Teacher Perception of 1:1 Technology Professional Development and Its Impact on 1:1 Implementation and 21st Century Skills Development in 5th Grade Classrooms

Vanessa R. Zamzow
B.S., University of Wisconsin-River Falls, 2006
M.S., Northwest Missouri State University, 2010

Submitted to the Graduate Department and Faculty of the School of Education of Baker University in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Leadership

_____
Dennis King, Ed. D.
Major Advisor

_____
Harold Frye, Ed. D.
Committee Member

_____
Kerry Roe, Ed. D.
Committee Member

January 28, 2016

Abstract

The purpose of this study was to investigate the relationship of one-to-one training, support, and professional development provided to teachers as it relates to one-to-one implementation and 21st century learning skills development in the fifth grade classroom. Thirty-three fifth grade teachers in District X were given the opportunity to participate in a survey that collected teacher perceptions on the professional development they received on one-to-one technology implementation and their one-to-one technology implementation practices. Fifteen fifth grade teachers responded. A 21st Century Learning Skills Index instrument was administered to fifth grade students by District X to measure their development of skills in problem solving, communication, collaboration, creativity, needs, relevancy, and engagement. Three research questions were developed to meet the purpose of the study. Chi-square analysis methods were used to test the research hypothesis. Findings of the current study align with those in the literature, suggesting that technology implementation helps to develop students' 21st century learning skills. Additional findings of the study also supported the literature, which states that technology coaches and technology collaboration opportunities are seen as beneficial practices in professional development and training programs working to increase the level of technology implementation in the classroom. The chi-square analysis and correlations revealed there is a significant proportional difference between perceived benefit and years of training for two one-to-one professional development practices. District X will continue implementing its one-to-one technology initiative in hopes of developing 21st century learning skills in students.

Dedication

I dedicate this work to the two strongest women I have ever known—my mom, Patricia R. Wright, and my grandmother, Lillian P. Wright. You are the reason for seeking this degree because at a young age you instilled in me the "I think I can" attitude by which I now live each and every day. I hope to follow in your footsteps in becoming an amazing woman, mother, and grandmother.

"The Little Blue Engine just smiled. And as she puffed down the mountain she seemed to say I thought I could. I thought I could. I thought I could!" (Piper, 1978, p. 9)

Acknowledgements

There are numerous people who have provided support and assistance throughout this journey. I would like to acknowledge them here.

First, to my advisor, Dr. Dennis King, and my committee members, Dr. Phillip Messner, Dr. Harold Frye, and Dr. Kerry Roe: Thank you for working with me and supporting me through the writing and defense of this dissertation. I am honored that you were willing to serve on my committee.

To my fellow cohort nine member, Larry Smith: You have been a mentor, friend, and amazing support over the last five years. You are a true inspiration. Love my team.

To my former teachers from Zanewood Elementary: I cannot think of another group of women who dedicate themselves to education more than you. I was lucky to have each of you in my life as a teacher and role model.

To Julia Saunders: Upon my first teaching job, you were the teacher I wanted to become. Your guidance and support has molded me into the teacher I am today.

To my parents: You have taught me many life lessons and never gave up on me throughout this journey. Thank you for always being there.

To my fifth grade students, math students, and AVID students: I come to work every day loving my job of teaching you. You are my motivation to continuously learn and improve. Each of you will always have a very special place in my heart.

To Nina Englund: You will always be my beautiful and talented cousin.

To Somer Stuhlsatz: You are my long-lost sister and a blessing I value every day. Thank you for sharing your friendship and family with me.

Table of Contents

Abstract ii

Dedication iii

Acknowledgements iv

Table of Contents v

List of Tables viii

Chapter One: Introduction 1

Background of the Study 5

Statement of the Problem 7

Purpose of the Study 8

Significance of the Study 9

Delimitations 10

Assumptions 10

Research Questions 11

Definition of Terms 10

Overview of the Methodology 12

Organization of the Study 13

Chapter Two: Review of the Literature 14

Cognitive Development 14

Adult Learning Theories 16

Professional Development in Technology 21

Technology in the Classroom and 21st Century Learning Skills Development 27

Summary 33

Chapter Three: Methods 35
Research Design 35
Population and Sample 35
Sampling Procedures 36
FLiP Professional Development and Training Survey Instrumentation 36
Measurement 37
Validity and Reliability 37
21st Century Learning Skills Index Instrumentation 38
Measurement 39
Validity and Reliability 40
Data Collection Procedures 40
Data Analysis and Hypothesis Testing 41
Limitations 42
Summary 42
Chapter Four: Results 44
Descriptive Statistics 44
Hypothesis Testing 49
Additional Analysis 51
Summary 55
Chapter Five: Interpretation and Recommendations 57
Study Summary 57
Overview of the Problem 57
Purpose Statement and Research Questions 58

Review of the Methodology....58
Major Findings....59
Findings Related to the Literature....60
Conclusions....65
Implications for Action....65
Recommendations for Future Research....66
Concluding Remarks....67
References....69
Appendices....75
Appendix A. FLiP Professional Development and Training Survey....76
Appendix B. 2012-2013 5th Grade 21st Century Learning Survey....80
Appendix C. Baker University IRB Approval to Conduct Research....84
Appendix D. District X Approval to Conduct Research....86

List of Tables

Table 1. Previous Structure of Teachers' Technology-Based Professional Development 22

Table 2. Frequency Table of Benefit of Overall FLiP Professional Development and Training 45

Table 3. Frequency Table of Benefit of Summer Professional Development Sessions 46

Table 4. Frequency Table of Benefit of Professional Development Training Sessions throughout the School Year 46

Table 5. Frequency Table of Benefit of Classroom Support from Instructional Technology Facilitators 47

Table 6. Frequency Table of Benefit of Technology Collaboration Meetings with Grade-Level Members 47

Table 7. Frequency Table of Benefit of Teacher Observations of One-to-One Classrooms 48

Table 8. Summary of All Descriptive Analysis Results by Survey Items by Frequency and Percent Perceived as Beneficial 49

Table 9. Chi-square Values Applied to the Frequency of Training Related to FLiP Professional Development Practices, and the Level of Benefit 51

Table 10. Summary Test of Mean Differences of FLiP for the Development of Seven 21st Century Learning Skills 55

Chapter One

Introduction

Effective technology integration and the development of student learning skills in the 21st century are common goals among schools. "Students in the 21st century should have experience with and develop skills around technological tools used in the classroom and the world around them" (National Council of Teachers of English [NCTE], 2013, p. 1). School districts are placing a large emphasis on developing 21st century learning skills to prepare students to be college and career ready (Rotherham & Willingham, 2009). The development of 21st century learning skills places emphasis on processes that students can do with knowledge, including problem solving, collaborating, and communicating. The ability to apply 21st century learning skills prepares students to live productively in a global and digital world (District X, 2014a). To prepare students for college and the workplace, school districts are going beyond the teaching of basic information:

> Nearly every segment of the workforce requires employees to know how to do more than simple procedures—they look for workers who can recognize what kind of information matters, why it matters, and how it connects and applies to other information. (Silva, 2008, p. 2)

Part of building a successful future for students is helping them to acquire the essential 21st century learning skills of creativity and innovation, communication and collaboration, research and problem solving, critical thinking, and digital citizenship (District X, 2014a). Research by Walden University (2010) has shown that the development of 21st century learning skills is largely influenced by the implementation of

technology in the classroom. Walden University's (2010) Richard W. Riley College of Education and Leadership found in a study of more than 1,000 teachers, principals, and assistant principals that frequent users of technology saw a greater impact on student behaviors associated with 21st century learning skills than infrequent users did. Specifically, the role of teachers and their technology use in the classroom can influence the level of importance placed on 21st century learning skills. "Teachers who are frequent technology users put more emphasis on 21st century skills, including accountability, collaboration, communication, creativity, critical thinking, ethics, global awareness, innovation, leadership, problem solving, productivity, and self-direction" (Walden University, 2010, p. 2). When districts set goals to prepare students to be 21st century learners and implement districtwide one-to-one initiatives to support that preparation, it is imperative to evaluate the program they are using to train the teachers responsible for such initiatives. "The goal of successful technology professional development is its integration into teaching to impact student learning" (Mozella, 2011, p. 44).

The International Society for Technology in Education (ISTE, 2015) established six standards that teachers are responsible for developing in students: (1) creativity and innovation, (2) communication and collaboration, (3) research and information fluency, (4) critical thinking/problem solving/decision making, (5) digital citizenship, and (6) technology operations and concepts (p. 1-2). A primary method to enhance 21st century learning skills and address the six ISTE student standards is with increased use of technology in the classroom. Students in a Technology Immersion Pilot study in a Texas middle school used wireless laptops at home and at school to access learning resources

for each of their content areas (Vockley, 2007). Not only did increased learning and engagement occur during this pilot study, but teachers also stated that one-to-one laptop use aided teachers in the process of developing students' 21st century learning skills, such as communication, problem solving, and evaluating information (Vockley, 2007).

One-to-one student and teacher computing is a trend that is quickly gaining momentum across the nation, with many schools considering implementation or already in the process of implementation (Garry & Graham, 2008). School districts are placing technology in the hands of students through one-to-one programs, and their implementation is having a positive effect on areas like attendance, discipline, and writing (*eSchool News,* 2006). Along with increasing student achievement and positive behavior, one-to-one implementation has also shown to help develop 21st century learning skills.

In one-to-one computing, teachers rely more on authentic, problem-based learning activities and inquiry-based teaching. As a result, students are more engaged in the classroom and develop skills in cooperative learning, communication, research, and collaboration (Vockley, 2007). This type of technology integration requires a considerable amount of professional development and training. One-to-one initiatives are increasing, and so is the need for effective and comprehensive teacher training and professional development in order to implement these initiatives (Garry & Graham, 2008).

Teachers play a vital role in effective technology implementation in the classroom, and their support and training can greatly influence the level of implementation that occurs. Past professional development programs for educational

technology are centered on educating teachers in basic hardware and software skills (Borthwick & Pierson, 2008). Skill-based professional development focuses on basic knowledge of the computer versus application to enhance instruction and learning in the classroom. Because schools are choosing one-to-one programs as their method to integrate technology into the classroom, professional development formats are changing to include teacher training in basic laptop skills, specific program training, integration training, and classroom coaching (Garry & Graham, 2008).

Understanding the relationship between this comprehensive type of professional development and its connection to developing 21st century learners is necessary for educational leaders to provide effective training to teachers. Providing time for teacher training and collaboration for those transitioning to a one-to-one classroom is critical in developing teacher buy-in and effective implementation, which contributes to higher levels of student achievement (Greaves, Hayes, Wilson, Gielniak, & Peterson, 2010). In addition to contributing to higher levels of student achievement and acquiring knowledge within content areas, effective implementation of technology can also have an effect on 21st century learning skills. As technology use increases in K-12 classrooms, teachers have begun to recognize and value the positive impact it can have on student engagement, student learning, and 21st century skills (Walden University, 2010).

The development of 21st century learning skills requires intense technology implementation and therefore effective professional development for the classroom teacher in the areas of both student learning and technology. School districts have created professional development and training practices to educate teachers on how to best use and implement technology devices in the classroom and ultimately enhance

student learning and the development of 21st century learning skills. The evaluation of those practices and their impact must be analyzed to ensure that 21st century skill development is occurring.

Background of the Study

District X, the setting for this study, is a suburban school district located in western Missouri. This public school district provides comprehensive educational services for students in pre-K through grade 12. For the 2014-15 school year, District X had a total enrollment of nearly 10,500 students, representing ten elementary schools, three middle schools (one with only sixth grade students), two high schools, a day treatment school, and an early childhood center. Of the district's total enrollment, 71.1% of the population was White, 10.2% African American, 9.4% Hispanic, 4.4% multi-racial, 3.2% Asian, 1.1% Pacific Islander, and 0.5% Native American. Approximately 29% of District X's student population qualified for free or reduced lunches (District X, 2014b).

District X is strategically aligned with a common mission, vision, and values. This alignment and the school district's Comprehensive School Improvement Plan serve as a foundation for its Education Technology Plan. District X's Education Technology Plan presents the district's outline for increased technology integration by focusing on the areas of student learning, teacher preparation, administration, management and communications, resources, and technology support (District X, 2012). A specific method to increase district technology integration is through the Future Learner Project, or FLiP. FLiP was piloted in three elementary schools in the district in 2012. In year one of implementation (2013-14), all fifth grade students were issued a computer for both

school and home use. In year two of implementation (2014-15), sixth grade students continued using their issued laptops, and laptop computers were again provided to current fifth graders in the district. District X developed an extensive professional development plan to help ensure the fidelity of implementation. A wide range of support and training was offered in the FLiP professional development plan. According to District X (2013), this plan includes but is not limited to the following:

1. Classroom observations for upcoming FLiP teachers: Classroom observations include teachers visiting and observing fellow teachers who have already implemented FLiP, in order to ask questions and gather ideas.
2. Summer training sessions: Summer professional development sessions are opportunities for teachers to learn more ways to integrate technology into their classroom with lesson ideas and tools.
3. Newly developed mentor program: The mentor program is aligned with the new teacher mentoring program where veteran teachers and content specialists partner with new teachers to guide them in the teaching process.
4. School-year training sessions: School-year training sessions are required professional development days where teachers receive additional training in programs, software, hardware, and lesson planning while having the opportunity to collaborate with fellow teachers.
5. Instructional Technology Facilitators: Instructional Technology Facilitators are specialists who work with teachers and offer various types of support in transforming classrooms into student-centered environments through one-to-

> one implementation. (Director of Instructional Technology in District X, personal communication, January 8, 2015; District X, 2015)

During the 2014-15 school year, District X employed 33 fifth grade teachers in the district's ten elementary schools. Fifth grade teachers were the focus of this study because teachers at this level received one-to-one implementation training and professional development for two consecutive years. Fifth grade teachers in District X were offered these five professional development opportunities during the 2013-14 and 2014-15 school years for the implementation of one-to-one technology in fifth grade classrooms to help strengthen 21st century learning skills.

Development of the six International Society for Technology in Education student standards of creativity and innovation, communication and collaboration, research and information fluency, critical thinking/problem solving/decision making, digital citizenship, and technology operations and concepts are the responsibility of the classroom teacher (ISTE, 2015). Student implementation of these standards requires effective use of technology in the classroom by both the student and teacher.

Statement of the Problem

According to Silva (2008), 21st century learning skills are being called the "must-have" skills of education because they place emphasis on what can be done with knowledge rather than what units of knowledge students possess. These abilities are becoming the focus of many school districts. Teachers are being tasked with the responsibility of developing these 21st century learning skills in each of their classrooms.

Challenges occur when teachers are unable to develop these proficiencies in their classrooms on their own. Technology implementation in the classroom is needed to help

teachers develop these "must-have" skills. "Schools cannot possibly prepare students to participate in a global economy without making intensive use of technology" (Vockley, 2007, p. 3). In order to reinforce 21st century learning skills in the classroom, students must have exposure to and experience with technology so that learning becomes student-centered. With teachers being a main component in providing students with opportunities for technology use in the classroom, it becomes important to ensure that their training in technology implementation and 21st century skill development is effective and that the technology implementation occurring is impacting their skill development. Districts must evaluate teacher perception of professional development training offered to them and their level of implementation as a result of the professional development. Without this information, it becomes difficult to identify the effectiveness and quality of the professional development being provided.

Purpose of the Study

The purpose of this study was to evaluate one-to-one training, support, and professional development provided to teachers as it relates to one-to-one implementation and 21st century skill development in the fifth grade classroom. Differences can occur among one-to-one training program practices, so evaluation of the program's five components provided perception data relative to those elements that were the most beneficial. This study was also conducted to analyze the effect that one-to-one technology implementation had on the enhancement of fifth grade students' 21st century learning skills (problem solving, communication, collaboration, creativity, needs, relevancy, and engagement) as measured by the 21st Century Learning Skills Index Survey administered by District X.

Significance of the Study

Technology use in a 21st century education system must be comprehensive and purposeful in order to support students in the mastery of core content areas and 21st century learning skills (Vockley, 2007). In order for schools to prepare students to compete in a global economy and build the skills necessary for them to be critical thinkers, innovators, and problem solvers, technology is necessary. A strong technology infrastructure and broad and intensive use of technology is required in creating a 21st century education system (Vockley, 2007).

"Advocates of 21st century skills favor student-centered methods—for example, problem-based learning and project-based learning—that allow students to collaborate, work on authentic problems, and engage with the community" (Rotherham & Willingham, 2009, p. 18). Students who are given opportunities to use modern technology are able to communicate, collaborate, create, solve problems, and take ownership of their work and lives (Vockley, 2007). Districts utilizing one-to-one programs to offer students opportunities to use modern technology must analyze their benefits.

The analysis of teachers' perceptions regarding the practices of a one-to-one professional development program is necessary to understand the value of the program. Understanding the use and implementation of technology and its relationship to the development of students' 21st century learning skills is also important when analyzing the value of a professional development program.

Results obtained from this study can better serve teachers and administrators integrating the FLiP program in this suburban Missouri school district and understanding its impact in the classroom. Professional development practices and training can also be

evaluated and adapted in District X, based on the results of this study. The study was also conducted in order to add to the current literature of effective professional development for technology implementation and the role of one-to-one implementation in the development of students' 21st century learning skills in schools. School districts considering implementing a one-to-one program could find value in the results of this study.

Delimitations

This research study was delimited to the population of fifth grade teachers employed during the 2015-16 school year in one suburban Missouri school district. This delimitation resulted in a small sample size for the study. In addition to surveying only fifth grade teachers, the collection of data from only fifth grade students is a delimitation. The study was also delimited to the use of an online survey instrument to collect data from fifth grade teachers participating in the FLiP Program at the district's ten elementary schools during the 2013-14 and 2014-15 school years.

Assumptions

For this study, the following were assumed to be true: (a) components of the FLiP professional development program were delivered in the manner outlined by the school district and used by teachers with fidelity, (b) participating teachers responded honestly to the survey, and (c) District X's 21st Century Learning Skills Index Survey is valid and reliable.

Research Questions

The following research questions to determine participating teachers' perceptions of the FLiP professional development program guided this study:

1. To what extent do teachers perceive that the overall FLiP professional development and training has been beneficial as they have implemented the one-to-one program in the classroom?
2. To what extent do teachers perceive one-to-one professional development practices as beneficial?
3. Is there a proportional difference between perceived benefit and years of training for each one-to-one professional development practice?

Definition of Terms

Terms used throughout this study are provided and defined here. According to Creswell (2009), definitions of terms should be provided when "individuals outside the field of study may not understand and that go beyond common language" (p. 39).

21st century learning skills. Twenty-first century learning skills include the knowledge, skills, character traits, and work habits that are considered by educators, college professors, employers, and others to be essential in experiencing success specifically in collegiate programs and the workplace (Hidden Curriculum, 2014).

Collaboration. Collaboration is working with others to solve problems in class and learning more as a result (District X, 2014a).

Communication. Communication is regularly sharing ideas and information with classmates and the teacher regarding what is being learned in class (District X, 2014a).

Creativity. Creativity is being able to show what was learned in a variety of ways (District X, 2014a).

Engagement. Engagement is having excitement about what is being learned and finding what is being taught as interesting (District X, 2014a).

Future Learner Project (FLiP). The FLiP program is designed to utilize the power of technology to deepen the understanding of content and develop 21st century learning skills for all students. Students are issued laptops to be used in class and also taken home each night. Goals for the program include increased 21st century learning skills, student engagement, technology skills, and academic achievement (District X, 2013).

Needs. Student needs being met is defined by learning a lot in the school year without any obstacles standing in the way (District X, 2014a).

One-to-one program. The definition of one-to-one (1:1) typically refers to a school that provides a take-home laptop computer or tablet for each student in the school system or for each student in a grade level for use in the classroom and at home (Sauers & McLeod, 2012)

Problem solving. Problem solving is knowing how to find answers and solve a variety of problems without being directed by a teacher (District X, 2014a).

Relevancy. Relevancy is knowing that what is learned in class connects to the real world and will help one in the future (District X, 2014a).

Overview of the Methodology

A quantitative research design was used in this study to examine the relationships between one-to-one professional development, the use of technology in the classroom, and student 21st century learning skills. Thirty-three fifth grade teachers from ten elementary schools in District X were invited to participate in this study; however, only 15 responded. Variables in the study included teacher perceptions of professional development, frequency of professional development, use of technology in the classroom,

and student 21st century learning skills, as measured by the 2014 21st Century Learning Skills Index Survey administered by District X.

Data for the perception of professional development, frequency of professional development, and use of technology in the classroom were collected from a survey created by the researcher. Data analyses included the use of chi-square analysis to test the research hypotheses.

Organization of the Study

This study is organized into five chapters. Chapter one includes background of the study, statement of the problem, purpose of the study, significance of the study, delimitations, assumptions, research questions, definition of terms, overview of the methodology, and organization of the study. Chapter two includes a review of literature related to cognitive development, adult learning theories, history of professional development, and development of 21st century learning skills and their connection to technology use. Chapter three contains the methodology and research design used in this study. Chapter four contains results of the data analysis from hypothesis testing. Finally, Chapter five is a summary of the study with discussion of the findings and recommendations for future research.

Chapter Two

Review of Literature

The development of 21st century learning skills in students has great implications for teacher training (Rotherham & Willingham, 2009). Teachers require more robust training and support that meets their cognitive needs and also emphasizes meeting the high cognitive demands of students in a technology-rich student-centered classroom (Rotherham & Willingham, 2009). The structure of how individuals learn and how professional development meets the needs of learners is discussed in this literature review. The chapter will begin by describing cognitive development and adult learning theories and continue into how professional development impacts technology integration. Technology in the classroom and 21st century skill development are discussed to provide a detailed understanding of the importance both topics play in education today.

Cognitive Development

The understanding of how instruction should be organized and implemented stems from an understanding of cognitive development (Lutz & Huitt, 2004). Jean Piaget, an influential researcher in the area of developmental psychology, studied the biological influences on how we come to know (Huitt & Hummel, 2003). "To Piaget, intelligence is represented by how an organism interacts with its environment through mental adaptation" (Lutz & Huitt, 2004, p. 2). The two processes used by individuals to adapt are assimilation and accommodation. Assimilation occurs when the environment is transformed so it can be placed in cognitive structures that already exist, while accommodation occurs when cognitive structures are transformed to adapt to the

environment (Huitt & Hummel, 2003). Each process can occur separately or together, and they are used throughout life.

Piaget identified four stages of cognitive development as humans became more complex in their behaviors and thinking: sensorimotor stage, pre-operational stage, concrete operational stage, and formal operational stage (Huitt & Hummel, 2003, p. 2). Children move through each level of progression once substantial improvement or change occurs in development. These stages begin at birth and last through adulthood. According to Lutz and Huitt (2004), three types of knowledge are present at all stages of cognitive development:

1. Physical—knowledge gathered with the environment through hands-on interaction.
2. Logical-mathematical—knowledge gathered through actions in abstract reasoning.
3. Social—knowledge gathered through interaction with others. (p. 3)

Although Piaget stated that each type of knowledge occurs throughout the different stages of cognitive development, researcher Lev Vygotsky identified social interaction as the framework for all learning and development (Lutz & Huitt, 2004). "The primary focus of Vygotsky and his colleagues, however, was on dyadic and small group forms of sociality, that is forms which fall under the heading of what we shall term social interactional processes" (Wertsch & Bivens, 1992, p. 37). Vygotsky's social development theory is based on three major principles. The first principle states that social interaction plays a critical role in what is learned, and when and how learning occurs during cognitive development (Nicholl, 1998). The second principle implies that

there is a constraint on cognitive development and that the potential for development is limited to a certain amount of time (Lutz & Huitt, 2004). The third principle behind Vygotsky's social development theory is that the only way to understand how humans come to know is to analyze learning in an environment where the processes of learning are studied instead of the end product (Lutz & Huitt, 2004).

Another concept Vygotsky identified is the zone of proximal development. Vygotsky identified the zone of proximal development as a means to understanding the relationship between learning and development on a continuum based on child development and assisted performance levels (Leong & Bodrova, 1995). "This zone indicates that at any point in development, there are three levels of ability that are possible: that which a person can do without guidance or help, that which a person cannot do even if helped, and that which a person can do with help" (Lutz & Huitt, 2004, p. 6). Vygotsky stated that this zone is a cycle that occurs repeatedly as children learn through social interaction. The implications it has on teaching and learning in the classroom include how assistance is given to a student, the assessment of a student, and the understanding of what is considered developmentally appropriate (Leong & Bodrova, 1995). The zone of proximal development reinforces the importance of teachers providing students with instructional tasks they can do independently and tasks they need additional assistance with, in order to challenge students to work and develop at a higher level.

Adult Learning Theories

Understanding the methods of how one learns is important in the instructional process. Integrating technology and 21st century skill development into the classroom

requires more planning and training than simply providing teachers with technology. Adult learning theory principles can be used in the design of instruction to make lessons for adult learners implementing technology more effective (Fidishun, 2005). As learners continue to develop and mature, different strategies are often used to better meet the needs of adult learners. "The adult learning process is complex, context bound, and highly personal. As a result, there is no single theory of learning that can be applied to all adults" (Corley, 2011, p. 1). Three adult learning theories that have been studied and vary in their approach to instruction are transformative learning, self-directed learning, and andragogy.

Transformative learning involves a change in consciousness where individuals shift the way they think about themselves and their world (Corley, 2011). This shift is based on adults' abilities to critically reflect on their experiences and learn from them. According to Brookfield (1995), critical reflection focuses on three interrelated processes:

1. The process by which adults question and then replace or reframe an assumption that up to that point has been uncritically accepted as representing common sense wisdom.
2. The process by which adults assume alternative perspectives on previously taken-for-granted ideas, actions, forms of reasoning, and ideologies.
3. The process by which adults come to recognize the hegemonic aspects of dominant cultural values and to understand how self-evident renderings of the "natural" state of the world actually bolster the power and self-interest of unrepresentative minorities. (p. 3)

Mezirow (2000) identified transformative learning as a rational process where, to be effective, individuals need to challenge and question each other's assumptions and support the concept of considering various perspectives. Mezirow (2000) recognized specific conditions that are necessary for reflective discourse to occur. Participants need to have accurate information on the topic and share empathy, trust, and acceptance for one another (Mezirow, 2000).

Transformative learning allows educators to target adult learning with multiple strategies. The first strategy involves establishing an environment that supports transformative learning. Taylor (1998) suggests that teachers "need to provide students with immediate and helpful feedback, employ activities that 'promote student autonomy, participation, and collaboration,' and help them to explore alternative perspectives and engage in problem-solving and critical reflection" (p. 48-49). The second strategy involves knowing learners and what types of learning activities most appeal to them (Corley, 2011). Diverse learners respond to different activities based on their own educational needs. Providing multiple opportunities for students to discuss, debate, and experience alternative viewpoints is necessary to involve all learners and allow for critical reflection. When non-confrontational learners are placed in debate groups, the benefit of the activity may be lost due to the activity style not aligning to the learner. The third strategy to target adult learners with transformative learning is utilizing activities that openly explore varying points of view (Corley, 2011). A teacher can implement a technique "to use critical incidents to engage in reflective discourse in which learners reflect on an experience, good or bad, and analyze their assumption and various perspectives" (Corley, 2011, p. 2).

The self-directed learning model is another theory supporting adult learners. "Self-directed learning focuses on the process by which adults take control of their own learning, in particular how they set their own learning goals, locate appropriate resources, decide on which learning methods to use and evaluate their progress" (Brookfield, 1995, p. 2). In self-directed learning, the process is informal and primarily takes place outside of the classroom (Corley, 2011). Adults themselves are able to make decisions about their learning process. This flexibility ultimately allows learning to be easily incorporated into the learner's daily life, whether through independent research or interaction with instructors and peers in a traditional classroom. Unlike a dependent learner, a self-directed learner can engage in student-directed discussions, independent projects, and discovery learning (Merriam, 2001). This type of learning model can be difficult for adults who lack intrinsic motivation (Merriam, 2001). Adults' engagement and interest levels vary from topic to topic; educators should not assume that if self-directed learning is effective for a learner in one situation, then he or she will be able to succeed in a new area with the same model (Merriam, 2001).

Self-directed learning can be facilitated in the classroom for adult learners through the utilization of specific strategies. Corley (2011) identified these strategies to include the following: identifying a starting point for a project; matching appropriate resources and methods to students' learning goals; negotiating a learning contract that outlines learning goals, strategies, and evaluation criteria for a topic; and developing positive attitudes and independence relative to self-directed learning.

Fidishun (2005) defines a third learning theory, andragogy, as "the set of assumptions about how adults learn" (p. 1). American adult educator Malcolm Knowles

documented the differences between how adults learn and how children learn by suggesting a group of assumptions about adult learners that lend themselves to implications for practice (Corley, 2011). According to Merriam (2001),

> The five assumptions underlying andragogy describe the adult learner as someone who (1) has an independent self-concept and who can direct his or her own learning, (2) has accumulated a reservoir of life experiences that is a rich resource for learning, (3) has learning needs closely related to changing social roles, (4) is problem-centered and interested in immediate application of knowledge, and (5) is motivated to learn by internal rather than external factors. (p. 5)

Knowles allowed instructors to deepen adult learning. Adult learners need to know the reasoning for learning, learning from doing, and they are problem-solvers, so effective instruction for them includes teachers explaining their reasoning for teaching, providing tasks that adults can perform, and involving adult learners in real-life problem solving (Corley, 2011).

Andragogy has also been utilized as an adult learning theory to effectively integrate technology into the classroom (Fidishun, 2005). Because school districts are offering more professional development relative to technology integration in the classroom, it becomes important to use methods of instruction to meet the needs of adult learners in charge of the technology implementation. "Faculty need to focus on learning theory in the design of instructional technology so that they can create lessons that are not only technology-effective but that are meaningful from the learner's standpoint" (Fidishun, 2005, p.1). "When the five assumptions are used in the designing of the learning environment, it becomes possible to create lessons that not only serve the needs

of students to use the latest technology but also serve the needs of adults, based on their requirements for learning" (Fidishun, 2005, p.1). With professional development being a main focus of school districts, specifically in the area of technology, the understanding and implementation of adult learning theories can become just as important as the professional development itself.

Professional Development in Technology

The role of professional development in support of technology integration has changed over time, just as education has evolved over the past 100 years. Professional development over the last decade or so for K-12 teachers in the area of technology has focused on the software and technology itself (Morehead & LaBeau, 2005). This focus has now shifted to a different type of technology integration. "Technology integration no longer involves only knowing the computer relations, technologies and software—it involves the way teachers and students approach learning" (Morehead & LaBeau, 2005, p. 1). Along with this shift, new effective professional development strategies are being implemented to ensure that teachers are ready for the task of technology implementation in the classroom.

A transformation is occurring with technology-related professional development. In the past, computer time meant learning how to use a tool with little or no connection to curriculum objectives (Plair, 2008). Therefore, this type of computer integration meant that professional development for teachers needed to focus only on the skills involved in how to use a device. Technology classes were grouped in with such classes as woodshop and sewing, and classroom or content teachers did not view technology as their responsibility or see any connection to it and their classroom (Plair, 2008). Not until the

late 1980s did leaders in technology begin focusing technology as a tool for inquiry in the classroom. "Programs such as Logo, the Voyage of the Mimi, and Windows on Science videodisks, promoted the ideas and concepts of inquiry based learning" (Moorehead & LaBeau, 2005, p. 2). These programs began to place technology in the classroom. However, computers would often sit untouched because school districts' professional development programs had not yet caught up to the technology resources available. Table 1 presents the previous ways in which districts would structure professional development for technology integration.

Table 1

Previous Structure of Teachers' Technology-Based Professional Development

Skill Level	Approach to Professional Development
Awareness	Short-duration sessions with news of an innovative practice
How to	Short-duration sessions or a series of sessions learning software applications
Seminars or Workshops	Longer-duration sessions, such as Intel Corporation's Teach to the Future, eMints training, or university programs
Ongoing Support	District help-desk staff, online support resources, and intermittent and limited follow-up on site

Note: Adapted from Plair (2008).

As technology in the classroom has continued to increase over the past decade, school districts, with the support of state and federal grants, have begun to restructure their professional development programs aimed at familiarizing teachers with new technology and how to use it effectively in the classroom (Hanover Research, 2014). The U.S Department of Education's (U.S. DOE) 2010 National Education Technology Plan recommends a continued and connected methodology for professional development for

teachers, so teachers are not only prepared for effective technology use but are consistently supported in their use. Technology training is moving towards ensuring there are opportunities for teachers to integrate learning into practice instead of short and sporadic workshop sessions. When it comes to providing teachers with professional development in technology implementation, there must be a culture shift that avoids using traditional educational practices (U.S. DOE, 2010).

The International Society for Technology in Education identified the components of successful professional development programs that are essential to effective technology implementation. These successful professional development programs are technology-rich, delivered through a coaching model, and enhanced by the power of community and social learning (Beglau, Craig-Hare, Foltos, Gann, James, Jobe, Knight, & Smith, 2011). With no one type of professional development practice meeting the needs of all learners, "Teacher [professional development] should be highly customized, delivering immediately usable solutions to the daily challenges that teachers will face when making major curricular changes in their subject areas" (Hanover Research, 2014, p. 4). Three practices associated with technology-related professional development are utilizing technology coaches, providing long-term teacher support, and altering teacher pedagogy.

Technology coaches. Using experts in specific content areas or subjects to help mentor and lead teachers in their classroom instruction is a way for teachers to receive instructional assistance by knowledgeable colleagues (Beglau et al., 2011). School districts often provide literacy coaches to support teachers and students in reading and writing, and they are beginning to see the need to implement technology specialists or

coaches to support teachers and students in technology integration as well. The ISTE has suggested that teachers are more likely to implement new instructional strategies after participating in a professional development program that includes coaching or mentoring (Hanover Research, 2014). A study conducted in 2004 by the University of Kansas Center for Research on Learning found that teachers who received coaching implemented new instructional methods at a rate of 85%, while teachers who did not receive coaching implemented new instructional methods at a rate of 15% (Beglau et al., 2011). Teachers identified the need for on-the-spot professional development and someone they can call and receive assistance from in a timely manner when the unexpected occurs (Plair, 2008). Support and expertise from an individual who is comfortable and competent with the subject of instructional technology is valuable to teachers. "Knowledge of education or instructional technology is a commodity to be shared, exchanged, valued, sought, and purchased, and the concept of a [coach], or go-between, fits what teachers need and want when integrating technology" (Plair, 2008, p. 72).

Long-term teacher support. While providing training sessions to teachers on how to use technology hardware and software is important, professional development must go beyond one-time training and provide ongoing support (Mozella, 2011). "The existing format for technology-related professional development lacks continuity that teachers need to develop the confidence and efficacy leading to technology fluency" (Plair, 2008, p. 70). Teachers want continued support and training in addition to professional development sessions and workshops they are attending. Based on a study conducted by the United Federation of Teachers (UFT) involving teachers, administrators, and UFT staff across 40 schools in New York City, it was found that in

addition to modeling, work sessions, study groups, coaching, and in-class assistance, two-thirds of teachers indicated they needed additional ongoing support to further integrate technology into their classroom (Mozella, 2011). As districts implement technology integration plans and expect teachers to use technology in the classroom with fidelity, long-term assistance is needed. Building- and district-level support of successful implementation in the classroom is necessary so that access to and use of technology are continuous from year to year (Hanover Research, 2014). "The overarching goal of technology professional development should be to provide teachers with opportunities to observe, practice and reflect on new technologies and it should be conducted over extended periods of time" (Mozella, 2011, p. 49).

Altering teacher pedagogy. A teacher-centered classroom or traditional classroom utilizes instructional strategies such as lecture and rote learning. These classrooms are typically the norm but may not provide the most conducive environment for effective technology integration. The Information Development Program (IDP) found that classrooms with a teacher-centered pedagogy typically only use technology as a supplement to lessons versus classrooms with a student-centered pedagogy where greater technology integration occurs (Trucano, 2005). In student-centered learning, both the teacher and the student take on new roles. The use of technology in this type of learning environment requires some self-directed learning from the student and more coaching or facilitation from the teacher (Hanover Research, 2011). Beneficial for technology integration, this shift in pedagogy can be new and uncomfortable for teachers who are used to a traditional classroom. Professional development, therefore, needs to not only

provide training and support with technology but also consider how to facilitate a change in the beliefs and preconceptions of teachers (Mozella, 2011).

The Education Development Center of Hanover Research (2014) has identified eight approaches utilized by schools that focus on student-centered teaching pedagogies through the use of technology:

1. Technology is deeply integrated into the overall vision, mission, and curriculum of the schools.
2. Technology is used flexibly across the curriculum as a tool for project-based learning and to support the pursuit of academic goals.
3. Technology is also an object of study through courses such as video production, multimedia design or computer science.
4. The curriculum is designed to foster the development of 21st century learning skills.
5. There is an emphasis on using technology in authentic ways (e.g., using digital probes to collect scientific data, using computer assisted design tools for creating blueprints) that mirror how professionals in the workplace use digital tools.
6. Students are active users and shapers of digital tools, rather than passive recipients of information delivered online.
7. Schools utilize performance-based assessments that include technology as a tool and allow teachers to measure, among other things, students' competence with technology and 21st century learning skills.

8. Teachers receive extensive professional development on using technology to support learning and have access to ongoing assistance during the school year. (p. 15)

Implementing appropriate pedagogical practices is an essential component to effective technology related professional development practices. Extensive training in both pedagogy and technology can assist teachers to fully commit and effectively implement technology in the classroom.

Technology in the Classroom and 21st Century Learning Skills Development

"As state budget scenarios improve, state and local education leaders are looking for ways to better engage students in learning and make their school experience more relevant to the 21st century" (*eSchool News*, 2006, p. 1). One method by which school districts are strengthening student engagement is through the use of technology.

Technology integration that provides students with computers at a one-to-one ratio began occurring in 1989 when Methodist Ladies College in Melbourne Australia required the purchase of Toshiba laptops for all students in grades five through twelve (Russell, Bebell, & Higgins, 2004). The use of technology in the classroom was seen as important in education beginning in the late 1980s. Although there can be varying reasons why school districts choose to implement one-to-one programs, a couple of common goals have remained consistent over time. The first common goal focuses on improving students' academic achievement (Sauers & McLeod, 2012) and is oftentimes addressed by districts by transitioning away from the typical teacher-centered classroom. The Irving Independent School District in Texas had a long-term goal of changing teaching and learning methodologies that teachers were using in the classroom

(Borthwick & Pierson, 2008). The school district ultimately addressed this goal in 2001 by implementing a one-to-one computer initiative (Borthwick & Pierson, 2008). In addition to the goal of increased student achievement and a change in pedagogy, school districts also share another common goal of increased technology fluency. School systems are spending millions of dollars on one-to-one programs, with hopes of closing technology gaps (Goodwin, 2011). "In fact, many education, government, and business leaders see the one-to-one movement as a way to fundamentally change public schools and pull them into the technology-rich 21st century" (Garry & Graham, 2008, p. 1). A third common goal that districts have begun to set with one-to-one program implementation is an increased development of 21st century learning skills. Administrators across the nation have strong perceptions on the positive impact of student technology use on their 21st century skill development and engagement in the classroom (Walden University, 2010). Although school districts' goals may vary as to what they hope a one-to-one program can specifically help them accomplish, a consistent theme among general goals is academic achievement, technology fluency, and 21st century skill development.

Impact of one-to-one programs. The impact of one-to-one laptop programs can vary just as diversely as its goals. Because laptop programs are continuing to be implemented and research on their impact is on-going, there continues to be anecdotal evidence from program evaluations that reports several positive outcomes based on implementation (Russell et al., 2004). School districts reporting successful use of one-to-one programs claim to have increased motivation and engagement, increased technology skills, and the development of 21st century learning skills.

In two states, student motivation and engagement increased in school districts implementing one-to-one programs. The Irving Independent School District in Texas implemented a one-to-one laptop program. The results of successful implementation identified student engagement and motivation as increasing in the classroom (Borthwick & Pierson, 2008). As a result of Michigan's Freedom to Learn initiative, 21,000 students across 95 districts were supplied a laptop, and nearly 90% of lead teachers stated that student motivation was increased because of the program (*eSchool News*, 2006, p. 1). Increased student motivation and engagement can also lead to other impacts after implementing a one-to-one program. In Texas, one study of 5,000 middle school students found that disciplinary problems for those engaged in laptop immersion programs were much fewer than those without laptops and that technology skills improved significantly for these students as well (Shapley, Sheehan, Sturges, Caranikas-Walker, Huntsberger, & Maloney, 2009). After three years in the laptop schools, low-income students displayed the same technology proficiency as wealthier students in the control schools (Shapley et al., 2009).

In addition to the impact of increased motivation and improved technology skills, schools are finding that the impact of one-to-one programs can also be positive regarding academic achievement and the development of 21st century learning skills. Henrico County Public Schools in Virginia, implemented a one-to-one initiative in 2001. Their efforts have ignited excitement in both teachers and learners, while helping to build students' critical thinking and problem-solving skills (Garry & Graham, 2008). This positive impact on student learning is found across the United States. In a study by Project RED (Revolutionizing Education) involving approximately 1,000 U.S. schools

representing the educational universe in enrollment, poverty-level, and ethnicity, an overall finding was that schools with a one-to-one computer program outperform schools without a one-to-one program on academic measures (Greaves et al., 2010). Increases in high-stakes test scores and graduation rates were found (Greaves et al., 2010).

A final effect that schools and districts are noticing from one-to-one programs is the impact that technology has on the development of 21st century learning skills (Walden University, 2010). The Richard W. Riley College of Education and Leadership conducted a study of more than 1,000 K-12 teachers and administrators on technology and 21st century learning skills. Results indicate that the teacher's use and classroom's use of technology can dramatically impact the development of 21st century learning skills in students (Walden University, 2010). Henrico County Public Schools in Virginia also found that their schools' increased use of technology through one-to-one programs helped develop students' 21st century learning skills in critical thinking and problem solving (Garry & Graham, 2008).

The implementation of one-to-one programs can have varying effects on schools and students, including motivation and engagement, increased technology skills, and 21st century skill development, to name a few. Of the various impacts, the development of 21st century learning skills is becoming the focus of school districts in preparing students for college and career readiness.

Rationale for 21st century learning skills. Dewey and leaders of the progressive education movement have argued for an education system that covers more than just basic skills in content areas (Silva, 2008). Because the nature of employment and the economy have changed over the last two decades, such educational demands have

increased (Silva, 2008). Students are needing college- and career-ready skills in order to be prepared for their post-high school plans.

> The push to prioritize 21st century skills is typically motivated by the belief that all students should be equipped with the knowledge, skills, work habits, and character traits they will need to pursue continued education and challenging careers after graduation, and that a failure to adequately prepare students effectively denies them opportunities with potentially significant consequences for our economy, democracy, and society. (Hidden Curriculum, 2014, p. 4)

The expectations that students face upon graduation encompass 21st century learning skills. College students and workers must possess the skill of critical thinking in order to generate original ideas from information sources and ultimately solve multifaceted problems (Silva, 2008). School districts provide the development of these skills to ensure students are prepared for their futures. "We can and must prepare all students with a 21st century education that will position them with the knowledge and skills they need to thrive, whether they continue their formal education or enter the workforce after high school" (Vockley, 2007, p. 2). The separation of teaching basic knowledge skills and 21st century learning skills is not necessary in the classroom. Even in the earliest of grade levels, there is no reason to isolate the learning of core content from more advanced thinking and problem-solving skills (Silva, 2008). The implementation and development of these learning skills is needed because without their identification, teachers often miss opportunities to have students practice learning skills like problem solving, collaboration, and communication. Overall, teaching students universally applicable learning skills needs to be a focus in schools because often schools do not prioritize these skills or

effectively teach them on their own (Hidden Curriculum, 2014). Twenty-first century learning skills prepare students to be college and career ready and also engage them in their current education. Integrating these skills in instruction and assessment is not only brought on by changes in the workforce, but it is an essential component to improving student learning (Silva, 2008).

Development of 21st century learning skills. Although often the most common form of instruction, traditional teaching methods do not provide opportunities needed for developing 21st century learning skills. "Fostering 21st century skills requires new approaches to teaching and learning, all of which can be enhanced with technology" (Vockley, 2007, p. 9). Teacher use and student use of technology help promote these learning skills in the classroom. Learning associated with 21st century skills is impacted more by frequent technology users compared to infrequent technology users (Walden University, 2010). Technology serves as a tool for teachers to provide additional opportunities for students to practice and hone their interpersonal and critical thinking skills. When students' learning experiences are based on effective teaching practices, technology use allows learners a larger spectrum of voices to be heard, which in turn exposes them to beliefs and practices outside of their own (NCTE, 2013). Technology must play a foundational role in education. Teachers must be using technology to develop 21st century skills, support innovative teaching and learning, and create strong support systems (Vockley, 2007).

In addition to utilizing technology to develop 21st century learning skills, a system of support is also needed to foster and promote these skills. "To work, the 21st century skills movement will require keen attention to curriculum, teacher quality, and

assessment" (Rotherham & Willingham, 2009, p.1). A comprehensive approach to integrating and evaluating these skills is necessary for successful development. Teachers are not able to carry this load on their own. Stakeholder support is vital, and districts and community members are beginning to work with teachers in developing 21st century learning skills. A network of around 30 businesses and education groups called The Partnership for 21st Century Skills serves as advocates for 21st century learning skills integration, and they have developed a framework to help combine content learning with 21st century skills to create "21st century learning" (Silva, 2008). School districts and schools are also beginning to provide ways for 21st century learning skills to intersect within classroom learning. Four strategies that allow for intersection are teachers intentionally utilizing cross-disciplinary skills in content courses, states and schools requiring the teaching and assessing of 21st century learning skills in regular courses, schools using approaches that facilitate the achievement of cross-disciplinary skills, and schools offering alternative learning opportunities through internships and on-the-job training (Hidden Curriculum, 2014). The development of 21st century learning skills requires technology and instructional support in order to be effective. Both components are needed for fostering these must-have skills.

Summary

Understanding how individuals learn and the role of professional development in meeting the needs of learners is important when districts implement new initiatives like technology integration. Cognitive development and adult learning theories offer insight in how to frame professional development to make it effective. Identifying the type of professional development to use for technology integration is important for teacher

comprehension and commitment. One-to-one programs are becoming the method that school districts are using for technology integration with implementation of 21st century learning skills. The impact of one-to-one programs shows positive outcomes, including assisting in the development of 21st century learning skills. These skills are a focus among districts across the nation, and they need the components of technology and instructional support in order to be effectively implemented.

Chapter one introduced this study, while Chapter two provided a literature review to support the importance of professional development for technology integration and the role of one-to-one programs and their relationship with 21st century learning skills. Chapter three will discuss the methodology used for the current study**.**

Chapter Three

Methods

The focus of this study was on the relationship between one-to-one technology implementation and the development of 21st century learning skills. In addition, the impact of professional development on one-to-one technology implementation was analyzed. Specific information was gathered on teacher perceptions of the effectiveness of professional development and one-to-one classroom implementation. The research design, population and sample, and sampling procedures are described in this chapter. Survey instrumentation, data collection and analysis, and limitations of the study are also presented.

Research Design

A quantitative research design was utilized here. Specifically, chi-square analysis was employed to measure associations among ordinal data. Correlational research methods have played a historical role in both educational and psychological research, with the purpose of determining the relationship among two or more variables (Lunenburg & Irby, 2008). The four variables examined in this study were teacher perceptions of the effectiveness of professional development for one-to-one implementation, frequency of professional development for one-to-one implementation, teacher implementation practices for one-to-one technology implementation, and student 21st century learning skills development.

Population and Sample

The population of this study was fifth grade teachers who received professional development for one-to-one implementation and who executed the FLiP program in their

classrooms during the 2013-14 and 2014-15 school years in one suburban Missouri school district. The sample for this study included teachers from ten elementary schools in District X. The teachers selected for this study were based on district implementation of the FLiP program at the fifth grade during the 2013-14 and 2014-15 school years.

Sampling Procedures

Purposive sampling was used in this study. "Purposive sampling involves selecting a sample based on the researcher's experience of knowledge of the group to be sampled" (Lunenburg & Irby, 2008, p. 175). Fifth grade teachers in District X during the 2013-14 and 2014-15 school years were included because this was the only grade level where the FLiP program was integrated in District X for two consecutive years. Teachers who responded to the survey were those included in the sample.

FLiP Professional Development and Training Survey Instrumentation

The FLiP Professional Development and Training Survey was created by the researcher to gather information about teacher perceptions towards the effectiveness of professional development for implementation of the one-to-one technology initiative offered by District X and teacher perception of one-to-one implementation in the classroom (see Appendix A). SurveyMonkey was used to create the survey. Survey items 1-6 were used to gather teacher perceptions on the effectiveness of professional development practices. Additionally, items 1-5 were used to gather information on when the teacher experienced the training. Item 7 addressed methods by which teachers utilized one-to-one technology in their classrooms with students. Item 8 identified the frequency of teacher use of one-to-one technology during instruction.

Measurement. Different measurement methods were used in the FLiP survey. Items 1-6 were on a 5-point Likert scale: 1 = *Not Beneficial At All*, 2 = *Somewhat Beneficial*, 3 = *Beneficial*, 4 = *Extremely Beneficial*, and 5 = *Not Applicable*. This rating scale allowed participants to indicate the level at which they perceived each item to be beneficial. Participants rated the effectiveness of the professional development practices for one-to-one implementation. Additionally, information was gathered on when professional development practices occurred in items 1-5; participants selected from the following responses: *first year of fifth grade implementation (2013-14), second year of fifth grade implementation (2014-15), both years of fifth grade implementation*, and *neither year of fifth grade implementation*. Item 7 had participants identify those areas in which one-to-one implementation occurred in the classroom, including assessments, reading instruction, projects, writing instruction, videos, math instruction, student collaboration, science instruction, student communication, social studies instruction, and other. Item 8 had participants estimate the percent of time that one-to-one implementation occurred in their classrooms: 0%, 25%, 50%, 75%, and 100%.

Validity and reliability. Prior to administering the survey to fifth grade teachers, a panel of four subject-matter experts was recruited to verify the validity of the survey instrument. These experts were all involved in one-to-one programs and had previous experience with one-to-one professional development. Subject Matter Experts 1, 2, and 3 were Instructional Technology Facilitators in District X. Subject Matter Expert 4 was the Director of Instructional Technology in District X. The researcher requested feedback about each section of the survey relative to accuracy and alignment of the research

questions and variables. Feedback from the four Subject Matter Experts confirmed the survey's accuracy and alignment to the researcher's research questions and variables.

The reliability for the survey was calculated at .837 for questions on the different types of professional development offered. Questions related to years of professional development had a reliability of .836.

21st Century Learning Skills Index Instrumentation

An additional variable in the study was the development of 21st century learning skills as measured by District X's 21st Century Learning Skills Index. This index was created to measure students' 21st century learning skills using constructs influenced by ISTE student standards focusing on problem solving, communication, collaboration, creativity, needs, relevancy, and engagement (District X, 2014a). Constructs used in the student survey did not specifically ask students about technology or if they liked using laptops. District X indicated that this type of questioning would bias the survey and result in false positives (District X, 2014a). The evaluation was designed so that the variable was the device, and therefore inferences could be made about the data received (District X, 2014a). Constructs were created from guidance from previous student surveys in the district and the International Society for Technology in Education. District X used six ISTE standards to help develop its survey on 21st century learning skills: creativity and innovation, communication and collaboration, research and information fluency, critical thinking/problem solving/decision making, digital citizenship, and technology operations and concepts (ISTE, 2015). A five-point rating scale was used to measure each skill, and data were analyzed using the Statistical Package for Social Sciences (SPSS) by performing t-tests on independent samples to test (District X, 2014a).

For accurate comparative purposes, data were reported for seven schools that did not have FLiP during the 2012-13 school year and compared to the same seven schools that did have FLiP during the 2013-14 school year. All fifth grade students in March of 2014 were invited to take this survey in order to measure their 21st century learning skills (See Appendix B).

Measurement. The 21st Century Learning Skills Index was used to collect data on the impact of the FLiP program on students' 21st century learning skills (problem solving, communication, collaboration, creativity, needs, relevancy, and engagement). According to District X (2014a), the following constructs were used:

1. Problem Solving
    a. My teachers expects me to solve a variety of problems.
    b. I can solve difficult problems.
    c. My teacher expects me to memorize a lot of facts. (reverse code)
    d. I know how to find an answer to a problem, even when my teacher does not tell me.
2. Communication
    a. I communicate regularly with my classmates about what I'm learning.
    b. I communicate regularly with my teachers about what I'm learning.
    c. I share my ideas during class.
3. Collaboration
    a. I work with others to solve problems in class.
    b. I learn more when I work with other students.
    c. Most of the time, I work on class projects by myself. (reverse code)

4. Creativity
    a. My teacher allows me to show my creativity.
    b. I get to show what I have learned in a variety of ways.
5. Needs
    a. My school is meeting my needs as a student.
    b. I am learning a lot in school this year.
6. Relevancy
    a. If I do well in school, it will help me when I grow up.
    b. Teachers connect what students are learning with the real world.
    c. I am often bored in class. (reverse code)
7. Engagement
    a. My teachers make learning interesting.
    b. Time goes quickly when I work on assignments for school.
    c. When something doesn't work the first time, I try again.
    d. I am excited about what I am learning this year in school. (p. 9-10)

Validity and reliability. The reliability for the 21st Century Learning Skills Index was computed at .70 criteria.

Data Collection Procedures

Before data collection occurred, the process to obtain permission from Baker University to conduct research was initiated by submitting an Institutional Review Board (IRB) request to the university. Approval was granted by the Baker University IRB for the study on July 21, 2015 (see Appendix B). Upon receiving IRB approval, a Research Application Request to obtain permission from District X to conduct research was

completed. The form was submitted to the Director of Research, Evaluation, and Assessment on July 27, 2015. The director granted permission to conduct the study on August 13, 2015 (see Appendix C).

The electronic survey was administered to fifth grade teachers through SurveyMonkey on August 30, 2015 (a copy of the survey is included in Appendix A). Reminder emails to complete the survey were sent to the sample on September 7, 2015, and September 11, 2015. Once survey results were collected, 21st Century Learning Skills Index data were obtained from District X's Director of Research, Evaluation, and Assessment. The survey data were entered into IBM® SPSS® Statistics Faculty Pack 23 for Windows for analyses.

Data Analysis and Hypothesis Testing

The research questions (RQs) for this study were focused on establishing teacher perception of the effectiveness of professional development and one-to-one implementation and their relationship to developing student 21st century learning skills. One hypothesis (*H1*) using a chi-square analysis addressed RQ 3. The level of significance was set at .25.

RQ1. To what extent do teachers perceive that the overall FLiP professional development and training has been beneficial as they have implemented the one-to-one program into the classroom?

RQ2. To what extent do teachers perceive one-to-one professional development practices as beneficial?

RQ3. Is there a proportional difference between perceived benefit and years of training for each one-to-one professional development practice?

H1. There is a significant proportional difference between perceived benefit and years of training for each one-to-one professional development practice.

Limitations

According to Lunenburg and Irby (2008), "limitations are factors that may have an effect on the interpretation of the findings or on the generalizability of the results" (p. 133). While the researcher cannot control limitations, Lunenburg and Irby (2008) emphasize the importance of providing the reader with information on limitations to avoid misinterpretation of the research findings. Limitations for this study included the following:

1. For convenience, the FLiP Professional Development and Training Survey was e-mailed to participating fifth grade teachers in this one suburban Missouri school district. Therefore, results represent the specific population from which the sample was drawn and may not represent beyond this sample.
2. Delivery of professional development courses and classroom support from Instructional Technology Facilitators may have varied from instructor to instructor.
3. One-to-one implementation expectations could vary from school to school.
4. Honesty of responses could vary from participant to participant.
5. Due to the way data were collected, student data could not be matched to teacher data in District X.

Summary

The current study was a quantitative design using the chi-square analysis method. Provided in this chapter was the purpose of and methods used in the study, including

research design, population and sample, sampling procedures, instrumentation, data collection procedures, data analysis and hypothesis testing, and limitations. The FLiP Professional Development and Training Survey and 21st Century Learning Skills Index were described in detail as the two instruments used for data collection. Results of the quantitative data analysis for this study are presented in Chapter four.

Chapter Four

Results

The purpose of this study was to evaluate one-to-one training, support, and professional development provided to teachers as it relates to one-to-one implementation and 21st century learning skills development in the fifth grade classroom. This chapter includes descriptive statistics, the results of chi-square analysis, and an additional analysis on the significance of mean scores. The results of the calculation of descriptive statistics are included for Research Questions 1 and 2. The results of the hypothesis testing are included for Research Question 3. Although the study had a return rate of approximately 45%, due to the small sample size of 33 fifth grade teachers in District X, 15 participants responded to the survey. Some participants did not respond to all of the questions, and therefore the totals on some of the frequency tables do not add up to 15. A supplemental analysis on the development of 21st century learning skills is also included in this chapter.

Descriptive Statistics

The population for the study was limited to 33 fifth grade teachers in District X. The sample consisted of 15 teachers who responded to the survey in the fall of 2015. For statistical analysis, survey measurement scales from the FLiP survey were condensed due to the small sample size. *Not Beneficial At All* and *Somewhat Beneficial* were combined and relabeled under the new heading of *Not Beneficial*. *Beneficial* and *Extremely Beneficial* were combined and relabeled under the new heading of *Beneficial*. Survey responses of *First Year of Fifth Grade Implementation (2013-14)* and *Second Year of Fifth Grade Implementation (2014-15)* were combined and relabeled under the new

heading of *One Year of Training And Support*. The response *Both Years of Fifth Grade Implementation* was relabeled under the new heading of *Two Years of Training and Support.* The response *Neither Year of Fifth Grade Implementation* was relabeled under the new heading of *No Years of Training or Support*.

Research Question 1: To what extent do teachers perceive that the overall FLiP professional development and training has been beneficial as they have implemented the one-to-one program in the classroom? Descriptive statistics were used to outline teachers' perceptions of the overall FLiP professional development and training. See Table 2 for a breakdown of the fifth grade teachers' perceptions in District X. Teachers rated how beneficial the overall FLiP professional development and training they received was. Six teachers stated there was little to no benefit to the training, while four teachers stated the training was beneficial to extremely beneficial. Five teachers responded that the question was not applicable to them and therefore were not included in the table.

Table 2

Frequency Table of Benefit of Overall FLiP Professional Development and Training

Perception	Frequency	Percent
Not Beneficial	6	60
Beneficial	4	40

Research Question 2: To what extent do teachers perceive one-to-one professional development practices as beneficial? Descriptive statistics were used to outline teachers' perceptions of the FLiP professional development and training practices.

See Tables 3, 4, 5, 6, and 7 for a breakdown of the fifth grade teachers' perceptions on one-to-one professional development practices in District X.

Teachers rated how beneficial the optional and/or required summer professional development sessions they received were. As shown in Table 3, five teachers stated there was little to no benefit to the training, while six teachers stated the training was beneficial to extremely beneficial. Four teachers responded that the question was not applicable to them and therefore were not included in the table.

Table 3

Frequency Table of Benefit of Summer Professional Development Sessions

Perception	Frequency	Percent
Not Beneficial	5	45.5
Beneficial	6	54.5

Teachers rated how beneficial the professional development training sessions throughout the school year were. As shown in Table 4, eight teachers stated there was little to no benefit to the training, while seven teachers stated the training was beneficial to extremely beneficial.

Table 4

Frequency Table of Benefit of Professional Development Training Sessions throughout the School Year

Perception	Frequency	Percent
Not Beneficial	8	53.3
Beneficial	7	46.7

Teachers rated how beneficial classroom support from the Instructional Technology Facilitators was. As shown in Table 5, five teachers stated there was little to no benefit to the support, while ten teachers stated the support was beneficial to extremely beneficial.

Table 5

Frequency Table of Benefit of Classroom Support from Instructional Technology Facilitators

Perception	Frequency	Percent
Not Beneficial	5	33.3
Beneficial	10	66.7

Teachers rated how beneficial technology collaboration meetings with their grade-level members were. As shown in Table 6, five teachers stated there was little to no benefit to the support, while ten teachers stated the support was beneficial to extremely beneficial.

Table 6

Frequency Table of Benefit of Technology Collaboration Meetings with Grade-Level Members

Perception	Frequency	Percent
Not Beneficial	5	33.3
Beneficial	10	66.7

Teachers rated how beneficial teacher observations of one-to-one classrooms were. As shown in Table 7, four teachers stated there was little to no benefit to the observations, while eight teachers stated the observations were beneficial to extremely

beneficial. Three teachers responded that the question was not applicable to them and therefore were not included in the table.

Table 7

Frequency Table of Benefit of Teacher Observations of One-to-One Classrooms

Perception	Frequency	Percent
Not Beneficial	4	33.3
Beneficial	8	66.7

Table 8 displays the results of all descriptive analyses based on perceived benefit. In summary, classroom support from the Instructional Technology Facilitators, technology collaboration meetings with grade-level members, and teacher observations of one-to-one classrooms were rated by more participants as being beneficial than not beneficial. Summer professional development sessions and professional development training sessions throughout the school year were both rated by more participants as being not beneficial versus beneficial. The overall FLiP professional development and training was rated by one more participant as being not beneficial compared to beneficial.

Table 8

Summary of All Descriptive Analysis Results by Survey Items (n = 6) by Frequency and Percent Perceived as Beneficial

Response Survey Item	Perceived as Beneficial	
	Frequency	Percent
Overall FLiP professional development and training	4	40
Summer professional development sessions	6	54.5
Professional development training sessions throughout school year	7	46.7
Classroom support from Instructional Technology Facilitators	10	66.7
Technology collaboration meetings with grade-level members	10	66.7
Teacher observations of one-to-one classrooms	8	66.7

Hypothesis Testing

A hypothesis was proposed to address Research Question 3, both of which are stated below. The hypothesis was tested using IBM® SPSS® Statistics Faculty Pack 23 for Windows. Chi-square analysis was conducted to test the hypothesis with a level of significance set at .25. This value was selected because of the small sample size of the study.

Research Question 3: Is there a proportional difference between perceived benefit and years of training for each one-to-one professional development practice?

Research Hypothesis 1. There is a significant proportional difference between perceived benefit and years of training for each one-to-one professional development practice.

A chi-square test of independence, crosstab two-by-two design, was performed, and no significant proportional difference was found between summer professional development sessions and the frequency of training, X^2 (1, n = 15) = 1.40, p = .50. In addition to the summer professional development sessions, a chi-square test was performed, and no significant proportional difference was found between professional development training sessions throughout the school year and the frequency of training, X^2 (2, n = 15) = 1.35, p = .51. Classroom support from the Instructional Technology Facilitators had a result similar to the other two professional development practices tested. A chi-square test was performed, and no significant proportional difference was found between classroom support from Instructional Technology Facilitators and the frequency of training, X^2 (2, n = 15) = 2.25, p = .33.

One practice that resulted in a significant difference was technology collaboration meetings with grade-level members. A chi-square test was performed, and a significant proportional difference was found between technology collaboration meetings with grade-level members and the frequency of training, X^2 (2, n = 15) = 3.55, p = .17. A chi-square test was performed, and a significant proportional difference was also found between teacher observations of one-to-one classrooms and the frequency of training, X^2 (1, n = 15) = 6.00, p =.01.

Table 9 displays the applied chi-square values to the frequency of training related to FLiP professional development and the level of benefit. In summary, of the five

professional development practices, only two resulted in a significant proportional difference between perceived benefit and years of training.

Table 9

Chi-Square Values Applied to the Frequency of Training Related to FLiP Professional Development Practices, and the Level of Benefit

Variable	Chi-square	*df*	*p*
Summer professional development sessions	1.40	2	.50
Professional development training sessions throughout school year	1.36	2	.51
Classroom support from Instructional Technology Facilitators	2.25	2	.33
Technology collaboration meetings with grade-level members	3.55	2	.17
Teacher observations of other one-to-one classrooms	6	1	.01

Additional Analysis

An additional quantitative analysis was conducted based on the 21st Century Learning Skills Index that District X distributed to fifth grade students in the spring of 2014. District X collected fifth grade student responses to various constructs focusing on 21st century learning skills that the district was studying. This analysis of student opinions was added to the study of one-to-one professional development practices to investigate the impact of the FLiP program on 21st century learning skills development in fifth grade students. District X collected survey data from 186 fifth grade students after one year of FLiP implementation and 502 fifth grade students without FLiP implementation (District X, 2014c). The mean, standard deviation, and sample size were

entered for the two samples of data, using a free, online, two-sample *t* test calculator at http://www.usablestats.com/calcs/2samplet&summary=1. This calculator was selected because the data were in the form of summary means and standard deviations. A summary means *t* test was used to test the mean difference between two samples of data for each 21st century learning skill: problem solving, communication, collaboration, creativity, needs, relevancy, and engagement. Seven comparisons of the summary means *t* tests were made. The FLiP classrooms' sample mean and the non-FLiP classrooms' sample mean were compared. The level of significance was set at .05. As shown in Table 10, a significant difference in mean scores was found in each 21st century learning skill, with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Problem solving. Results of the summary means *t* test for the 21st century learning skill of problem solving indicated a statistically significant difference between the two values, $t(398) = 2.498$, $p = .0019$. The sample mean for FLiP classrooms ($M = 4.19$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 3.95$, $SD = 1$). On average, students in FLiP classrooms had higher problem-solving scores than those students in non-FLiP classrooms. A significant difference in mean scores was found, with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Communication. Results of the summary means *t* test for the 21st century learning skill of communication indicated a statistically significant difference between the two values, $t(606) = 3.802$, $p = .0001$. The sample mean for FLiP classrooms ($M = 4.09$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 3.77$, $SD = 1$). On average, students in FLiP classrooms had higher communication scores than

those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Collaboration. Results of the summary means *t* test for the 21st century learning skill of collaboration indicated a statistically significant difference between the two values, $t(606) = 2.306$, $p = .010$. The sample mean for FLiP classrooms ($M = 3.81$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 3.61$, $SD = 1$). On average, students in FLiP classrooms had higher collaboration scores than those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Creativity. Results of the summary means *t* test for the 21st century learning skill of creativity indicated a statistically significant difference between the two values, $t(607) = 3.008$, $p = .001$. The sample mean for FLiP classrooms ($M = 4.40$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 4.14$, $SD = 1$). On average, students in FLiP classrooms had higher creativity scores than those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Needs. Results of the summary means *t* test for the 21st century learning skill of needs indicated a statistically significant difference between the two values, $t(578) = 2.576$, $p = .005$. The sample mean for FLiP classrooms ($M = 4.56$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 4.33$, $SD = 1$). On average, students in FLiP classrooms had higher needs scores than those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Relevancy. Results of the summary means *t* test for the 21st century learning skill of relevancy indicated a statistically significant difference between the two values, $t(606) = 3.189$, $p = .001$. The sample mean for FLiP classrooms ($M = 4.33$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 4.05$, $SD = 1$). On average, students in FLiP classrooms had higher relevancy scores than those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Engagement. Results of the summary means *t* test for the 21st century learning skill of engagement indicated a statistically significant difference between the two values, $t(596) = 4.211$, $p = .0001$. The sample mean for FLiP classrooms ($M = 4.31$, $SD = 1$) was higher than the sample mean for non-FLiP classrooms ($M = 3.95$, $SD = 1$). On average, students in FLiP classrooms had higher engagement scores than those students in non-FLiP classrooms. A significant difference in mean scores was found with FLiP classrooms having a higher mean score than non-FLiP classrooms.

Table 10 displays the summary test of mean differences of FLiP for the development of seven 21st century learning skills. In summary, each 21st century skill was shown as having a higher mean score in FLiP classrooms compared to non-FLiP classrooms, with a significant difference occurring in each analysis.

Table 10

Summary Test of Mean Differences of FLiP for the Development of Seven 21st Century Learning skills

Variable	Non-FLiP Classrooms	FLiP Classrooms	*t*-value	*df*	*p*
Problem Solving	3.95	4.19	3.498	398	.0019
Communication	3.77	4.09	3.802	606	.0001
Collaboration	3.61	3.81	2.306	606	.0104
Creativity	4.14	4.40	3.008	607	.0013
Needs	4.33	4.56	2.576	578	.0047
Relevancy	4.05	4.33	3.189	606	.0007
Engagement	3.95	4.31	4.211	596	.0001

Summary

In this chapter, the calculated results of descriptive statistics were presented to address Research Questions 1 and 2. In addition, chi-square analysis results were calculated to address Research Question 3. The calculated results of two sample *t* tests were also presented in this chapter as a supplementary analysis. Results of the descriptive statistics showed classroom support from Instructional Technology Facilitators and technology collaboration time with grade-level members as being beneficial professional development practices. Results of the hypothesis testing showed a significant proportional difference between two of the professional development practices and the frequency of training. Lastly, the additional analysis of 21st century learning skills through two sample *t* tests produced results indicating a statistically significant

difference between FLiP classrooms and non-FLiP classrooms regarding the development of 21st century learning skills.

Chapter five includes an overview of the study, findings from the study, and connections to the literature. It also makes recommendations for future study and discusses implications for action.

Chapter Five

Interpretation and Recommendations

There were three main goals in this study. The first goal was to gather teacher perceptions of one-to-one professional development and training in one Missouri school district. A second goal was to explore the relationship between the frequency of one-to-one professional development practices and their perceived benefit. The third goal was to study the impact of one-to-one implementation on the development of student 21st century learning skills. Chapter five provides an overview of chapters one to four and includes a study summary, major findings, implications for action, and recommendations for future research.

Study Summary

A brief overview of chapters one to four are provided in this section. An overview of the problem, purpose statement, methodology, and major findings are described.

Overview of the problem. With increased emphasis on the use of 21st century learning skills, teachers are now responsible for developing these skills in the classroom. Twenty-first century learning skills concentrate on what students can do with knowledge instead of focusing on the knowledge they actually possess (Silva, 2008). However, teachers face a challenge when asked to develop these skills in the classroom, because the development of 21st century learning skills requires some type of technology implementation.

According to Vockley (2007), without making use of intensive technology implementation, schools cannot prepare students for a global economy. The main component in providing students with the opportunity for technology implementation involves teachers and their training in technology implementation and 21st century skills development. Ensuring that this training is effective and that the technology implementation is impacting 21st century skills development is essential.

School and district leaders are advised to evaluate teacher perceptions of professional development training needs. The effectiveness and quality of training along with its impact on technology implementation cannot be identified without this information.

Purpose statement and research questions. The following purposes of this study have been studied and evaluated:

1. One-to-one training, support, and professional development as it relates to one-to-one implementation.
2. The effect of one-to-one implementation on 21st century learning skills development.

This study was conducted to evaluate the overall benefit of District X's one-to-one professional development program and the five practices which make up the program. An additional purpose was to analyze the development of 21st century learning skills (problem solving, communication, collaboration, creativity, needs, relevancy, and engagement) based on the effect of one-to-one technology implementation.

Review of the methodology. The sample for this study included fifth grade teachers representing ten elementary schools in one suburban school district in Missouri.

The selection of teachers for this study was based on district implementation of the FLiP program at the fifth grade during the 2013-14 and 2014-15 school years. These teachers were used for purposive sampling because fifth grade was the only grade level where two consecutive years of FLiP implementation occurred. To gather information about teacher perceptions towards the effectiveness of professional development for implementation of the one-to-one technology initiative offered by District X, the FLiP Professional Development and Training Survey was created by the researcher. This study involved three research questions, with one hypothesis to address Research Question 3. A chi-square analysis was used to examine the hypothesis.

Major findings. In Chapter four, the results of teachers' perceptions on FLiP professional development and training were presented. Overall, more teachers rated the overall FLiP professional development and training as not beneficial rather than beneficial. The two practices that were rated weakest by teachers were summer professional development sessions and professional development training throughout the school year. Teachers rated classroom support from Instructional Technology Facilitators and technology collaboration meetings with grade-level members highest. The next highest rated practice was teacher observations of one-to-one classrooms.

Additionally, hypothesis testing results were determined for each FLiP professional development and training component. There was no correlation found between summer professional development sessions and the frequency of training. Furthermore, no correlation was found between professional development training sessions throughout the school year and the frequency of training, and no correlation was found between classroom support from Instructional Technology Facilitators and the

frequency of training. One professional development and training practice that resulted in a significant difference and correlation was technology collaboration meetings with grade-level members. A significant proportional difference and correlation were found between technology collaboration meetings with grade-level members and the frequency of training. A significant proportional difference and correlation were also found between teacher observations of one-to-one classrooms and the frequency of training. Based on these findings, it would be beneficial to teachers in District X to receive continued professional development in the areas of technology collaboration time and one-to-one classroom observations.

The sample size of teachers was so small in this study that it is difficult to draw conclusions for all school districts implementing a one-to-one program. However, the correlations that were found are valid for District X.

Findings Related to the Literature

Connections between the findings in this study and those from literature are presented here. Similarities and differences among the literature reviewed in Chapter two and study findings will be discussed. Literature connections to the results of the descriptive statistics and hypothesis testing will be made. Connections will also be made to the results of the additional analyses on 21st century learning skills development.

Descriptive statistics from the study revealed that only 40% of participating teachers perceived the overall one-to-one professional development and training they received as beneficial. Teacher perception of one-to-one professional development in District X does not support the literature from Rotherham and Willingham (2009) and Morehead and LaBeau (2005); however, it does support the work of Garry and Graham

(2008). Rotherham and Willingham (2009) stated that vigorous training and support were needed by teachers in order to meet the demands of students in classrooms with high levels of technology integration. This relates to the current study by not aligning to the results of increased development of 21st century learning skills and high levels of technology integration based on a professional development program that was considered weak. According to Morehead and LaBeau (2005), integrating technology into the classroom requires training on knowing computer functions and also how to approach teaching and learning with technology. This does not support the current study because although technology integration occurred in fifth grade classrooms, the top three rated professional development practices had no specific training on computer functions and hardware. The literature from Garry and Graham, however, did support the current study. As one-to-one initiatives increase, Garry and Graham (2008) have mentioned that the need for comprehensive and effective teacher professional development also increases. The current study provides support for their results by demonstrating the correlation that can occur between the frequency of professional development and the perceived benefit of it.

Additional descriptive statistics revealed that approximately 66.7% of participating teachers perceived that classroom support from Instructional Technology Facilitators was beneficial. This supports the work of Beglau et al. (2011), Plair (2008), and Hanover Research (2014). Technology professional development programs are successful when delivered through a coaching model and enriched by social learning (Beglau et al. 2011). Plair (2008) claimed that the importance of coaches in successful professional development programs is that they fulfill teachers' desires to have someone

who can provide assistance when the unexpected occurs. This relates to the current study by providing support for why more than half the teachers surveyed found Instructional Technology Facilitators beneficial. The International Society for Technology in Education suggests new instructional strategies are more likely to be implemented by teachers after they have participated in professional development training programs that utilize mentoring or coaching (Hanover Research, 2014). This literature and the majority of teachers' ratings of Instructional Technology Facilitators as being beneficial in the current study provide support for District X's selection of utilizing coaches in their FLiP professional development training.

Descriptive statistics also revealed approximately 66.7% of participating teachers perceived that technology collaboration meetings with grade-level members were beneficial. This data supports the work of Mezirow (2000) and Greaves et al. (2010). The adult learning theory of transformative learning takes place when individuals are able to discuss and challenge each other's opinions on a topic while sharing trust and empathy for one another (Mezirow, 2000). District X's decision to include technology collaboration meetings with their FLiP professional development and training is supported by fifth grade teachers in the district and the literature from multiple authors. Greaves et al. (2010) have supported the role of collaboration in learning and effective professional development by stating that it is critical to provide teachers transitioning to a one-to-one classroom with time for training and collaboration. Not only does it improve teacher buy-in, but it also aides in effective implementation (Greaves et al., 2010).

A final professional development component that approximately 66.7% of participating teachers perceived as being beneficial, as revealed by a descriptive statistic,

involved teacher observations of one-to-one classrooms. This statistic is supported by the work of Mozella (2011). The practice of teacher observations of one-to-one classrooms was selected by District X to be included in their FLiP professional development training. This practice was found to be beneficial for more than half of the teachers surveyed and is supported by research. Professional development for technology implementation should encompass opportunities for teachers first to observe, and then to practice and reflect on their own implementation (Mozella, 2011).

Findings related to the literature associated with long-term professional development support include information from Mozella (2011), Hanover Research (2014), and the U.S. Department of Education (2010). When a chi-square test was performed in the current study, a significant proportional difference was found between technology collaboration meetings with grade-level members and the frequency of training. A significant proportional difference was also found between teacher observations of one-to-one classrooms and the frequency of training. Both professional development components were perceived as beneficial by 66.7% of teachers surveyed, thereby displaying a relationship between frequency of training and the level of benefit of these two practices. District X's method to extend the duration of professional development practices in order to provide teachers with long-term support was found as beneficial to the majority of teachers and is also supported by the work of multiple authors. Mozella (2011) stated that it is important to provide professional development that offers ongoing support and goes beyond a onetime training. He goes on to state that although coaching, modeling, and work sessions are important, teachers need long-term support to further integrate technology into the classroom (Mozella, 2011). Hanover

Research (2014) agrees by saying that the role of building- and district-level support in the technology implementation process is necessary in order for year-to-year access and support of technology to occur. This relates to the current study by supporting what teachers are reporting. Instead of using quick and sporadic workshop sessions, professional development in technology implementation needs to be providing opportunities for teachers to integrate their learning into ongoing classroom practice (U.S. DOE, 2010).

Findings related to literature associated with the development of 21st century learning skills include information from Borthwick and Pierson (2008), Garry and Graham (2008), and Walden University (2010). Additional analyses in the current study revealed that, on average, students in FLiP classrooms were perceived to have had higher 21st century learning skills (problem solving, communication, collaboration, creativity, needs, relevancy, and engagement) scores than those students in non-FLiP classrooms. A significant difference in means scores was found for each 21st century skill where scores between the two types of classrooms were compared. District X's implementation of a one-to-one program with hopes of developing student 21st century learning skills is supported by multiple studies. According to Borthwick and Pierson (2008), the results of successful implementation of a one-to-one program in a school district in Texas displayed an increase in student engagement and motivation. Students' critical thinking and problem-solving skills were better developed as a result of a school district in Virginia successfully implementing a one-to-one program (Garry & Graham, 2008). Students and teachers' have also had an increased enthusiasm and engagement as a result of the one-to-one initiative (Garry & Graham 2008). This literature supports the current study's results

of increased engagement and problem-solving skills as a result of implementing a one-to-one program. An additional study that supported District X's results of higher 21st century learning skills scores based on implementing a one-to-one program was a study done by the Richard W. Riley College of Education. This study of more than 1,000 teachers and administrators in a K-12 environment revealed that 21st century learning skills can be dramatically impacted by teacher and classroom use of technology (Walden University, 2010).

Conclusions

Conclusions are drawn in this last section of Chapter Five. Implications for action, recommendations for future research, and concluding remarks are also included.

Implications for action. This study supports the connection between professional development and frequency of practice. When professional development is perceived to be beneficial, then it is more likely that teachers will implement the practice into their classrooms. This study also supports the connection between the implementation of one-to-one programs and the development of 21st century learning skills. When the level of technology usage in the classroom increases, the development of 21st century learning skills increases.

Based on the results that were found from the three research questions, school districts should reflect on their own technology professional development programs and gather feedback from teachers tasked with the responsibility of technology implementation. School leaders are advised to focus on the importance of quality professional development and its impact on teacher practice. If new programs do not include quality professional development, then implementation into the classroom is

doubtful. Understanding perceptions about technology professional development programs can inform building and district leaders about relevant and effective practices. School leaders should collect this type of data and customize technology professional development programs to better meet the needs of their teachers and ultimately increase technology implementation in the classroom. Collecting this type of data can also help districts ensure that funding for professional development is being utilized on best practices.

Results that were found from the additional analyses conducted should prompt school districts wanting to develop students' 21st century learning skills to consider the idea of a one-to-one technology program. School leaders should provide technology resources to support a more student-centered learning environment, which ultimately helps promote students' learning skills in problem solving, communication, collaboration, needs, relevancy, and engagement. For districts already implementing a one-to-one technology program, district leaders should ensure that the professional development being provided not only helps teachers understand the use of technology, but also emphasizes and supports the instructional shift that must occur in order to promote student development of 21st century learning skills.

Recommendations for future research. This study has added to the research on one-to-one professional development for technology implementation and also on the development of 21st century learning skills. This study could be expanded to investigate additional aspects relating to the same topics, including the following:

1. A larger sample size of teachers who have implemented the FLiP program at different grade levels.

2. Other districts who have implemented a one-to-one technology program.
3. The impact that one-to-one technology programs have on student achievement.
4. An expansion of the FLiP Professional Development and Training Survey to allow for qualitative responses and a deeper analysis of professional development practices.
5. Interviews of teachers implementing the FLiP program to expand the study as a mixed-methods approach.
6. Observations of teachers to evaluate the level of technology implementation in a classroom.

Concluding remarks. The current study examined one-to-one training, support, and professional development provided to teachers as it relates to one-to-one implementation and 21st century learning skills development in the fifth grade classroom. As more school districts begin to increase the use of technology in the classroom and focus on developing 21st century learning skills in students, it becomes important to evaluate professional development methods provided by school districts and analyze the impact they have on technology implementation and 21st century learning skills development. The results of this study found that specific professional development practices are viewed as more beneficial than others and that the frequency of training can also impact the perceived benefit. Additional results revealed that one-to-one laptop implementation positively impacted fifth grade student scores in problem solving, communication, collaboration, needs, relevancy, and engagement. Given the small

sample size of the study, implications for further action and additional research would provide a more in-depth analysis of these relevant topics.

References

Bebell, D., & Kay, R. (2010). One to one computing: A summary of the quantitative results from the Berkshire Wireless Learning Initiative. *Journal of Technology, Learning, and Assessment, 9*(2). Retrieved from http://ejournals.bc.edu/ojs/index.php/jtla/article/view/1607/1462

Beglau, M., Craig-Hare, J., Foltos, L., Gann, K., James, J., Jobe, H., Knight, J., & Smith, B. (2011). *Technology, coaching, and community*. Eugene, OR: International Society for Technology in Education.

Borthwick, A., & Pierson, M. (Eds.). (2008). *Transforming classroom practice: Professional development strategies in educational technology*. Eugene, OR: International Society for Technology in Education.

Brookfield, S. (1995). *Adult learning: An overview*. Retrieved from http://www.fsu.edu/~elps/ae/download/ade5385/Brookfield.pdf

Burns, M. (2010). How to help teachers use technology in the classroom: The 5J approach. *eLearn Magazine.* Retrieved from http://elearnmag.acm.org/archive.cfm?aid=1865476

Corley, M. (2011). TEAL Center fact sheet no. 11: Adult learning theories (18-21). In Just Write! Guide (18-21). Washington, DC: The Teaching Excellence in Adult Literacy (TEAL) Center, U.S. Department of Education. Retrieved from https://teal.ed.gov/tealguide/adultlearning.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Los Angeles, CA: Sage Publications, Inc.

District X. (2012). *Education technology plan*. Copy in possession of author.

District X. (2013). *FLiP update report*. Copy in possession of author.

District X. (2014a). *2013-2014 Future Learner Project (FLiP) update and evaluation*. Copy in possession of author.

District X. (2014b). *Demographic profile*. Copy in possession of author.

District X. (2014c). 2013 5th grade survey analysis. Copy in possession of author.

District X. (2015). *District X FLiP professional development.* Copy in possession of author.

eSchool News. (2006). 1-to-1 computing on the rise in schools. *eSchool News: Daily Tech News & Innovation*. Retrieved from http://www.eschoolnews.com/2006/05/01/1-to-1-computing-on-the-rise-in-schools/

Fidishun, D. (n.d., circa 2005). *Andragogy and technology: Integrating adult learning theory as we teach with technology,* Malvern, PA: Penn State Great Valley School of Graduate Professional Studies.

Garry, A., & Graham, P. (2008). *Leadership and professional development in one-to-one computing*. Tech & Learning. Retrieved from http://www.techlearning.com/news/0002/leadership-and-professional-development-in-onetoone-computing/65594

Goodwin, B. (2011). One-to-one laptop programs are no silver bullet. *Educational Leadership, 68*(5), 78-79.

Greaves, T., Hayes, J., Wilson, L., Gielniak, M., & Peterson, E. (2010). *Project RED key findings* [ITSE PowerPoint presentation, June 28, 2010]. Shelton, CT: Market Data Retrieval. Retrieved from http://npsdigitalconversion.files.wordpress.com/2011/04/iste-2010-presentation-v2-1.pdf

Hanover Research. (2014). *Professional development for technology integration*. Retrieved from https://ts.madison.k12.wi.us/files/techsvc/Professional%20Development%20for%20Technology%20Integration.pdf

Hidden Curriculum (2014). *The glossary of education reform*. Retrieved from http://edglossary.org/21st-century-skills/

Huitt, W., & Hummel, J. (2003). Piaget's theory of cognitive development. In *Educational Psychology Interactive*. Valdosta, GA: Valdosta State University. Retrieved from http://www.edpsycinteractive.org/topics/cognition/piaget.html

International Society for Technology in Education. (2015). *Standards for students*. Retrieved from http://www.iste.org/standards/ISTE-standards/standards-for-students

Leong, D., & Bodrova, E. (1995). Vygotsky's zone of proximal development. *Of Primary Interest, 2*(4), 1-3.

Lunenburg, F. C., & Irby, B. J. (2008). *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences.* Thousand Oaks, CA: Corwin Press.

Lutz, S., & Huitt, W. (2004). Connecting cognitive development and constructivism: Implications from theory for instruction and assessment. *Constructivism in the Human Sciences, 9*(1), 67-90.

Merriam, S. B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult and Continuing Education, 89*, 3-13.

Mezirow, J. (2000). *Learning as transformation: Critical perspectives on a theory in progress*. San Francisco: Jossey-Bass Publishers.

Morehead, P., & LaBeau, B. (2005). *The continuing challenges of technology integration for teachers*. Retrieved from http://www.usca.edu/essays/vol152005/moreheadrev.pdf

Mozella, N. (2011). What are we learning about technology integration and professional development? *Educators Voice*, *4*(7), 42-49.

National Council of Teachers of English. (2013). *NCTE framework for 21st century curriculum and assessment.* Retrieved from www.ncte.org/positions/statements/21stcentframework

Nicholl, T. (1998). *Vygotsky*. The Virtual Faculty. Palmerston North, New Zealand: Massey University. Retrieved from http://www.massey.ac.nz/~alock/virtual/trishvyg.htm

Piper, W. (1978). *The little engine that could*. New York: Grosset & Dunlap.

Plair, S. (2008). Revamping professional development for technology integration and fluency. *Clearing House*, *82*(2), 70-74. Retrieved from http://search.ebscohost.com.eres.library.manoa.hawaii.edu

Rotherham, A., & Willingham, D. (2009). 21st century skills: The challenges ahead. *Teaching for the 21st Century*, *67*(1), 16-21.

Russell, M., Bebell, D., & Higgins, J. (2004). Laptop learning: A comparison of teaching and learning in upper elementary equipped with shared carts of laptops and permanent 1:1 laptops. *Journal of Educational Computing Research*, *30*(3), 313-330.

Russell, M., Bebell, D., O'Dwyer, L. M., & O'Connor, K. M. (2003). Examining teacher technology use: Implications for pre-service and in-service teacher preparation. *Journal of Teacher Education*, *54*(4), 297-310.

Sauers, N. J., & McLeod, S. (2012). *What does the research say about school one-to-one computing initiatives.* Lexington, KY: University of Kentucky Center for the Advanced Study of Technology Leadership in Education.

Sauro, J. (2015). *2 sample t-test calculator*. Retrieved from http://www.usablestats.com/calcs/2samplet&summary=1

Shapley, K., Sheehan, D., Sturges, K., Caranikas-Walker, F., Huntsberger, B., & Maloney, C. (2009). Evaluation of the Texas Technology immersion pilot: Final outcomes for a four-year study (2004-05 to 2007-08). Austin: Texas Center for Educational Research.

Silva, E. (2008). *Measuring skills for the 21st century*. Washington, DC: Education Sector Reports. Retrieved from www.educationsector.org/usr_doc/MeasuringSkills.pdf

Taylor, E. W. (1998). *The theory and practice of transformative learning: A critical review*. Columbus, OH: Center on Education and Training for Employment. Retrieved from http://eric.ed.gov/?id=ED423422

Trucano, Michael. (2005). *Knowledge maps: ICT in education*. Washington, DC: Information Development Program, World Bank. Retrieved from https://www.infodev.org/infodev-files/resource/InfodevDocuments_8.pdf

U.S. Department of Education. (2010). *Transforming American education: Learning powered by technology*. National Education Technology Plan 2010. Office of

Educational Technology. Retrieved from https://www.ed.gov/sites/default/files/netp2010.pdf

Vockley, M. (2007). Maximizing the impact: The pivotal role of technology in a 21st century education system. (ERIC Document Reproduction Service No. ED519463)

Walden University. (2010). *Education technology: Educators, technology and 21st century skills: Dispelling five myths*. Richard W. Riley College of Education and Leadership. Retrieved from http://www.waldenu.edu/~/media/Files/WAL/full-report-dispelling-fivemyths.

Wertsch, J., & Bivens, J. (1992). The social origins of individual mental functioning: Alternatives and perspectives. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition, 14*(2), 35-44.

Appendices

Appendix A: FLiP Professional Development and Training Survey

Reflecting on your participation in FLiP professional development and training, please rate how beneficial each of these components have been to you as you have implemented the one-to-one program into your classroom. After each component, please select the year(s) you participated in the professional development listed.

1. Optional and/or required summer professional development sessions

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely Beneficial	Not applicable
○	○	○	○	○

Select the year(s) you participated in optional and/or required summer professional development training sessions.

- ○ First year of fifth grade implementation (2013-2014)
- ○ Second year of fifth grade implementation (2014-2015)
- ○ Both years of fifth grade implementation (2013-2014 & 2014-2015)
- ○ Neither years of fifth grade implementation

2. Professional development training sessions throughout the school year

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely beneficial	Not applicable
○	○	○	○	○

Select the year(s) you participated in professional development training sessions throughout the school year.

- ○ First year of fifth grade implementation (2013-2014)
- ○ Second year of fifth grade implementation (2014-2015)
- ○ Both years of fifth grade implementation (2013-2014 & 2014-2015)
- ○ Neither years of fifth grade implementation

3. Classroom support from Instructional Technology Facilitators

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely beneficial	Not applicable
○	○	○	○	○

Select the year(s) you received classroom support from Instructional Technology Facilitators.

- ◯ First year of fifth grade implementation (2013-2014)
- ◯ Second year of fifth grade implementation (2014-2015)
- ◯ Both years of fifth grade implementation (2013-2014 & 2014-2015)
- ◯ Neither years of fifth grade implementation

4. Technology collaboration meetings with your grade level

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely beneficial	Not applicable
◯	◯	◯	◯	◯

Select the year(s) you participated in technology collaboration meetings with your grade level.

- ◯ First year of fifth grade implementation (2013-2014)
- ◯ Second year of fifth grade implementation (2014-2015)
- ◯ Both years of fifth grade implementation (2013-2014 & 2014-2015)
- ◯ Neither years of fifth grade implemenation

5. Teacher observations of other one-to-one classrooms

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely beneficial	Not applicable
◯	◯	◯	◯	◯

Select the year(s) you participated in observing other one-to-one classrooms.

- ◯ First year of fifth grade implementation (2013-2014)
- ◯ Second year of fifth grade implementation (2014-2015)
- ◯ Both years of fifth grade implementation (2013-2014 & 2014-2015)
- ◯ Neither years of fifth grade implementation

6. Rate how beneficial the overall FLiP professional development and training has been for you as you have implemented the one-to-one program into your classroom.

Not at all beneficial	Somewhat beneficial	Beneficial	Extremely beneficial	Not applicable
◯	◯	◯	◯	◯

7. In what ways do you use the one-to-one technology in your classroom? Please check all that apply.

- [ ] Assessments
- [ ] Reading Instruction
- [ ] Projects
- [ ] Writing Instruction
- [ ] Videos
- [ ] Math Instruction
- [ ] Student Collaboration
- [ ] Science Instruction
- [ ] Student Communication
- [ ] Social Studies Instruction
- [ ] Other

8. What percent of the day do you use one-to-one technology in your classroom?

0%	25%	50%	75%	100%
○	○	○	○	○

Appendix B: 2012-2013 5th Grade 21st Century Learning Survey

2012-2013 5th Grade 21st Century Learning Survey

Critical Thinking

1. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
My teacher expects me to solve a variety of problems.	○	○	○	○	○
I can solve difficult problems.	○	○	○	○	○
My teacher expects me to memorize a lot of facts.	○	○	○	○	○
I know how to find an answer to a problem, even when my teacher does not tell me.	○	○	○	○	○

Communication

2. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I communicate regularly with my classmates about what I'm learning.	○	○	○	○	○
I communicate regularly with my teacher about what I'm learning.	○	○	○	○	○
I share my ideas during class.	○	○	○	○	○

Collaboration

3. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I work with others to solve problems in class.	○	○	○	○	○
I learn more when I work with other students.	○	○	○	○	○
Most of the time, I work on class projects by myself.	○	○	○	○	○

Creativity

2012-2013 5th Grade 21st Century Learning Survey

4. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
My teacher allows me to show my creativity.	○	○	○	○	○
I get to show what I have learned in a variety of ways.	○	○	○	○	○

2012-2013 5th Grade 21st Century Learning Survey

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree

Needs

5. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
My school is meeting my needs as a student.	○	○	○	○	○
I am learning a lot in school this year.	○	○	○	○	○

Relevancy

6. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
If I do well in school, it will help me when I grow up.	○	○	○	○	○
Teachers connect what students are learning with the real world.	○	○	○	○	○
I am often bored in class.	○	○	○	○	○

Engagement

7. Please rate your level of agreement with the following statements.

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
My teachers make learning interesting.	○	○	○	○	○
Time goes quickly when I work on assignments for school.	○	○	○	○	○
When something doesn't work the first time, I try again.	○	○	○	○	○
I am excited about what I am learning this year in school.	○	○	○	○	○

School Information

Appendix C: Baker University IRB Approval to Conduct Research

BAKER UNIVERSITY
Own Confidence

Baker University Institutional Review Board

July 21, 2015

Dear Vanessa Zamzow and Dr. King,

The Baker University IRB has reviewed your research project application and approved this project under Expedited Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.

Please inform this Committee or myself when this project is terminated or completed. As noted above, you must also provide IRB with an annual status report and receive approval for maintaining your status. If you have any questions, please contact me at CTodden@BakerU.edu or 785.594.8440.

Sincerely,

Chris Todden EdD
Chair, Baker University IRB

Baker University IRB Committee
Verneda Edwards EdD
Sara Crump PhD
Erin Morris PhD
Scott Crenshaw

Appendix D: District X Approval to Conduct Research

August, 2015

Dear Ms. Zamzow:

Per District Board Policy, external agencies or individuals desiring to conduct research studies involving either students or staff members during the school day must submit a written prospectus to the Superintendent, or designee, for approval prior to initiation of the study. To be approved, all such research proposals must demonstrate that the projected findings will have value to either the District as a whole or to a unit within the District, and not be unduly disruptive or time consuming to the normal educational process.

The District recognizes the importance of research as a means of improving the instructional program for the District's students and also recognizes the need to monitor and control the amount of time and energy expended by both staff and students on research projects.

I have had the opportunity to review the prospectus for the research project entitled *Teacher Perception of One-to-One Technology Professional Development and Its Impact on One-to-One Implementation and 21st Century Skill Development in Fifth Grade Classrooms* as well as speak to the principal at the school regarding the project. It is my pleasure to approve the project *Teacher Perception of One-to-One Technology Professional Development and Its Impact on One-to-One Implementation and 21st Century Skill Development in Fifth Grade Classrooms* and the use of relevant School District data, classrooms and students within the project. I find the project to have value to the district, support the goals of the district, and not be unduly disruptive or time consuming to the educational process.

Please contact me if you have any questions.

Cordially,

Mike Kimbrel, Ph.D.
Director of Research, Evaluation, & Assessment
l District