moral support they received. Those with high levels of self-efficacy placed a high value on technology in their personal and professional lives and perceived the level of support from their administrator and from district technology personnel to be excellent. Those with low levels of technology self-efficacy not only placed a low value on technology in general but perceived the lack of technical and moral support to hinder their ability to effectively use one-to-one technology during literacy instruction. This lack of value placed upon technology

resulted in limited experimentation and self-learning outside of the school day and a feeling of burden associated with their responsibility for incorporating one-to-one technology in the classroom.

This chapter will analyze, interpret, and synthesize the findings from the study. It will then provide conclusions and future recommendations based upon each of the findings. The chapter is organized by the following analytic categories:

1. The relationship between the value teachers assigned to technology and perceived investment required to utilize it effectively. (Question 1 and 4)
2. The relationship between perceived technology expertise and actual practice in the classroom. (Question 2 and 3)
3. Perceptions of effective professional development practices related to technology. (Question 5)

The prior analytic categories are directly aligned to this study's research questions. Discussion takes into consideration the findings from previous research on one-to-one technology use in schools and effective professional development practices. The implications of these findings are intended to augment the understanding of what factors teachers perceive to influence their self-efficacy with one-to-one technology use during literacy instruction. The chapter concludes by summarizing the limitations of the study and providing recommendations based upon the findings presented.

## Analytic Category 1: The Relationship Between the Value Teachers Assigned to Technology and Perceived Investment Required to Utilize it Effectively

The first research question sought to determine what factors teachers perceived to influence their self-efficacy of technology use in their classroom. As illustrated in Figure 5.1, the findings of this study revealed one of the greatest discrepancies between participants with high and low levels of technology self-efficacy was the value they placed on technology use in

general. This value assigned to technology set the stage for how much time participants were inclined to invest in learning about new technology tools and in planning classroom activities that required students to utilize one-to-one technology. This notion is supported by Hughes (2005) who found that teachers will not spend precious time, energy, and resources learning about a new technology tool and incorporating it into current pedagogical practices if it is not valued.

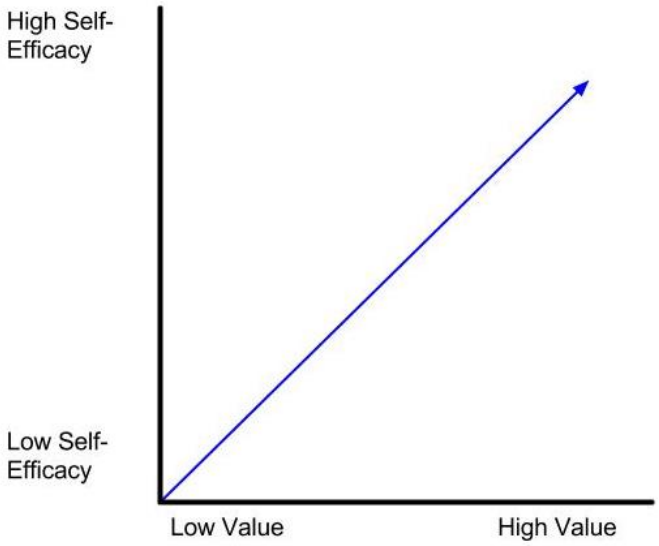


*Fig. 5.1*. Relationship between value assigned to technology and technology self-efficacy

The findings of the study also revealed that both low and high self-efficacy participants viewed the amount of planning necessary to effectively utilize one-to-one technology in the classroom as a primary disadvantage of its use. It is my interpretation that the difference in how participants of varying levels of technology self-efficacy responded to this perceived disadvantage is a primary factor in their perceived ability to effectively utilize the technology in their classroom. By expressing their view that additional time is required to both learn and plan for utilizing technology in their instruction, participants are acknowledging that the amount of time invested is a factor in their effective use of the one-to-one technology. Coppola (2004)

found that teachers would not use technology in their instruction unless they held strong beliefs in its value, as evidenced by the following statement:

> …[technology integration] requires so much work that only a teacher who already sees its value will carry it out. The teacher had to be sold on the idea that computers could be instructionally worthwhile before he or she would dig into the hard work of integrating them with instruction. (p. 108)

As illustrated in Figure 5.2, participants with high technology self-efficacy hold a high value for technology in their personal lives and are likely to invest in self-learning activities during their personal time to explore new ways to incorporate it into their lessons. They spent a great deal of time outside the school day using technology for both personal and professional purposes. They not only use the technology for entertainment but also dedicated personal time to learning and experimenting with new technology tools and exploring new ways to utilize the one-to-one technology instructionally.

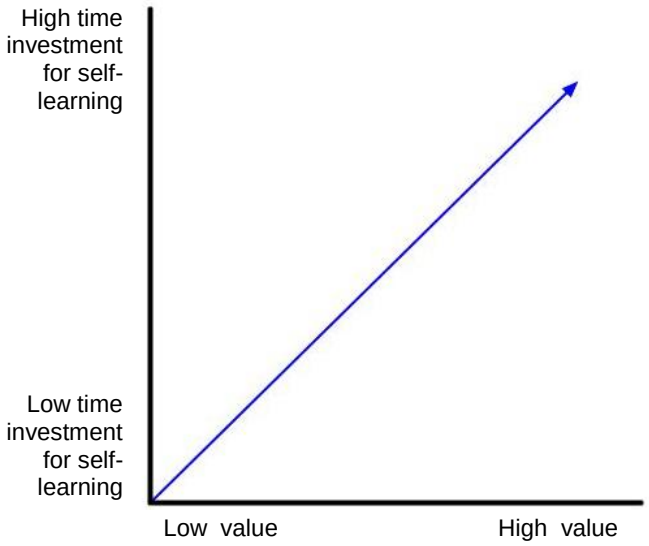


*Fig. 5.2*. Relationship between value assigned to technology and time invested in self-learning

Low self-efficacy participants, in contrast, view this extra time investment as a burden and are less likely to invest their own personal time in self-learning activities. This results in a lack of exposure and practice with using the one-to-one technology devices in their classroom environment. This, coupled with a low inclination for using the devices outside of school, results

in a larger learning curve that is only exacerbated by the lack of value they place on using technology in general.

## Analytic Category 2: The Relationship Between Perceived Technology Expertise and Actual Practice in the Classroom

The second research question sought to examine how teachers perceived their own level of expertise with utilizing one-to-one technology. In an attempt to gain insight into whether there was an association between perceived expertise and actual practice, these results were cross-referenced with the findings from research question three, which delved into how teachers were actually using one-to-one technology during literacy instruction. The findings resulted in mixed outcomes.

Participants with high technology self-efficacy as measured by the CTI survey also perceived themselves to have a high level of expertise with using one-to-one technology during literacy instruction. Observational data indicated their actual practice was congruent with their self-perceived high level of expertise. Both high self-efficacy participants displayed a high-level of expertise in their utilization of one-to-one technology during instruction, with students using the technology for a variety of complex and sophisticated learning activities.

Both low-self efficacy participants indicated they perceived their own level of expertise with using one-to-one technology as only "partially effective." This was also consistent with the results from their CTI survey. Contrary to what I anticipated observing, one of the two low self-efficacy participants also displayed a high level of skill in incorporating one-to-one technology despite her modest self-perception of expertise related to technology. Debbie's students were equally as engaged in a highly-sophisticated variety of learning activities as those students in Ann and Beth's classrooms. Debbie's students were involved in activities that included the

creation of slideshow presentations and collaborative editing activities that involved peers providing feedback on the writing drafts of their classmates. Her fellow low self-efficacy colleague did not display a similar level of expertise in implementing the same one-to-one technology in her classroom.

I interpret this discrepancy in classroom observational data as suggesting that teacher perceptions of their own level of expertise with technology use may differ based upon their own personalized expectation levels. Debbie's observational data illustrated a classroom setting that was extremely organized and structured, while Cindy's observational data demonstrated a classroom with significantly fewer of these same qualities. Debbie's observational data was indicative of a highly-effective teacher with a stringent set of self-imposed expectations for her performance in the classroom. The possibility of this scenario is supported by Dunning, Heath, and Suls (2004) whose study found:

> In general, people's self-views hold only a tenuous to modest relationship with their actual behavior and performance. The correlation between self-ratings of skill and actual performance in many domains is moderate to meager – indeed, at times, other people's predictions of a person's outcomes prove more accurate than that person's self-predictions. (p. 69)

Though the observational evidence indicated Debbie's use of one-to-one technology to be on par with that of her counterparts with high technology self-efficacy, her own perceived expertise and her CTI survey results illustrated an individual of a lesser skill set. Also, her stated level of frustration and dissatisfaction with the level of support and direction from her district was congruent with those of the other low self-efficacy participant.

It is my deduction that Debbie's low value for technology combined with a lack of feedback and support from her administrator that she had mentioned in the interview led to meager perceptions of her own performance with utilizing one-to-one technology. Her self-evaluation resulted in not meeting her own elevated expectations despite observational data

indicating she is performing in a manner equal to those participants with a high perception of their expertise. This perception of not performing up to her individual standards impacted her job satisfaction levels and fueled frustration that she was not receiving enough support to be effective.

## Analytic Category 3: Perceptions of Effective Professional Development Practices Related to Technology

The fifth research question was intended to investigate what types of technology professional development teachers perceived to be most beneficial to integrating one-to-one technology into literacy instruction. The findings of this study revealed participants valued learning that was specific and relevant to their content area, resulting in a preference for learning from their colleagues in a small group setting.

It is my interpretation that this preference for learning from their colleagues stems from the nature of learning new uses for technology integration in small chunks that are timely and relevant to the curriculum being taught each day in their classrooms. Conversations that take place in the hallway or during a common planning period that revolve around a new instructional technique that a fellow teacher had success with slowly builds value in the eye of the teacher. Barko and Putnam (1995) suggested that prior to teachers placing value on technological tools their knowledge base must be expanded by providing education and training about what tools are available.

When the source of new ideas is a colleague, it is a source they have already built trust in and has the same barriers and supports in place that they do. Learning from a colleague who is responsible for teaching the same content lends credibility to the new knowledge being introduced and lessens the potential for skepticism that the instructional method or technological

tool being introduced would not be applicable in their own classroom setting. One participant expressed it by saying, "The stuff that I love the best is really just talking to my co-workers because I think they know what's going on in our classroom. Because we really teach the same – in a similar way." Removal of the perceived applicability barrier may increase the likelihood of the teacher being open minded about the new tool and willing to invest time into learning how to incorporate it into their own instruction. This possibility is supported by Hughes (2005) whose study suggested training that is specific to their content area allows teachers to be better equipped to translate the new knowledge to their classrooms, causing them to be more likely to see value and strive to learn it.

Participants also highlighted the need for time during the school day to be provided in order to share ideas and practice the skills picked up from these targeted and relevant trainings. Those participants with high self-efficacy for technology held a high value for technology in general and use it outside of the school setting, making them more prone to set aside personal time outside of the school day to self-learn and practice using new tools. This creates a cycle of the strong getting stronger, as the increased use allows them to become more confident in their ability to incorporate a new technological asset during instruction.

Those with low self-efficacy were less inclined to set aside personal time to evaluate and practice new methods of incorporating technology in a way that enhances student learning. They do, however, need the same amount of time – perhaps even more – than their high self-efficacy colleagues in order to practice and become familiar with a new tool before being convinced that it brings value to the learning process. Even then, Farrah (2011) suggests strong beliefs about the value of a new tool is not enough for teachers to utilize it if they have a fear of not being able to effectively implement, troubleshoot, or create effective learning opportunities while using it as

an instructional tool. This underscores the importance of providing time during contracted hours for teachers with low technology self-efficacy to work with their high self-efficacy colleagues, witness new technologies being used in a setting similar to their own, and practice using it on their own.

## Limitations of the Study

Analysis of this study's findings is presented with the understanding that limitations are inevitable. First, the research sample was small, with only thirty-one completed surveys and four participants selected for interviews and observations. Also, interviews were conducted prior to the classroom observations, which may have sensitized the participants to the nature of the study and impacted their actions during the observed lesson.

In qualitative research the human element is both its greatest strength and its greatest weakness. I recognize the subjective nature of the preceding analysis and the claims made regarding the meaning of the data. As another researcher with different potential biases may have offered alternate conclusions, this chapter serves as a presentation of how this researcher alone understands and comprehends the data.

## Implications

As is the case with many case studies, due to the numerous limitations present, it is difficult to attribute definitively significant findings to this study. If my analysis of the findings is accurate then we can imply that teachers who value technology as an instructional tool are more likely to invest their time in searching for meaningful methods to utilize technology in a way that impacts their instructional practices. If the ultimate goals of utilizing any instructional tool are to enhance and improve student learning, then this relationship is one of significance and should be intentionally addressed by educators.

One-to-one technology is a relatively new resource available to teachers but has grown into a fairly mainstream approach during the last decade. In today's age of accountability, large portions of school district budgets are being allocated to funding new instructional technologies and districts must eventually have a positive return on their investment if this trend should continue. The most obvious manner for this return to be manifested would be in the form of increased student achievement.

As illustrated in Figure 5.3, it is my suggestion that the relationship between a teacher's level of previous experiences with technology combined with perceived level of administrator support for technology use and frequency of peer-based learning opportunities impacts a teacher's level of self-efficacy related to technology use. This level of self-efficacy then influences the value they assign to the technology as an instructional tool. It is my belief that once teachers possess high levels of self-efficacy and hold strong beliefs regarding its value as an instructional tool we will then have a greater chance to see a transformational impact on student learning.

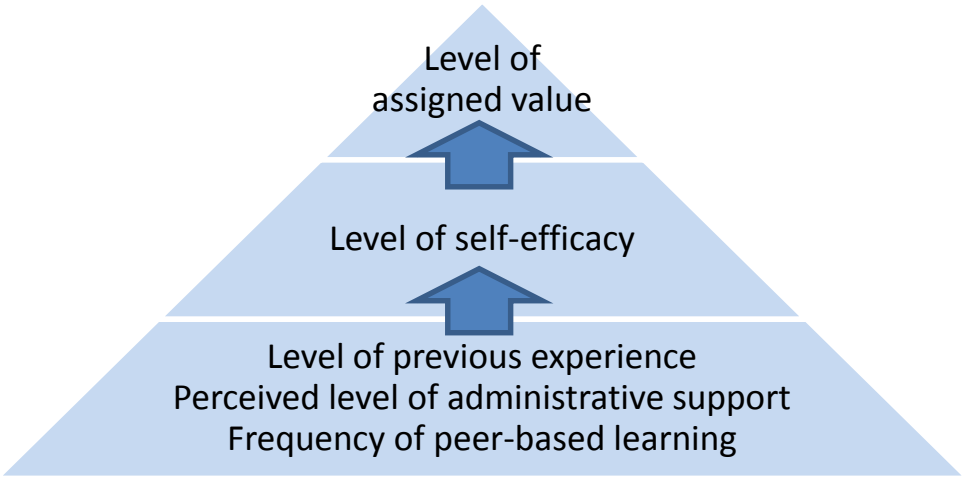


*Fig. 5.3*. Model of potential factors that impact a user's value for technology

In order for this to occur, school administrators must schedule time for teachers with low technology self-efficacy to collaborate with their high technology self-efficacy counterparts. I suggest that the more time teachers are able to spend with their colleagues discussing how technology can be utilized to benefit learning, the more comfortable low-self-efficacy teachers will be with these new tools and the more likely they will be to investigate potential uses on their own. Schools that foster a culture of teacher sharing and a risk-free environment for experimenting with new approaches to teaching and learning will be more likely to reap the rewards of their technology investment.

A challenge to this model comes in the form of increased accountability and high-stakes testing that characterizes the current climate in education. With such a high emphasis on assessment data and tracking student growth – even tying these results to teacher compensation in some schools – teachers may be reluctant to take risks with instructional approaches they are not confident will produce immediate results. This is not only a hindrance to taking instructional risks but also to the open sharing of resources and ideas between teachers. This challenge goes far beyond the realm of the school administrator and district policies, expanding into how state and federal education agencies determine requirements for accreditation and reward funding to local districts. An environment where all levels of administration hold a common vision that fosters a culture of collaboration in our schools would improve the likelihood of continued and sustained progress in this regards.

## Recommendations

This section offers recommendations based upon the findings, analysis, and conclusions presented in this study. The recommendations that follow are for school administrators, teachers in one-to-one technology schools, and for future study.

School administrators should consider the following:

1. Set realistic expectations for the implementation of a new one-to-one initiative and communicate those clearly to staff. Provide regular feedback to teachers regarding whether they are using the technology in a way that is consistent with district and building expectations. Do so in a way that is both supportive and patient of teachers' varying levels of technology self-efficacy.
2. Place an emphasis on technology professional development that is ongoing and job-embedded by ensuring the following:
    A. Invest time to build a sense of value for one-to-one technology as an instructional tool prior to introducing it in the classroom. Place the devices in the hands of teachers well before they are expected to utilize it in the classroom in order to help them familiarize themselves with the new device.
    B. Provide additional time during the school day for teachers with low technology self-efficacy to learn about and practice using the new tools just as we would provide additional time for struggling students to master a new skill or concept.
    C. Create opportunities for teachers to learn from each other and share specific methods they have had success with in utilizing one-to-one technology as an instructional tool.

Teachers in one-to-one technology schools should consider the following:

1. Prior to implementing a one-to-one classroom initiative, invest time in using, researching about, and experimenting with the particular device that is being utilized in your school.

2. Seek out colleagues who are responsible for similar content or curricular areas and share ideas about what instructional methods they are having success with while utilizing the one-to-one technology.
3. Pursue opportunities for utilizing one-to-one technology in a way that is transformative to current instructional practices. As technology continues to evolve, so will the opportunities for future application.

Recommendations for further research:

1. This study focused on the perceptions of factors that influenced teacher self-efficacy of one-to-one technology use during literacy instruction through the eyes of a group of teachers in grades three through six. Additional insight may be gained by expanding the study to include teachers at the secondary level.
2. This study focused on the perspectives of those teachers who were responsible for literacy instruction. Performing further study that investigates the perceptions of teachers in the curricular areas of math and science, fields directly responsible for the advancement of new technologies, may provide additional insights and direction for future professional development practices.
3. Replicate the study with classroom observational data collected prior to participant interviews in order to minimize the potential impact of participants being sensitized to the nature of the study.
4. Examine the link between student achievement levels and teacher efficacy with using one-to-one technology.

## Conclusion

In an age where computers and one-to-one devices are being widely used in the classroom as instructional tools, it is important to determine what teachers perceive as keys to their effective implementation. This study examined teachers with varying levels of technology self-efficacy and the findings suggested those who value technology use in general were more inclined to invest time in learning about it while those who did not value it were less likely to invest their own time discovering and experimenting. In order for these new resources to be used effectively in the classroom, teachers must be willing to invest time in learning and becoming proficient in its use. Administrators should strive to provide teachers with experiences that help to build value for technology as an instructional tool. This study's findings suggest that teachers feel the most productive learning experiences are specific and relevant to their content area, with the preference being to learn in a small group setting, directly from their colleagues.

School administrators must set the stage for a risk-free environment that encourages teachers to experiment with new teaching approaches without fear of failure. The findings from this study indicate that teachers had higher levels of self-efficacy when they had an administrator who demonstrated patience and provided regular encouragement and constructive feedback related to technology use in the classroom. Today's environment of high-stakes testing and accountability present some significant challenges to this approach, but those who find the balance between the two worlds will be more likely to reap the rewards of their technology investments.

## References


Agar, M. (1996). *The professional stranger: An informal introduction to ethnography* (2nd ed.). San Diego, CA: Academic Press.

Albion, P. (1999). Self-efficacy beliefs as an indicator of teachers' preparedness for teaching with technology. In *Proceedings of the 10th International Conference of the Society for Information Technology & Teacher Education (SITE 1999)* (pp. 1602-1608). Association for the Advancement of Computing in Education (AACE).

Ashton, P. T., & Webb, R. B. (1986). *Making a difference: Teachers' sense of efficacy and student achievement.* New York: Longman.

Attwell, A. A., Orpet, R. T., & Meyers, C. E. (1967). Kindergarten behavior ratings as a predictor of academic achievement. *Journal of School Psychology,6*(1), 43-46. doi:10.1016/0022-4405(67)90064-7

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215.

Bandura, A. (1986). *Social foundations of thought and action*. Prentice Hall: Englewood Cliffs, NJ.

Bandura, A. (1994). Self-efficacy. In, V.S. Ramachaudran (Ed.) *Encyclopedia of human behavior* (Vol. 4, pp. 71-81).

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman/Times Books/Henry Holt & Co.

Blok, H., Oostdam, R., Otter, M. E., & Overmatt, M. (2002). Computer-assisted instruction in support of beginning reading instruction: A review. *Review of Educational Research, 72*(1), 101-130.

Bloomberg, L., & Volpe, M. (2008). *Completing your qualitative dissertation: A roadmap from beginning to end*. Thousand Oaks, CA: Sage Publications.

Cheung, A., & Slavin, R. (2011). *The effectiveness of education technology for enhancing reading achievement: A meta-analysis.* Retrieved July 2012 from http://www.bestevidence.org/word/tech_read_May_02_2011.pdf

Chong, W., & Kong, C. (2012). Teacher collaborative learning and teacher self-efficacy: The case of lesson study. *Journal of Experimental Education, 80*(3), 263-283. doi:10.1080/00220973.2011.596854

Cobb, J. A. (1972). Relationship of discrete classroom behaviors to fourth-grade academic achievement. *Journal of Educational Psychology, 63*(1), 74-80. doi:10.1037/h0032247

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS quarterly, (19)*2, 189-211.

Coppola, E. M. (2004). Powering up: Learning to teach well with technology. New York: Teachers College Press.

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, CA: Sage Publications.

Creswell, J.W., & Miller, D.L. (2000). Determining Validity in Qualitative Inquiry. *Theory into Practice, 19*(3), 124-130.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and Conducting Mixed Methods Research.* Thousand Oaks, CA: Sage Publications.

Cuban, L. (2001). *Oversold and underused: Computers in schools, 1980-2000*. Cambridge, MA: Harvard University Press.

Donnison, S. (2007). "Unpacking the millennials: A cautionary tale for teacher education," *Australian Journal of Teacher Education, 32*(3). http://ro.ecu.edu.au/ajte/vol32/iss3/1

Duhaney, D.C. (2000). Teacher education: Preparing teachers to integrate technology. *International Journal of Instructional Media, 29*(1), 23- 29.

Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment implications for health, education, and the workplace. *Psychological Science in the Public Interest*, *5*(3), 69-106.

Dwyer, D. C., Ringstaff, C., & Sandholz, J. H. (1990). *Teacher beliefs and practices part II: Support for change.* ACOT Report #9: Apple Classrooms of Tomorrow, Advanced Technology Group, Apple Computer.

Ertmer, P. A., Gopalakrishnan, S., & Ross, E. M. (2001). Technology-Using Teachers. *Journal of Research on Computing In Education, 33*(5), 1-26.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-435. doi:10.1016/j.compedu.2012.02.001

Ertmer, P. A., Ottenbreit-Leftwich, A., & York, C. (2006). Exemplary technology-using teachers: Perceptions of factors influencing success. *Journal of Computing in Teacher Education, 23*(2), 55–61.

Ertmer, P. A., Ottenbreit-Leftwich, A., & York, C. (2006). Exemplary technology-using teachers: Perceptions of factors influencing success. *Journal of Computing in Teacher Education, 23*(2), 55–61.

Ertmer, P., & Ottenbreit-Leftwich, A. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255–284.

Ertmer, P., & Ottenbreit-Leftwich, A. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255–284.

Farah, A. C. (2011). Factors influencing teachers' technology self-efficacy: A case study. Liberty University). ProQuest Dissertations and Theses, Retrieved from http://0 search.proquest.com.library.uark.edu/docview/922578690?accountid=8361

Fielding, N., & J. Fielding. (1986). *Linking data*. Beverly Hills, CA: Sage Publications.

Finn, J., & Rock, D. (1997). Academic success among students at risk for failure. *Journal of Applied Psychology*, *82*(2), 221-234.

Fisher, T. (2006). Educational transformation: Is it, like 'beauty', in the eye of the beholder, or will we know it when we see it?*Education and Information Technologies*, *11*(3-4), 293-303.

Fletcher-Finn, C., & Gravatt, B. (1995). The efficacy of computer-assisted instruction (CAI): A meta-analysis. *Journal of Educational Computing Research*, *12*(3), 219-241.

Goad, K. D. (2012). The perception of teachers toward the use of mobile technology as a tool to engage students in learning. Indiana State University. ProQuest Dissertations and Theses, Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1015628727?accountid=8361

Hamilton, L., Halverson, R., Jackson, S. S., Mandinach, E., Supovitz, J. A., & Wayman, J. C. (2009). Using Student Achievement Data to Support Instructional Decision Making. IES Practice Guide. NCEE 2009-4067. *National Center for Education Evaluation and Regional Assistance*.

Hoy, A. W. (2000) *Changes in teacher efficacy during the early years of teaching.* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans.

Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of Technology and Teacher Education, 13*, 277 302.

Hutchison, A. (2012). Literacy teachers' perceptions of professional development that increases integration of technology into literacy instruction. *Technology, Pedagogy and Education, 21*(1), 37-56.

In4Grants. (2011). Avoiding the downward grant spiral, increasing grant revenue: Three mega trends affecting grant funding and what organizations can do now to succeed. Retrieved

June 2014 from
http://www.in4grants.com/pdfs/InfoReady%203%20trends%20whitepaper.pdf

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education, 14*, 581–597.

Kanaya, T. & Light, D. (2005). *Duration and relevance of a professional development program: Using Intel Teach to the Future to illuminate successful programmatic features.* Presented at Society for Information Technology and Teacher Education International Conference 2005. Norfolk,VA: AACE.

Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health,74*(7), 262-273.

Kulik, C. L. C., & Kulik, J. A. (1991). Effectiveness of computer-based instruction: An update analysis. *Computers in Human Behavior, 7*(1-2), 75-94.

Kurzweil, Ray (2001). Law of accelerating returns. Retrieved May 2014 from http://www.kurzweilai.net/the-law-of-accelerating-returns

Labbo, L. D., & Reinking, D. (1999). Negotiating the multiple realities of technology in literacy research and instruction. *Reading Research Quarterly,34*(4), 478-492.

Lei, J., & Zhao, Y. (2007). Technology use and student achievement: A longitudinal study. *Computers & Education, 49*(2), 284-296.

Leu, D. J. (2000). Literacy and technology: Deictic consequences for literacy education in an information age. *Handbook of reading research, 3*, 743-770.

Lincoln, Y. S., & Guba, E. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage Publications.

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage handbook of qualitative research*, *4*, 97-128.

Manuguerra, M., & Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: The role of the iPad. *Asian Social Science, 7*(11), 61-65.

Marshall, C., & Rossman, G. (2011). *Designing Qualitative Research.* Thousand Oaks, CA: Sage Publications.

Maxwell, J. (2005). *Qualitative research design: An interactive approach* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Maxwell, J. (2013). *Qualitative research design: An interactive approach* (ed. 3). Thousand Oaks, CA: Sage Publications.

McIntyre, B. K. (2011). *Teachers' beliefs and practices regarding the role of technology in literacy instruction: A mixed methods study.* The University of North Carolina at Charlotte. ProQuest Dissertations and Theses, Retrieved from http://0 search.proquest.com.library.uark.edu/docview/873952994?accountid=8361

Midgley, C., Feldlaufer, H., & Eccles, J. S. (1989). Change in teacher efficacy and student self- and task-related beliefs in mathematics during the transition to junior high school. *Journal of educational Psychology*, *81*(2), 247.

Miltiadou, M., & Yu, C. H. (2000). Validation of the online technologies self-efficacy scale (OTSES). (ERIC Document Reproduction Service No. ED445672)

Moore, W., & Esselman, M. (1992, April). *Teacher efficacy, power, school climate and achievement: A desegregating district's experience.* Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative Health Research, 8*(3), 362-376.

Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers & Education*, *51*(4), 1523-1537.

National Association for State Boards of Education (2001). *Any time, any place, any path, any pace: Taking the lead on e-learning policy.* Alexandria, VA: Author

National Center for Education Statistics (NCES). (1997). *Student use of computers, by level of instruction and selected characteristics: 1984 to 1997.* Retrieved July 2012 from http://nces.ed.gov/programs/digest/d99/d99t434.asp

National Center for Education Statistics (NCES). (2000). *The condition of education 2000*. Washington, DC: U.S. Department of Education.

Niemiec, R., & Walberg, H. J. (1987). Comparative effects of computer-assisted instruction: A synthesis of reviews. *Journal of Educational Computing Research, 3*(1), 19-37.

Oblinger, D., & Oblinger, J. (2005). *Educating the net generation. Educause: Transforming education through information technologies.* Retrieved July 2012 from http://net.educause.edu/ir/library/pdf/pub7101.pdf

Oblinger, D., Oblinger, J.L., & Lippincott, J. K. (January 1, 2005). Educating the Net Generation. *Educause.net.* September 20, 2012, from https://net.educause.edu/ir/library/pdf/pub7101.pdf

Ottenbreit-Leftwich, A.T.; Glazewski, K.D.; Newby, T.J.; Ertmer, P.A. (2010). Teacher value beliefs associated with using technology: Addressing professional and student needs. *Computers and Education, 55*(3), 1321-1335.

Pan, C. (2008). A year-long investigation of self-efficacy for technology integration and behavior pattern in a pre-service technology course using Hispanic student population. *International Journal of Technology in Teaching and Learning, 4*(1), 34–44

Park, S. (2003). *Classroom variables affecting student engagement and reading achievement*. The University of Wisconsin - Madison. ProQuest Dissertations and Theses, 95 p. Retrieved from http://0 search.proquest.com.library.uark.edu/docview/305296811?accountid=8361

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon, 9*(5), 1-6.

Reeves, D. B. (2009). Three challenges of web 2.0. *Educational Leadership, 66*(6), 87-89.

Reichardt, C. S., & Rallis, S. F. (1994). Qualitative and quantitative inquiries are not incompatible: A call for a new partnership. *New directions for program evaluation, 1994*(61), 85-91.

Rockman et. al. (1997). Report of a laptop program pilot: A project for Anytime Anywhere Learning by Microsoft Corporation Notebooks for Schools by Toshiba America Information Systems. San Francisco, CA: Rockman et al.

Ross, J. A. (1992). Teacher efficacy and the effect of coaching on student achievement. *Canadian Journal of Education, 17*(1), 51–65.

Saldana, J. (2013). *The coding manual for qualitative researchers* (ed. 3). Thousand Oaks, CA: Sage Publications.

Schutt, R K. (2012). Investigating the social world: The process and practice of research. Thousand Oaks, CA: Sage Publications.

Sprenger, M. (2009). Focusing the digital brain. *Educational Leadership, 67*(1), 34-39.

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches.* Thousand Oaks, CA: Sage Publications.

Terrion, J., & Aceti, V. (2012). Perceptions of the effects of clicker technology on student learning and engagement: A study of freshmen chemistry students. *Research In Learning Technology, 20*(2), 1-11.

U.S. Department of Education, National Center for Education Statistics. (2010). *Teachers' use of educational technology in U.S. public schools: 2009.* Retrieved July 2012 from http://nces.ed.gov/pubs2010/2010040.pdf

Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing preservice teachers' self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education*, *36*(3), 231-250.

Weis, L., & Fine, M. (2000). *Speed bumps: A student-friendly guide to qualitative research.* New York: Teachers College Press.

Willingham, W. W., Pollack, J. M., & Lewis, C. (2002). Grades and test scores: Accounting for observed differences. *Journal of Educational Measurement, 39*(1), 1-37.

Yeo, M. (2007). New literacies, alternative texts: Teachers' conceptualizations of composition and literacy. *English Teaching: Practice & Critique, 6*(1), 113-131.

Zeldin, A. L., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal, 37*(1), 215-246.

**APPENDIX A: SURVEY INSTRUMENT**
Technology Integration in the Classroom Survey

District:_____ School:_____

Thank you in advance for participating in this study. The purpose of this survey is to determine how you feel about integrating technology into classroom teaching. Should you have any further questions, please contact Michael Methvin (EdD candidate) at XXXXX@email.uark.edu or (XXX) XXX-XXXX. Again, thank you!

**Part I - BACKGROUND INFORMATION**
Directions: Please provide your first and last name. This information is for the researcher's use only. Your responses will be kept strictly confidential. Actual names will be changed to pseudonyms for data analysis.

_____ _____
First name Last name

Highest degree earned:
o Bachelor's
o Master's
o Doctorate

Total number of years teaching: _____
Number of years teaching at this school _____

Have you ever received training on the use of technology in the classroom? If so, how many hours?
o No, training never received
o Yes, less than 10 hours
o Yes, 10 to 20 hours
o Yes, more than 20 hours

In what type of environment did you receive most of your technology training? (check all that apply)
o On-site school training
o Off-site school training (e.g., training provided by the district at another site within the district)
o Off-site school training (e.g., training not provided by / affiliated with the district)
o As part of your educational degree or certification program
o Self-taught

What grade do you teach?
o 4 o 5 o 6

Do you teach reading / language arts?
o Yes o No

**Part II - COMPUTER TECHNOLOGY INTERGRATION SURVEY**

Directions: For each statement below, indicate the strength of your agreement or disagreement by circling one of the five scales.

Below is a definition of technology integration with accompanying examples:

- Technology integration: Using computers to support students as they construct their own knowledge through the completion of authentic, meaningful tasks.

Examples:

- Students working on research projects, obtaining information from the Internet.
- Students constructing Web pages to show their projects to others.
- Students using application software to create student products (composing a personal letter, developing PowerPoint presentations, etc.).

Using the above as a baseline, please select one response for each of the statements in the table:

SD=Strongly Disagree, D=Disagree, NA/ND=Neither Agree nor Disagree, A=Agree, SA=Strongly Agree

| | | | | | |
|---|---|---|---|---|---|
| 1. I feel confident that I understand computer capabilities well enough to maximize them in my classroom. | SD | D | NA/ND | A | SA |
| 2. I feel confident that I have the skills necessary to use the computer for instruction. | SD | D | NA/ND | A | SA |
| 3. I feel confident that I can successfully teach relevant subject content with appropriate use of technology. | SD | D | NA/ND | A | SA |
| 4. I feel confident in my ability to evaluate software for teaching and learning. | SD | D | NA/ND | A | SA |
| 5. I feel confident that I can use correct computer terminology when directing my students' computer use. | SD | D | NA/ND | A | SA |
| 6. I feel confident I can help students when they have difficulty with the computer. | SD | D | NA/ND | A | SA |
| 7. I feel confident I can effectively monitor students' computer use for project development in my classroom. | SD | D | NA/ND | A | SA |
| 8. I feel confident that I can motivate my students to participate in technology-based projects. | SD | D | NA/ND | A | SA |
| 9. I feel confident I can mentor students in appropriate uses of technology. | SD | D | NA/ND | A | SA |
| 10. I feel confident I can consistently use educational technology in effective ways. | SD | D | NA/ND | A | SA |
| 11. I feel confident I can provide individual feedback to students during technology use. | SD | D | NA/ND | A | SA |
| 12. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning. | SD | D | NA/ND | A | SA |

| | | | | | |
|---|---|---|---|---|---|
| 13. I feel confident about selecting appropriate technology for instruction based on curriculum standards. | SD | D | NA/ND | A | SA |
| 14. I feel confident about assigning and grading technology-based projects. | SD | D | NA/ND | A | SA |
| 15. I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices. | SD | D | NA/ND | A | SA |
| 16. I feel confident I can be responsive to students' needs during computer use. | SD | D | NA/ND | A | SA |

In order to gather details and teacher perspectives that cannot be captured via the survey, I would like to gather additional data from four participants who teach reading / language arts. You may be contacted regarding further participation in the form of one 30-45 minute interview and a classroom observation to see how you integrate one-to-one technology during literacy instruction. Thank you again for completing this study!

Would you like the survey results emailed to you?
o Yes
o No

## APPENDIX B: INTERVIEW PROTOCOL

Name of Interviewee: _____
Date: _____

Preliminary Script: "This is [interviewer's name]. Today's is [day and date]. It is _____ o'clock, and I am here in [location] with [name of interviewee], the [title] of [institution or system]. We'll be discussing [topic of interview]."

Thank you for agreeing to talk with me about how you use technology. This study is part of my dissertation with the Graduate School at the University of Arkansas. I am interested in finding out a little bit about what technology integration means to you and what causes you to choose to integrate technology into your literacy instruction. I'd like to ask you some questions about your use of technology. There are no right or wrong answers; I am just interested in finding out more about what you think. This interview should take no more than 45 minutes. With your permission, I am going to digitally record our conversation for accuracy. No one will hear the recording except me. After I transcribe our conversation, I will destroy the recording and your responses will remain confidential and anonymous. If at any point you would like to stop the recording, please tell me and we'll stop. Do you have any questions before we begin?

1. Please tell me about yourself both personally and professionally.

_____

_____

2. Tell me about your reasons for choosing education as a career.

_____

_____

3. Tell me about the path that has led you to your current position? What influenced you along this path?

_____

_____

a. How long have you been with this school system? _____
b. How long have you been in this position? _____
c. How long have you been in education? _____
d. What degrees and certifications do you have? When did you get them? Where?

_____

_____

4. What type(s) of technology do you have access to at home?

_____

_____

5. What type(s) of technology do you have access to at work?

_____

_____

6. Describe the role technology has played in your life outside of education?

_____

_____

7. Tell me about how you approach literacy instruction.

_____

8. What might a typical reading or writing lesson look like in your classroom?

9. What role does technology play in your literacy instruction?

10. What do you think it looks like when 1-to-1 technology is being integrated effectively into a lesson?

11. How do you think that type of integration impacts your instruction?

12. What value do you believe student use of 1-to-1 technology adds to their learning?

13. Do you think that using 1-to-1 technology during your literacy instruction requires any skills that a traditional lesson would not?

14. Can you give me some specific examples of the types of 1-to-1 technology you use in your literacy instruction and ways that you use them?

15. Would you say that when you are integrating 1-to-1 technology into a lesson, you are in control of the lesson or your students are?

16. During a typical situation where 1-to-1 technology is integrated into the lesson, what are you usually doing?

17. During this same type of lesson, what are your students usually doing?

18. How does 1-to-1 technology integration affect student behaviors? Engagement?

19. Would you say that any of the activities your students do with 1-to-1 technology engage their higher order thinking skills? Describe.

20. How often do you typically integrate 1-to-1 technology into your literacy instruction?

21. Are there some types of 1-to-1 technology that you use more often than others?

22. What affects your decision on whether or not to integrate technology into a particular lesson?

23. What affects how often you integrate 1-to-1 technology?

24. When is it appropriate to utilize 1-to-1 technology during literacy instruction?

25. What are the advantages or disadvantages to this approach?

26. How often do you experiment with/take the time to learn new technology?

27. Do you feel you have adequate time during the regular school day to learn about technology to use in your classroom?

28. Do you feel you have adequate opportunities and/or time to learn about technology to use in your classroom through other venues such as professional development seminars/workshops, conferences, summer sessions?

29. What types of professional development experiences are most beneficial to your implementation of new technologies in the classroom?

30. Describe the local support you have with using instructional technology in your classroom.

Concluding Question:
Is there anything else you would like to share with me?

**APPENDIX C: CLASSROOM OBSERVATION PROTOCOL**

Teacher: _____ Date: _____

Other adults present (position/title only): _____

Class/ Subject: _____ Grade: _____

Number of Students: _____ TOTAL _____ BOYS _____ GIRLS

Observation start time: _____ End time: _____

Grouping of Students: ____whole group _____small group ____individual

Objective(s): What will the student know or be able to do at the end of the lesson?

_____

_____

Instructional Materials Used:

_____

_____

Technology Tools Used:

_____

_____

_____

| TIME | STUDENT BEHAVIORS | TEACHER BEHAVIORS | TECHNOLOGY USE |
|---|---|---|---|
| | | | |

## APPENDIX D: INFORMED CONSENT FORM

Teacher Self-Efficacy of One-to-One Technology Use During Literacy Instruction

### Informed Consent

I, _____, agree to participate in the research study titled "Teacher perceptions of factors that influence their self-efficacy of one-to-one technology use during reading instruction." This research is being conducted by Michael T. Methvin (University of Arkansas). I understand that my participation is voluntary. I can refuse to participate, or stop participating at any time, without giving any reason and without penalty or loss of benefits to which I am otherwise entitled. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The purpose of this case study will be to identify teacher perceptions of factors that influence their own self-efficacy with using one-to-one technology during literacy instruction. It is intended to delve into an aspect of technology usage which previous studies have not addressed while providing information related to teacher perceptions of what factors give them confidence in trying new technologies that transform their current instructional practices versus what causes them to be less self-assured in their use of those same technologies.

If I volunteer to take part in this study, I may be asked to do the following things:

1) Be personally interviewed up to 3 times, with each audio-recorded interview lasting approximately 90 minutes.
2) Be observed while conducting lessons that incorporate one-to-one technology during literacy instruction.
3) Answer via telephone or e-mail any follow-up questions the researcher may have.
4) Review interview transcripts and findings for accuracy.

I will not receive any monetary compensation for participation in this study. Any compensation I receive is in the form of perceived benefit from possible feedback and insight gained by reviewing the said recordings. I understand that I may be asked to discuss sensitive topics and difficult subject matter; however, it is believed that the benefits of participating in this study outweigh any potential risks.

Information collected will be stored in a secure, locked location. Unless required by law, no individually identifiable information about me will be publicly disseminated. Participants and their districts will be provided pseudonyms, and all persons or places to which they refer will also be pseudonymized. Where details might allow outsiders to intuit identities, such details will be removed or changed. Interviews will be transcribed by the researcher, thus ensuring confidentiality. Records of participant names will be kept in a separate file from any other documents. Audio files will be stored on the secured computer in the researcher's office in Pleasant Hope, Missouri. Only the researcher will have access to these files. Audio files will be destroyed through magnetic erasure methods after five years in May 2019. The investigator will answer any further questions about the research now or during the course of the project.

I understand that by signing this form I am agreeing to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

For questions about your rights as a research participant please call or write:

**Iroshi Windwalker**
Compliance Coordinator, 210 Administration Building, Fayetteville, Arkansas 72701
Telephone: (479)575-2208
E-mail Address: irb@uark.edu

April 1, 2014

**Name of Researcher:** Michael T. Methvin

**Researcher's Signature:** _____

**Researcher's Telephone:** (XXX) XXX-XXXX

**Researcher's Email:** XXXXX@email.uark.edu

**Faculty Advisor:** Dr. Ed Bengtson

**Advisor's Email:** egbengts@uark.edu

**Name of Subject:** _____

Signature: _____ Date: _____

## APPENDIX E: INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL

UNIVERSITY OF
ARKANSAS

*Office of Research Compliance*
*Institutional Review Board*

September 15, 2014

MEMORANDUM

| | |
|---|---|
| TO: | Michael Todd Methvin<br>Ed Bengtson |
| FROM: | Ro Windwalker<br>IRB Coordinator |
| RE: | New Protocol Approval |
| IRB Protocol #: | 14-07-036 |
| Protocol Title: | *Examining Teacher Perceptions of Factors that Influence their Self-Efficacy of One-to-One Technology Use during Literacy Instruction* |
| Review Type: | ☐ EXEMPT ☒ EXPEDITED ☐ FULL IRB |
| Approved Project Period: | Start Date: 09/15/2014 Expiration Date: 08/11/2015 |

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

**This protocol has been approved for 50 participants.** If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

210 Administration Building • 1 University of Arkansas • Fayetteville, AR 72701
Voice (479) 575-2208 • Fax (479) 575-3846 • Email irb@uark.edu

## APPENDIX F: COMPARISON OF CASE STUDY PARTICIPANTS

| Participant | Ann | Beth | Cindy | Debbie |
|---|---|---|---|---|
| CTI Self-Efficacy Level | High | High | Low | Low |
| Perceived Administrator pressure | Low | Low | High | High |
| Perceived Administrator support | High | High | Low | Low |
| Perceived District technology support | High | High | Low | Low |
| Perceived ability to self-troubleshoot | High | High | Low | Low |
| Personal use of technology | High | High | Low | Low |
| Perceived instructional benefits | Feedback, Efficiency | Feedback, Efficiency | Differentiation | Collaboration, Feedback, Efficiency |
| Risk taking | High | High | Low | Low |
| Career stage | Middle | Middle | Late | Middle |