A study of first-grade teachers using instructional technology for literacy instruction: the contributing factors

Teresa C. Schneider

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ABSTRACT

A STUDY OF FIRST-GRADE TEACHERS USING INSTRUCTIONAL TECHNOLOGY FOR LITERACY INSTRUCTION: THE CONTRIBUTING FACTORS

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Department of Curriculum and Instruction
Northern Illinois University, 2017
Laurie Elish-Piper, Director

This qualitative study examined the perspectives of first-grade teachers on implementing instructional technology during literacy instruction. Four first-grade teachers were observed using instructional technology during their 90-minute reading block. Follow-up interviews revealed the teachers’ perspectives of the contributing factors that influenced the teachers’ decisions to implement instructional technology for literacy instruction. In this study, teachers identified barriers that played in their decisions as lack of technology support and training on technology tools and programs, limited collaboration with peers, and an absence of a technology curriculum or expectation guidelines. In addition, this study also revealed traditional literacy instruction was enhanced by teachers’ use of instructional technology; teachers perceived high student engagement and motivation when using technology tools and programs; and teachers reported that familiar technology tools and programs provided instructional convenience. The findings support the literature regarding influences and barriers that contribute to teachers’ decisions when implementing technology for literacy instruction.
NORTHERN ILLINOIS UNIVERSITY
DEKALB, ILLINOIS

MAY 2017

A STUDY OF FIRST-GRADE TEACHERS USING INSTRUCTIONAL TECHNOLOGY FOR LITERACY INSTRUCTION: THE CONTRIBUTING FACTORS

BY

TERESA C. SCHNEIDER
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A DISSERTATION SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE DOCTOR OF EDUCATION

DEPARTMENT OF CURRICULUM AND INSTRUCTION

Doctoral Director:
Laurie Elish-Piper
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DEDICATION

To teachers everywhere who change their instruction to meet the needs of their students
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CHAPTER 1

INTRODUCTION TO THE STUDY

Technology in the classroom has provided new and exciting pathways for teaching, learning, and communication. By integrating instructional technology into the curriculum, students have an opportunity to use a variety of modalities (auditory, visual, and kinesthetic) for learning new concepts and skills (Reiser & Dempsey, 2012). Instructional technology (IT) advocates the “ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources” (Resier & Dempsey, 2012, p. 4). Instructional technology has been described as the technology tools and software programs used for instructional/educational purposes to support the teachers’ instruction and students’ learning (Lockee & Reiser, 2006). More states are moving toward instructional technology-based learning with the adoption of the Common Core State Standards (CCSS) (ISBE, 2014). The CCSS have specific standards that address the use of technology in the English Language Arts. For example, the CCSS for first grade, W.1.6. states, “With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers” (ISBE, 2014). In fourth grade, CCSS W.4.6. states, “With some guidance and support from adults, use technology including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skill to type a minimum of one page in a single setting”
(ISBE, 2014). With the CCSS, the demands for more proficiency with technology increase through the grade levels.

Students attending school for the first time most likely have had some introduction to current technology tools. A study conducted by Carrington (2005) documented that the majority of kindergarten students beginning school have had many experiences with technology found in their homes or in familiar environments. Examples include children who have played with Smart phones, tablets, and iPads or have used hand-held video controllers for playing games. SMARTboards, iPads, notebooks, laptops, desktop computers, tablets, and accompanying software programs are examples of IT found in many classrooms today. Carrington (2005) and other researchers (Rasinski & Padak, 2011; Reiser & Dempsey, 2012) have established that students in the classroom displayed high engagement when they interacted with the technology. The students also appeared to find the technology activities meaningful and enjoyable. Researchers have found that the use of instructional technology in the classroom has the potential for improving students’ cognitive abilities, especially critical thinking and analytical skills (Schmid, Miodrag, & Di Francesco, 2008).

By including instructional technology in the classroom, traditional forms of instruction have shifted to more technology-based instruction (Lockee & Reiser, 2006). Teachers have embraced the multimodalities of technology and the benefits it provides as a teaching and learning resource (Cummins, 2013). Multimodalities can be defined as various modes of media, such as audio, film, and electronic books that can be used to enhance meaning from written text for instructional purposes (McLaughlin, 2013). Teachers have incorporated multimodal images and digital text into their reading instruction with the use of
iPads, laptops, SMARTboards, and desktop computers (Bromley, 2010). Digital text or e-text is usually defined as an electronic version of written text (Hertzog & Klein, 2005; Walsh, 2010). Research has also shown digital text is used more often than any other form of communication, except speech, and “like it or not, digital text has invaded our world and found a solid place in our future” (Bromley 2010, p. 99). The shift to using digital text and other forms of multimodalities for instructional purposes is important, as computer literacy has become necessary for 21st-century learners (Hutchison & Reinking, 2011).

Not surprisingly, instructional technology tools can facilitate basic literacy skills and reading development in previously unimaginable ways (Levy, 2009; Macaruso & Rodman, 2011, Tracy & Young, 2007). Starfall (www.Starfall.com), a program service of Starfall Education Foundation, for example, is a children’s website designed to teach basic English reading and writing skills to primary students. The multimodal web-based software reading program allows students to practice their basic literacy skills such as reading left to right and from top to bottom by using games and phonics. Starfall also allows the readers to learn that print contains the message, letter and sound recognition, and other foundational reading skills through a choice of three reading activities: Learn to Read, It’s Fun to Read, and I’m Reading. Students listen to the story and use the computer mouse to interact with the text, responding to comprehension and prediction questions. In the Learn to Read program students are prompted by an animated character to add first-letter sounds to a word family to match the picture (e.g., add “c” to “an” to make “can”). Other examples of instructional technology tools used to facilitate basic literacy skills include electronic (digital) picture books or eBooks. These
eBooks can be used in the classroom to support vocabulary, comprehension, and fluency (McLaughlin, 2013).

Some teachers, however, are hesitant to use instructional technology in their classrooms for a variety of reasons. For example, a national survey was conducted with 1,441 literacy teachers in the United States on the importance of implementing instructional technology into literacy instruction and the obstacles encountered by doing so (Hutchison & Reinking, 2011).

The results show a discrepancy in the participants’ perception of the importance of implementing instructional technology into literacy instruction and its actual reported use. The teachers saw the integration of IT for literacy instruction as “enhancing conventional instructional goals or using technology for its own sake as opposed to adopting new instructional goals involving new activities” (Hutchison & Reinking, 2011, p. 323). A high percentage of the teachers in this study reported using instructional technology for more perfunctory activities such as supplementing instruction, word processing, and/or as a presentation tool. Even though the teachers acknowledged the importance of the IT strategies, skills, and dispositions associated with literacy in the 21st century, according to that study they were unable to demonstrate actual implementation of the integration of instructional technology into literacy instruction.

A similar study completed by Vannatta and Fordham (2004) in six Ohio schools measured teacher dispositions as a predictor of instructional technology use in the classroom. Teachers completed a survey with a combination of factors that could affect a teacher’s decision regarding instructional technology implementation, e.g., professional development, the importance of implementing technology, teacher self-efficacy, and the amount of
technology training. The results of the survey showed overall low use of technology in general for instructional use, with teachers using technology in the classroom as more of a classroom organizational tool than for student use or instruction.

To summarize, research has shown that using instructional technology tools and programs is engaging and benefits students’ basic learning (Goetze & Walker, 2004; Jeffs, Evmenova, Warren, & Rider, 2006; Mills, 2006; Stetter & Hughes, 2010; Voogt & McKenney, 2007). Research has also shown that although teachers feel implementing technology for instruction is important, the actual process of including instructional technology into their teaching is not always evident (Hutchison & Reinking, 2011; Lovell & Phillips, 2009; Macaruso & Rodman, 2011; Park & Ertmer, 2007; Vannatta & Fordham, 2004).

Purpose Statement

When teachers use instructional technology and software programs for literacy instruction, they are providing unprecedented levels of personal learning for students (Biancarosa & Griffiths, 2012). This allows students to become active participants in their own discovery of the literacy world and prepares them for using technology for writing, research, collaboration, problem solving, and communication purposes, vital skills needed for the 21st century society.

While many teachers agree with the student learning benefits of implementing instructional technology in their classroom for literacy instruction, research has found a discrepancy in that implementation, as previously stated (Hutchison & Reinking, 2011; Lovell & Phillips, 2009; Macaruso & Rodman, 2011). This lack of implementation triggers several important questions. What factors contribute to the decision making of a teacher to implement or not implement
technology for literacy instruction? Does collaboration with others contribute to increased use of instructional technology? If teachers are implementing instructional technology into their literacy instruction, how much does the implementation affect their practice? What aspects of instructional technology do teachers find most and least successful during and for their literacy instruction? Therefore, the purpose of this study was to focus on four first-grade teachers and their teaching decisions when implementing technology for literacy instruction. This qualitative study was designed to gain a deeper understanding of what affected the four first-grade teachers’ decisions to implement or not to implement instructional technology for literacy instruction.

Research Questions

In this study, the following research questions were addressed:

1. According to the first-grade teachers, what factors contribute to their practice and decision making about implementing technology into literacy instruction?
   a. What role does collaboration play in their decision making about implementing instructional technology into their literacy instruction?

2. How do first-grade teachers who implement instructional technology into their literacy instruction describe the development of their knowledge and how is it applied into their practice?

3. When integrating instructional technology into literacy instruction, what aspects of technology do first-grade teachers perceive as most and least successful? Why?
Methodology

This qualitative research study took place in the natural setting of an elementary school. The study was focused on the first-grade team of teachers and their use of instructional technology for literacy instruction in one elementary school in northern Illinois. In-depth data collection was conducted with the four first-grade teachers, and the data was analyzed to reveal what factors influenced the first-grade teachers’ decisions to implement instructional technology for literacy instruction. Data was collected through reviews of individual teacher lesson plans, transcripts of individual interviews, and field notes from classroom observations of the classrooms’ 90-minute literacy instruction block. The collected data was analyzed through the use of Strauss and Corbin's (1998) three-step coding process (open coding, axial coding, and selective coding) to categorize the findings into themes to answer the research questions. The themes were further analyzed for emergent patterns not noted in the first analysis. Detailed explanation of the methodology for this study is found in Chapter 3.

Theoretical Framework

The theoretical framework for this study is comprised of two components: the technology acceptance model and social constructivism. A brief discussion of the theoretical framework is provided below; a more detailed discussion is offered in Chapter 2.

The technology acceptance model is a theoretical model that explains how a user comes to accept and use technology (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). The model suggests that perceived usefulness and the perceived ease of use of the technology tool influences the users’ intention to use technology. The theory also suggests that the users’
attitude toward technology is positively affected by the perceived usefulness and ease of use of the technology tool which increases behavioral intention to use. The technology acceptance model can be used to predict individual and group technology use and can also be applied to an educational setting, as teachers have “distinguishable differences in their views of technology and computers” in the classroom (Holden & Rada, 2011, p. 360).

Social constructivism recognizes that knowledge is constructed through social interaction and is a shared rather than an individual experience (Vygotsky, 1978). Social constructivists believe “individuals seek understanding of the world in which they live and work” (Creswell, 2009, p. 8). The first-grade teachers in this qualitative study have developed varied and multiple views from their own experiences and their views are often formed and or changed due to collaborative interactions with others (Creswell, 2009).

Significance of the Study

The results of this study contribute to the professional literature on the factors that may influence first-grade teachers’ decision to use instructional technology for literacy instruction. The findings reflect the first-grade teachers’ perceptions and choices and are significant, in part, because the researcher elicited information directly from the teachers and can be used to focus on specific areas of concerns identified in the study. This study brought attention to the focus of the teachers’ knowledge of instructional technology and the decisions teachers made when implementing instructional technology for literacy instruction. The study also revealed the challenges and the successes the first-grade teachers faced when attempting to integrate more technology into their literacy block.
Organization of the Study

This study includes five chapters. Chapter 1 presents the introduction and rationale for the study. It also includes the statement of the problem, research questions, and the study's significance. Chapter 2 provides a review of the literature that is related to instructional technology for literacy instruction in primary-level classrooms and factors teachers face when implementing IT. Chapter 3 focuses on the data collection and analysis methods used for this research study. Chapter 4 presents the findings of the research. Chapter 5 includes a discussion, conclusions, implications for practice, and ideas for future research.
CHAPTER 2
LITERATURE REVIEW

"If we teach today as we taught yesterday,
then we rob our children of tomorrow."

John Dewey

This study focused on the factors that contribute to the decisions a team of four first-grade teachers made in using instructional technology for literacy instruction. This chapter begins with the theoretical framework that surrounds this study: the teacher acceptance model and social constructivist learning theory. A review of the literature follows that focuses on studies that examine literacy outcomes for students who were instructed using instructional technology. This chapter also focuses on studies that review the decisions teachers face when implementing instructional technology for instruction.

Theoretical Framework
Technology Acceptance Model

The decision to use or not to use technology has been an area of study for the last two decades. Researchers have looked into understanding the determinants of using technology to minimize user resistance. The technology acceptance model (TAM) suggests that the user’s decision to use technology can be explained by two determinants—perceived usefulness and perceived ease of use of the technology tool—which directly impact the user’s intention to use the technology (Davis, 1989; Davis et al., 1989). Perceived usefulness can be defined as the user’s belief that by using this technology tool, his or her job performance will increase, while
perceived ease of use is defined as the user’s perception of the technology tool as requiring no physical or mental effort to use (Davis, 1989; Davis et al., 1989). The TAM theory can be applied to education and can help explain in part the teachers’ decision of how and when to use instructional technology in the classroom (Chuttur, 2009).

The technology acceptance model has been used in educational research to explore teachers’ acceptance of new and currently used technologies. Adiguzel, Capraro, and Willson (2011) explored the acceptance of using new handheld computers with 45 special education teachers. The researchers identified five determinants for using technology in this study: perceived ease of use, perceived usefulness, subjective norms (how people view their behavior), dependability, and intention to use. The study revealed perceived usefulness and perceived ease of use were the two determinants that directly affected the teachers’ intention to use the handheld computers in their classroom. The special education teachers perceived that the handheld computers improved “their instructional performance, productivity, and effectiveness” (p. 21).

Holden and Rada (2011) evaluated teachers’ acceptance of technology by focusing on the technology teachers were already using in their classrooms. The focus of the study was on the teachers’ usage behavior with technology and not on the intention to use technology behavior, as the teachers were already using the technology in their classroom. Holden and Rada (2011) also focused on the relationship of self-efficacy and the technology acceptance use. The main purpose of their study was to “evaluate the main effects of users’ perceived usability and technology self-efficacy” on the teachers’ technology acceptance (p. 350). The teachers in the study were provided with a survey containing questions pertaining to the technology used
daily with their students. The questions pertained to the perceived usefulness, perceived ease of use, attitudes toward using the technology, and teacher self-efficacy with technology. Ninety-nine teachers, from kindergarten through twelfth grade, responded to the survey. The survey revealed that the teachers’ attitudes toward technology directly correlated to the perceived usefulness of the technology. The study also revealed that teachers’ self-efficacy with technology directly influenced the teachers’ perceptions of ease of use and usability. These findings add to other research that reveal teachers’ positive attitude and perceptions as well as technology self-efficacy correlate with the usage of technology in the classroom (Brinkerhoff, 2006; Ertmer & Ottenbreit-Leftwich, 2010; Ertmer, Ottenbreit-Leftwich, & York, 2007; Holden & Rada, 2011; Hutchison & Reinking, 2011; Loreman, Sharma, & Forlin, 2013; Macaruso & Rodman, 2011; Pan & Franklin, 2011; Teo, 2002; Vannatta & Fordham, 2004).

**Social Constructivist Learning Theory**

The formalization of the constructivism theory is generally attributed to Piaget (Phillips, 1975). The constructivist theory emphasized that people learn by constructing their own knowledge. Piaget argued that to construct new knowledge, individuals must either assimilate or accommodate new knowledge into their existing knowledge. Further, to assimilate new knowledge, the individual must use their cognitive structures to interpret and incorporate new experiences into the old experiences, developing new outlooks, and modifying their current perceptions in their new environment. Piaget’s theory focused on learning as an ongoing process, “involving continual interactions between the mind and the environment, an interaction which is never completed” (Schcolnik, Kol, & Abarbanel, 2016, p. 12).
The social constructivist learning theory built on Piaget’s theory and stressed the importance of the social and interpersonal interactions with others in the construction of new knowledge (Vygotsky, 1978). With emphasis on collaborative learning, the social constructivist theory emphasizes that individuals learn through the active process of involvement and interactions with others. The collaborative group or leaning community can provide opportunity to construct new knowledge from other individuals and create a shared meaning (Vygotsky, 1978). These learning communities engage individuals in social learning activities and can be supported by knowledgeable others. In a constructivist setting individual learners learn best when they are actively involved with the content, ask questions, problem solve, and collaborate (Liu & Chen, 2010). Most grade-level meetings create learning communities where teachers provide resources, ideas, and support for each other with curriculum issues. In this study, the researcher hoped to gain valuable data about the teachers’ decision to implement instructional technology for literacy instruction from the social interactions occurring between the first-grade teachers during the weekly grade-level meetings.

Collaboration can play a role in the teachers’ decision to increase the use of instructional technology for literacy instruction in the classroom (Greenhow, Dexter & Hughes, 2008; Stevenson, 2004). A study by Stevenson (2004) explored the impact of teachers’ collaborations on the increased use of instructional technology for teaching and learning. The study revealed that the teachers felt the most effective method to receive assistance regarding technology use in their classrooms was from their peers or teaching partners and not from professional development trainers. Peers and teaching partners were cited as providing consistent emotional support along with the opportunity to share new ideas during frequent
informal contacts. These informal contacts and collaborations seemed to be useful for addressing needs, such as specific problems or projects and for gathering and creating new ideas.

In the current study, the researcher attempted to use the technology acceptance model and social constructivist theory to better understand how teachers, when interacting formally and informally with their colleagues, made decisions about using instructional technology in their literacy instruction.

Review of Research

Teaching reading from printed text as the only resource reflects an era of the past as classrooms are becoming more and more technologically based (Carrington, 2005). Primary students today live in a world where personal computers are the norm. Prensky (2009) labeled these students as “digital natives” (p. 5). Prensky (2009) also labeled those who did not grow up with an abundance of technology “digital immigrants” (p. 5). Bromley’s (2010) article “Picture a World without Pens, Pencils, and Paper: The Unanticipated Future of Reading and Writing” predicted the world would become almost paperless. Bromley (2010) stated that almost everything will be downloaded using technology, including items such as magazines and transaction receipts. Bromley also discussed that in the near future, most students in grades K-16 will have wireless devices for the purpose of reading and writing. Bromley (2010) called this era “Generation Text” (p. 99).

With the use of new technologies such as iPads, desktop computers, tablets, and SMARTboards, Bromley's (2010) predictions have become reality in today’s classrooms. No longer are students confined to just printed text on a page for literacy instruction. Instructional
technology implementation allows the students to use multimodalities when reading text (Couse & Chen, 2010; Hassett & Curwood, 2009; Jewitt, 2005; Jewitt & Kress, 2008). Literacy instruction with instructional technology is allowing students the ability to interact and manipulate text for their own meaning and communication purposes (Rose & Dalton, 2009; Macaruso & Rodman, 2011).

**Multimodalities**

Research has shown the integration of instructional technology using multimodalities enhances literacy instruction with the combination of the elements of digital text, visual images, audio, design, and graphics (Biancarosa & Griffiths, 2012; Cahill, McGill-Franzen, & Peterson, 2012; Ciampa, 2012a; Couse & Chen, 2010; Jewitt, 2005, 2008; Jewitt & Kress, 2008). Many teachers are adapting lesson designs to reflect the 21st-century definition of literacy, which includes the expansion of reading and writing with the use of instructional technology tools and programs (Ciampa, 2012a, 2012b). These teachers provide new instructional technology experiences for students with the use of multimodal text and technological literacy in their classroom instruction. The students develop meaning through the combination and assistance of some or all of the modes of print, visual images, audio, design, gestures, and graphics that accompany digital text and screen-based technology (Hassett & Curwood, 2009; Jewitt, 2008; Kress, 2003). Using multimodalities can assist students in making meaning when reading, viewing, understanding, and responding to digital text and multimedia (Walsh, 2010).

Instructional technology tools and programs can also encourage student thinking, language skills, and problem solving (Couse & Chen, 2010). For example, digital picture
books in the classroom positively influenced students’ language skills, as the books used paired text narration and animation (Cahill et al., 2012). It was also revealed that the digital picture books facilitated the students’ comprehension and that the comprehension skills and strategies learned from the digital text transferred to reading comprehension with printed text.

Benefits from Integrating IT Using Multimodalities for Literacy Instruction

Researchers have also found that integrating instructional technology and using multimodalities for young readers has been beneficial for students who are emerging and challenged in their reading development (Levy, 2009; Macaruso & Rodman, 2011; Mioduser, Tur-Kaspa, & Leitner, 2000; Tracy & Young, 2007). The following section will discuss the benefits of integrating instructional technology using multimodalities for literacy instruction in early childhood and primary classrooms.

Children as young as three years old are benefitting from integrating instructional technology using multimodal exposure (Levy, 2009). Levy (2009) examined how young children’s perceptions of printed literacy were impacted by the use of multimodal text on the computer screen. The young students in the study were able to explain how to interact with the multimodal text and images through demonstration. They were encouraged to look at books on the computer screen in any way they chose. This activity gave the researcher an opportunity to see the strategies the students used to make sense of the text. Levy concluded the results from the study demonstrated that young students “were using a whole variety of multimodal cues including pictures, symbols, sounds, color, and print in order to access and use computer text” (p. 85). Students understood the meaning of the symbols on the computer screen and could identify each symbol representation. Most of the students in the study were
able to acquire meaning from using print within the context of the multimodal text. For example, the students were asked to create a nursery rhyme type story using the selection of visual and auditory items available on the screen. They were also provided with a digital game where they had to navigate through the game using symbols, print, auditory cues, and moving images. The data from this study showed students reading a variety of multidimensional text in different settings and in different contexts. It also revealed that students were able to use a variety of multimodal cues to create meaning.

Macaruso and Rodman (2011) found positive results integrating instructional technology using a multimodal software program with preschoolers. The students in that study benefited from a multimodal computer program titled Early Reading that targets emergent literacy skills. The Early Reading program focused on phonological awareness and letter sound mapping. Students in that study manipulated letters, responded to sounds, used visual graphics, and matched tasks using auditory and visual stimuli. The Early Reading program gave immediate feedback, which appeared to keep the students motivated. The treatment group showed a significant gain in their emerging literacy skills of letter mapping and phonological awareness, whereas the control group showed no gain.

The Waterford Early Reading Program (WERP), a computer-assisted instruction (CAI) program, was used in a study conducted by Tracy and Young (2007) with kindergarteners who were identified as at risk for reading difficulties. Those students had been identified with potential future problems learning to read and not fulfilling their academic learning potential (Allington & Cunningham, 1996). WERP was used as a supplemental software program that was interactive and was designed to help the students
develop their early literacy skills, including automatic letter recognition, phonemic awareness, vocabulary, and comprehension skills. The software program used multimodalities such as sounds, pairing games, fill-in-the-blank activities, and songs with accompanying tasks. By integrating the software program, Tracy and Young (2007) showed strong, positive, statistically significant results of increased early literacy skills targeted in the program. The students in the study improved their emerging literacy skills of letter recognition, phonemic abilities, vocabulary knowledge, and the ability to construct meaning with text.

Mioduser et al. (2000) found similar results when they completed a study with 46 students, ages 5-6, who were identified as high risk for learning disabilities and reading difficulties. The study examined the pairing of multimodal computer-based instruction using the software program I Have a Secret—I Can Read with textbooks and teacher instruction to enhance the students’ emerging reading strategies, phonological awareness, word recognition, and letter naming. Students in that study used the instructional technology program that included digitized speech, touch screens, drill generation, and adaptation algorithms to support automation of skills and individualization of instructional sequence. The results showed significant improvement in the students’ phonological awareness, word recognition, and letter identification. The researchers stated that by integrating the multimodal computer program, student successes were observed in their multi-sensory, input-output, and text-to-speech capabilities.

Another study focused on upper elementary school students with minimal learning disabilities who were deficient in early literacy skills such as decoding, vowel sounds, two-syllable words, and suffixes (Regan, Berkley, Hughes, & Kirby, 2014). The study focused
on differentiating the instruction for four students in grades four through six. Lexia Learning Systems developed three reading software programs (Lexia SOS) designed to target each individual student’s literacy skills deficit. After working with the software programs for a maximum of 54 sessions for 10 minutes each, the results showed evidence of mastery of basic literacy skills needed for reading text successfully in upper elementary school. The findings also indicated that along with the Lexia SOS software programs, differentiated direct instruction benefited the students.

Using instructional technology in the classroom for literacy instruction can have other benefits as well. More recent research has shown that online reading may be more supportive for the challenging text presented by the Common Core standards. Leu, Forzani, Timbrell, and Maykel (2015) found several multimedia elements in online text that make reading and learning easier, such as graphics, animations, audio clips, and videos. McDermott and Gormley (2016) looked at how technology was actually changing reading instruction and if there were benefits from the change. Their findings showed that elementary teachers were using multimedia displays with their SMARTboards for literacy skills, lesson content, and choral readings. They were also using desktop and laptop computers for reading at center time. McDermott and Gormley (2016) found when elementary teachers used instructional technology for literacy instruction, the added benefits were physically engaging students in the learning activities and the increase of the students’ attention on the lesson.

Other researchers have found that student engagement and motivation in the task increased when using instructional technology. Research has shown the integration of instructional technology using multimodalities enhances literacy instruction with the
combination of the elements of digital text, visual images, audio, design, and graphics (Biancarosa & Griffiths, 2012; Cahill et al., 2012; Ciampa, 2012a, 2012b; Couse & Chen, 2010; Jewitt, 2005; Jewitt & Kress, 2008; Min & Siegel, 2011). Min and Siegel (2011) found that student engagement increased when adding the SMARTboard to students’ math and science lessons over a one-week period. The students in the study were observed for engagement purposes for one week without the use of the SMARTboard and one week using the SMARTboard. When the SMARTboards were used for instructional purposes, during math and science lessons, student engagement increased by at least 20%.

Using technology such as a tablet or a laptop when listening to a previously recorded story also had an impact on student engagement. A recent study focused on six first-grade readers’ engagement with electronic reading (e-books) using the ICANREAD materials over a three-month period (Ciampa, 2012a). Students in the study read two e-books per session once a week. By the end of the three months, the students in the study preferred the electronic reading material over printed text and were motivated by the opportunity to self-select their book choice from a wide variety of e-texts.

Factors Influencing Teachers’ Decisions to Implement Instructional Technology for Literacy Instruction

Although research shows the benefits of implementing instructional technology tools and programs for literacy instruction, many contributing factors influence the decisions classroom teachers make when implementing technology for daily instruction. The factors discussed in this review are barriers, teacher self-efficacy, and technology self-efficacy.
Barriers with Instructional Technology

Barriers teachers face when implementing IT for literacy instruction vary. Barriers with instructional technology are defined as any preventing factor or restriction that keeps the teacher from successfully integrating technology in the classroom (Brinkerhoff, 2006). External and internal are two types of technology barriers that researchers have identified (Ertmer, 1999). External barriers such as lack of equipment availability, lack of access, or lack of training with computers, programs, or time to plan in a supportive environment, can impede implementation of instructional technology. For example, a study concluded by Carver (2016) found the teachers’ decision to use instructional technology in their classroom was solely determined by its availability or lack of availability and the location of the technology tools. Other external barriers brought forth in this study were the amount of student instructional time with technology and the availability of technology support to problem-solve technological issues (Carver, 2016). Internal barriers such as individual teachers’ perceptions of limited benefits for instructional purposes, comfort level with using instructional technology tools and programs, and overall technology experiences and acceptance can also hamper the degree to which teachers have students interact with instructional technology for learning purposes (Davis, 1989; Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2011; Ihmeideh, 2010; Moore- Hayes, 2011).

Another study revealed that teachers feel “intrinsic [internal] factors to be significantly more influential than extrinsic [external] factors in their ability to become successful technology- using teachers” (Ertmer, Ottenbreit-Leftwich, & York, 2007, p. 57). The teachers in this study revealed that they were committed to implementing technology into their
instruction because “they believed that it increased their ability to enhance student learning” (Ertmer et al., 2007, p. 57).

Teachers’ beliefs, attitudes, and knowledge play important roles in the integrations of instructional technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2011; Ihmeideh, 2010). In a recent study by Hutchison and Reinking (2011), a survey focused on teachers’ perceptions of computer-based instruction for literacy. The survey revealed that teachers “understand and accept that literacy instruction needs to address digital forms of reading and writing, and they acknowledge the importance of doing so, although their perception of frequency of use does not typically coincide with the level of importance they assign to various applications and activities” (p. 46).

A similar study was completed by Ihmeideh (2010), which investigated preschool teachers’ beliefs and practices on the integration of instructional technology for reading and writing in their early childhood classrooms. The results from the questionnaires showed that many early literacy instructional practices were delivered to the students without the use of instructional technology activities. Overall, the results revealed that the preschool teachers did not have strong beliefs about allowing children to engage with instructional technology for literacy purposes. The data showed teachers were resistant to giving students access to the computer for multimodal reading and writing activities on a weekly basis. The preschool teachers did not feel their students would develop social, emotional, or physical skills by using computers. The most highly active use of instructional technology in the preschool classrooms, according to that study, was exposing students to language games using a desktop computer.
Teacher Self-Efficacy

According to Bandura (1997), self-efficacy is defined as people’s belief in their ability to be successful in particular situations. The beliefs are determinants of how people think, feel, and behave. These beliefs are developed through prior experiences of performing a task successfully, identifying with another’s success, social persuasion to do one’s best, and one’s responses and emotional reactions to particular situations.

Teachers’ self-efficacy beliefs can be powerful influences on their motivation to attempt a task, their persistence to stay with the task, and the amount of effort they put into the task (Bandura, 1997). Research has shown that teachers with high self-efficacy have encouraging characteristics that could positively affect student achievement (Corkett, Hatt, & Benevides, 2011; Swackhamer, Koellner, Basile, & Kimbrough, 2009; Teo, 2002). The encouraging characteristics are related to work ethic and pedagogical practice. Teachers with high self-efficacy are normally characterized as having high expectations, work longer, feel responsible for outcomes, have strategies for achieving objectives, have positive attitudes, and perceive themselves as effective (Corkett et al., 2011). Teachers with high self-efficacy tend to be highly motivated to use teaching methods such as inquiry and technology-based instruction as well as student-centered approaches (Teo, 2002).

Two recent studies have looked into developing self-efficacies in pre-service teachers already enrolled in their teacher preparation programs (Loreman et al., 2013; Swackhamer et al., 2009). Both studies used surveys to discover differences in pre-service teachers’ levels of self-efficacy. Not surprisingly, the two studies showed similarities in their findings. The pre-service teachers with the highest self-efficacy had more content-specific knowledge,
revealing that teaching self-efficacy is a context-specific construct. Therefore, the preservice teachers’ perceptions about their positive performance in a given context affected their self-efficacy. The outcomes of the studies also indicated that to raise the self-efficacy of pre-service teachers the teacher preparation programs must provide more training in content-specific areas along with opportunities for collaboration with colleagues in those same content-specific subjects (Loreman et al., 2013; Swackhamer et al., 2009).

Practicing teachers’ self-efficacy with technology has also been addressed in recent studies, as practicing teachers have a wide range of skill and confident levels in regard to instructional technology (Brinkerhoff, 2006; Ertmer, 1999; Ertmer & Ottenbriet-Leftwich, 2010; Greenhow et al., 2008; Holden & Rada, 2011; Moore-Hayes, 2011; Vannatta & Fordmam, 2004). Moore-Hayes (2011) conducted a study focusing on pre-service and practicing teachers’ self-efficacy beliefs related to integrating technology into their lessons. The study’s results showed both pre-service and practicing teachers felt they were not prepared to effectively integrate technology into their teaching. Both groups stated that more professional development, whether online or ongoing workshop sessions, observations of other teachers proficient in technology, and mentoring by an experienced teacher, would help increase the levels of technology integration in their classrooms. These findings agree with prior research that has shown teachers need access to ongoing relevant training of technology tools and programs as well as daily collaborative technology support to improve self-efficacy with technology (Brinkerhoff, 2006; Moore-Hayes, 2011). Professional development, delivered over a length of time, improves teachers’ self-efficacy toward technology, as teachers
have time to experiment with new technology and are supported during the length of the training (Brinkerhoff, 2006).

**Technology Self-Efficacy**

Teachers bring to their classroom their beliefs about teaching and learning. If teachers believe their technology competencies are poor or that students learn more by teacher-directed instruction, the teacher will generally provide limited time for students to use instructional technology for learning purposes (Teo, 2002). Teachers’ perceptions about learning and instruction are fairly consistent with how they implement technology into their lessons (Kurz-McDowell & Hannafin, 2004). Teachers who genuinely lean toward teacher-directed instruction tend to use technology for skills and practice rather than enriching student learning. Teachers who teach with more student-centered activities tend to use technology for more student-centered environments. For example, ten elementary teachers who were identified as successful in integrating technology in the classroom overcame barriers such as attitudes and beliefs, technology issues, and lack of teacher technical skills and know-how (Walker & Shepard, 2011). These teachers embraced new learning experiences, had strong technological support available, and were self-motivated and self-submerged in technology.

A study by Teo (2002) revealed that student teachers’ “perceptions [self-efficacy] of their basic technology skills and ability to use technology for pedagogy were significant predictors of their intention to use in either a traditional (i.e., drill and practice) or constructivist (i.e., student-centered) way” (p. 13). Therefore, teachers’ beliefs about using technology for instructional purposes are shaped by their self-efficacy (Pan & Franklin, 2011; Teo, 2002).
Technology self-efficacy is defined as a judgment of one's capability to successfully use technology (Teo, 2002). Research has found that teachers with high self-efficacy toward technology have positive attitudes toward instructional technology tools and programs, and display a direct correlation with the amount of screen time their students engage in on a daily basis (Brinkerhoff, 2006; Pan & Franklin, 2011; Teo, 2002; Topkaya, 2010). Teachers with low self-efficacy toward technology are not as eager to employ instructional technology tools and programs—therefore, limiting the time their students are engaged with technology (Brinkerhoff, 2006; Pan & Franklin, 2011; Teo, 2002; Topkaya, 2010).

A teacher’s technology self-efficacy can increase with professional development. Brinkerhoff (2006) evaluated the effectiveness of a long-term professional development academy designed to increase teachers’ technology self-efficacy by reducing the technology barriers to increase the use of instructional technology in the classroom. Over two school years, the participants met for 30 days in the summer and ten institute days over the two-year span while school was in session. The results of the academy revealed the teachers were less fearful and more confident with technology, felt that professional development had altered their teaching, and perceived an increase in their technology skills.

A similar study by Vannatta and Fordham (2004) revealed that “higher levels of classroom technology use were best predicted not only by the amount of technology training a teacher received, but by the amount of time a teacher spends outside of class preparing for instruction and by a teacher’s openness to change regardless of teaching philosophy or belief’s about one’s teaching ability” (p. 261). Those studies suggest professional development can improve a teacher’s self-efficacy with technology as well as
increase the implementation of instructional technology in the classroom (Brinkerhoff, 2006; King, 2002; Vannatta & Fordham, 2004). Hew and Brush (2007) found that effective professional development to increase teacher self-efficacy in using technology in the classroom needs to include how teachers can use the technology tools in specific ways to support student learning, how students learn using technology, and be content-specific so it can be directly applied to their classroom.

Synthesis of the Research

Instructional technology has provided teachers with new ways to deliver literacy instruction to their students. Instructional technology allows students to use multimodal text to interact with the text and create meaning using a variety of modalities. Researchers have found benefits when integrating instructional technology for literacy instruction such as high student engagement and motivation, gains in emerging literacy skills, and students’ ability to use multimodal cues to create meaning. Though teachers see benefits in using instructional technology in their classroom for literacy instruction, there are many factors that contribute to their decisions to actually implement technology in their lessons. The factors include barriers with instructional technology, teacher self-efficacy, and technology self-efficacy.

The focus of this qualitative study was to gain a better understanding of what factors influenced four first-grade teachers’ decisions to use the available instructional technology tools and programs for and during literacy instruction. The study’s findings contribute to the ongoing research on teachers’ use of technology for literacy instruction in the classroom.
Conclusion

There is a general belief in our society that using technology as an instructional tool in the classroom can enhance instruction. This literature review provided an overview of the positive impact of using technology in the classroom for literacy instructional purposes and reviewed some of the factors that may influence teachers’ decisions to implement instructional technology tools and programs. Further research on this topic could help identify successful and highly engaging instructional technology programs teachers are implementing for literacy instruction in their classrooms and how teachers have overcome some of the barriers of using instructional technology as a learning tool.
CHAPTER 3

METHODOLOGY

The purpose of this study was to examine teachers’ perceptions of factors that contribute to their decision making when using instructional technology for literacy instruction. The study explored a team of four first-grade teachers’ perceptions of the factors that contribute to their decisions and challenges faced when implementing technology during literacy instruction. Understanding the contributing factors and perceptions of first-grade teachers regarding use of instructional technology for literacy instruction may lead to deeper understanding that can contribute to pedagogical practices. The study was guided by the following research questions:

1. According to first grade teachers, what factors contribute to their practice and decision making about implementing technology into literacy instruction?
   a. What role does collaboration play in their decision making about implementing instructional technology into their literacy instruction?

2. How do first-grade teachers who implement instructional technology into their literacy instruction describe the development of their knowledge and how is it applied into their practice?
3. When integrating instructional technology into literacy instruction, what aspects of technology do first-grade teachers perceive as most and least successful? Why?

This chapter focuses on the methodology used for this qualitative study. Included in this chapter are the research design, data collection, data analysis, delimitations, and summary.

Research Design

A qualitative research design was used for this study. The term *qualitative research* describes “any type of research that produces findings not arrived at by statistical procedures or another means of quantification” (Strauss & Corbin, 1998, p. 10). Mertens (2010) identified the qualitative researcher as “the instrument that collects data by observing, interviewing, examining records, documents, and other artifacts in the research setting” (p. 366). A qualitative study thoroughly examines the phenomenon under study by using multiple data sources to provide a rich description of the phenomenon from the perspectives of the participants (Mertens, 2010). The multiple data sources used for this study were review of teacher-generated documents, observations, and interviews. The researcher chose this design as it emphasized collecting descriptive data in a natural setting to understand the experiences, behaviors, and organizational functioning of the participants (Strauss & Corbin, 1998). This qualitative study focused on the first-grade team and their use of instructional technology during and for literacy instruction in their classrooms.
District and Building Context

The district chosen for the study was in an urban city with a population of approximately 250,000 residents. The elementary building where the study took place was Stone Elementary (a pseudonym used for the purpose of this study), located in the southwestern quadrant of the city. Permission was granted to conduct the research in the elementary building by the researcher’s supervisor and Northern Illinois University’s Institutional Review Board (See Appendix A). The school was surrounded by a variety of businesses and industries, including a small airport. The majority of students utilize the school’s transportation services to travel to and from school. The elementary schools in this district were zoned, resulting in a student’s address determining what school he/she will attend. Stone Elementary contains Kindergarten through fifth grade, with a total of 528 students enrolled for the 2015-2016 school year when the study was conducted. According to the 2014-2015 Illinois School Report Card, the student population of the school was 18.2% White, 17.0% African American, 54.7% Hispanic, 5.5% Asian, 0.2% Pacific Islander, and 4.4% two or more races. The percentage of students coming from homes where the income makes them eligible for free and reduced lunch program was 95%, and 0.3% were considered homeless. A total of 10% of students were identified as having a learning disability, and 54% of the students have Spanish as their first language. These students were considered English language learners (ELLs). The student mobility rate was 17%, and the average class size was 24 students.

The researcher obtained additional Stone Elementary information through the assistance of the school office personnel. Stone Elementary had 34 certified teachers: 27
females and 7 males. White and Hispanic were the only teachers’ races identified at Stone Elementary, with 79% of the teachers classified as White and 21% Hispanic. Sixty-four percent of the teachers at Stone Elementary had a master's degree and 36% had a bachelor's degree. The average length of teaching experience at Stone Elementary was 8.96 years.

Stone Elementary follows the district Balanced Literacy reading curriculum using guided reading for core instruction and the Pearson Basal Reading series, *Reading Street*, for supplemental instruction. The district had been using the Balanced Literacy approach, which includes reading and writing, for nine years. Teachers were initially provided with professional development on how to successfully implement Balanced Literacy when it was first adopted by the district. Ongoing professional development was available for refreshers of the curriculum and for teachers new to the district.

Guided reading lessons were provided during a 90-minute reading block each day in small groups determined by reading skill ability. The reading groups were no larger than five to six children, and depending on the number of students in the classroom, there were between four to six reading groups for each classroom. At the time of the study, the district did not require teachers to have a technology component embedded in the primary curriculum even though all classrooms were equipped with SMARTboard technology, a shared set of 30 iPads, and two to five student desktop computers in each classroom. Teachers still had the option of completing district benchmark testing using paper and pencil even though the technology was available. The amount of technology use in the classroom was solely up to the teachers’ discretion.
Professional development with technology was offered through the district Instructional Technology (IT) department for specific purposes and was not ongoing. Teachers new to the district attended a professional development technology workshop on using the online grading system on how to enter their assessment scores for data analysis purposes. Additional professional development on the use of the available technology in the building was only granted through the building administrators’ requests to the IT department. During the study the district housed 12 technology technicians who were responsible for the technology in 35 elementary schools, 6 middle schools, and 6 high schools. The 12 IT technicians responded to technology issues on a first come, first serve basis, with response time taking as long as ten working days. There were no building-level IT technicians who were available to assist with technology issues in the classrooms on a daily basis.

**Participants**

The participating teachers in this study were chosen via convenience sampling, as “they were readily available” and convenient for the researcher (Mertens, 2010, p. 325). The participants in this study were four first-grade teachers. I chose to study the first-grade teachers’ implementation of instructional technology during reading instruction for a variety of reasons. One reason for choosing the first-grade teachers was they all reported using technology during their 90-minute daily reading block. The first-grade teachers’ classrooms were equipped with SMARTboards, a small number of students’ computers, and a shared cart of iPads. The teachers also had common planning time each day and had the opportunity to plan together as suggested by their administrator.
Another reason for choosing first-grade teachers for this study was that in this school district, formal reading instruction began in first grade. First-grade students were to master seven to ten reading benchmark skill levels in order to be considered at the second-grade reading level by the end of first grade. First-grade students are generally five or six years old when they enter first grade and have spent one year being exposed to the five areas of reading instruction in their kindergarten classrooms (Carnine, Silbert, Kame'enui, Traver, & Jungjohann, 2006). The five areas identified by the National Reading Panel are phonemic awareness, phonics, fluency, comprehension, and vocabulary. The first-grade teachers build on the students’ knowledge of these five areas of reading skills when introducing formal reading instruction (Rasinski & Padak, 2011). The researcher also considered the Common Core State Standards for primary grades that require the integration of technology for reading and writing instruction in daily lessons to prepare students for 21st-century literacy demands (Hutchison & Reinking, 2011; ISBE, 2014).

After introducing the study to the first-grade team, a consent form was given to all teachers to sign (See Appendix B). All of the teachers were Caucasian. There were three female teachers: Ms. Adams, Ms. Silver, and Ms. Kasey. The fourth teacher was male, Mr. Brown. Their names have been changed to ensure confidentiality. During the initial interview, the researcher was an active listener and spent as much time as needed in order for the teachers to feel comfortable telling their stories with technology. The researcher in turn shared her own limited experiences with technology with the goal of building trust between the participants and the researcher.
Ms. Adams was in her mid-fifties and had been teaching in an English-speaking classroom for 11 years; six of those years were in first grade. Her classroom shared a wall with another first-grade teacher’s (Ms. Silver) classroom, and they regularly corresponded about issues related to the curriculum. Ms. Adams’s classroom was located on the first floor in a pod-style layout. She had a bachelor's degree in Elementary Education and a master’s in Reading. Ms. Adams had 26 students in her classroom and arranged her student desks in groups of four. Bookshelves covered one entire wall which provided a large variety of picture books for students to choose from. The books were tubs labeled by themes and there was an area for students to read on a rug close by. Though Ms. Adams stated she had discipline problems with some students in her classroom, none were noted during the observations. At the time of the study, Ms. Adams explained she had five reading groups, with only one reading group reading above grade level. This was a challenge to her as she felt there was not enough time in the school day to meet her student’s needs. Ms. Adams participated on her building’s Activities Committee and the Parents as Partners planning group. She enjoyed putting her plans into action with the freedom of choosing technology to help enhance her lessons, especially science and social studies.

Ms. Silver was in her early fifties and had been teaching in an English-speaking classroom for 27 years. She had been teaching first grade for eight years. Ms. Silver’s classroom was located in the first-floor pod near Ms. Adams’s. She also had 26 students and arranged her student desk in clusters of two. Ms. Silver had a variety of bookshelves on the perimeter of classroom that were in labeled tubs by themes. She explained that overall the student behavior in her classroom was appropriate. At the time of the study, she had a
classroom aide that was assigned to an autistic student in her room, but also assisted other
students was well. Ms. Silver stated that she had more students reading on grade level this
year and felt the aide had been very helpful in assisting her in accomplishing that task. Ms.
Silver had a bachelor’s degree in Early Childhood Education and a master’s degree in Reading.
She was currently certified as a Reading Specialist. Ms. Silver was very active in her building
with professional responsibilities. She participated on the Leadership Committee, the Social
Committee, and the Building Committee. Ms. Silver stated her favorite part of her school day
was when she reads aloud to her students, whether it was fiction or nonfiction books. She
stated that read alouds, reading orally to students, allowed her students to engage in “high
level thinking about so many topics.”

Ms. Kasey was in her mid-twenties and had been teaching for 3 years. Ms. Kasey
had a bachelor’s degree in Child Development and spent her practicum in a child development
lab. She was hired at Stone Elementary on a provisional bilingual teaching certificate and had
fulfilled the requirement of being fluent in reading and writing in both English and Spanish.
The provisional teaching certificate helped alleviate the shortage of highly qualified bilingual
teachers in the area. Ms. Kasey had spent two years teaching in Madrid, Spain and was
currently teaching a bilingual first-grade classroom. Ms. Kasey’s first-grade classroom was on
the second floor next to the second-grade classrooms, separated from the other three first-grade
classrooms on the first floor. Her students sat at tables in groups of four as there were no desks
available when she was hired for the first-grade position two days before the school year
started. Ms. Kasey’s had only 18 students in her classroom and they were “good kids”
according to Ms. Kasey and there were no discipline problems. She shared she had only a few
students reading at grade level. Ms. Kasey said she had limited resources available to her which posed as a challenge. She had a small classroom library clustered on one bookshelf, no student desks, and only 2 desktop computers for student use. She met often with Mr. Brown to share information regarding their bilingual curriculum, as it differs somewhat from the monolingual curriculum, especially in teaching reading due to the letter sounds. Ms. Kasey’s favorite part of her day was her language arts block.

Mr. Brown was in his mid-fifties and had a bachelor’s degree in History and a master’s degree in International Policy Studies. He was a relatively new teacher with two years of experience, and he was assigned to a first-grade bilingual class. Mr. Brown was also working on a provisional bilingual teaching certificate. His classroom at Stone Elementary was on the first floor across the hall from Ms. Adams’s and Ms. Silver’s classrooms. This was Mr. Brown’s second career, as he was previously involved in insurance and international education administration at the tertiary level. He had only 17 students in his classroom and was unable to tell me more about their skill level at the time of the initial interview. The student desks in his classroom were clustered in groups of four. Mr. Brown also had two large tables in the back of his classroom which appeared to be used for group writing work as there were a variety of writing material and paper in the middle of the table for student use. There was a small bookshelf in one corner with books in crates that were not labeled. During the observations, Mr. Brown’s classroom was very active as students were not giving full attention to any task he presented. He stated this was a problem he was working on with positive reinforcement techniques. Mr. Brown was a mentor for Ms. Kasey, a new teacher in his school building that year. He participated in the Activities and Parents as Partner Committees. Mr. Brown and Ms.
Kasey met often to support each other with the bilingual curriculum materials. His favorite part of the school day was reading aloud to his students and working with small groups during guided reading.

Data Collection

The data collected for this qualitative study came from various sources, including transcripts from interviews, field notes from observations of reading lessons, and document reviews of the first-grade teachers’ lesson plans.

Interviews

Interviews are purposeful conversations, normally involving two people, where one person is looking for information from the other (Bogdan & Biklen, 2007). The researcher used interviews as one of the data collection approaches for this qualitative study. Interview protocols were used to ensure validity of the researcher’s questions and prompts so as to not lead the participants’ thought processes during questioning. Before the initial interview, the researcher reviewed the consent forms with the teachers and identified the participants’ rights. Interviews were audio recorded with each participant’s permission. The initial interview was semi-structured and focused questions on the participants’ background, comfort level with technology, and use of technology for instruction in the classroom (see Appendix C). The initial interviews were held after school in each teacher’s classroom and lasted no longer than 30 minutes. The interview protocol kept the questioning consistent for each participant concerning their technology use in their classroom. The researcher conducted the interviews
for this qualitative study using a semi-structured format, allowing the teacher to shape the
content of the interview (Bogdan & Biklen, 2007; Mertens, 2010).

Three more interviews were conducted individually with each teacher after each
classroom observation. The most recent observations were discussed, allowing the researcher
to gain more insight about the teacher’s perspectives and pedagogy (Calderhead, 1981;
Mertens, 2010). The semi-structured interviews were no longer than 30 minutes in duration
and focused on events recorded by the researcher during the most recent observation. The
participants’ reflections produced insightful data for examining how they experienced an
instructional event in their classroom and gave credence to their decision-making processes
(Calderhead, 1981; Mertens, 2010). In order to understand the teachers’ processes and keep
the participants focused on the issue, the researcher asked probing and clarification questions
(See Appendix D) during the interview such as, “What were your thoughts when doing this
activity? What do you mean? Would you explain that? What were you thinking then? How
important was it to use technology for this lesson? and Tell me more about that decision”
(Bogdan & Biklen, 2007).

**Observations**

Observations are an active, evolving process that help the researcher understand the
occurring phenomenon (Shank, 2002). The researcher observed the phenomenon—the
reading lesson—as it occurred in a “natural setting,” the classroom, and did not become an
active participant in the activities (Mertens, 2010, p. 225). The first-grade teachers were
observed during their classroom literacy instruction block. For the observations, the researcher
took on the complete observer role. Although the students were present in the classroom
during the observations of the literacy instruction, this particular study focused on the teachers’ perceptions and decision-making processes and not on the first-grade students. Therefore, any data involving students was only referred to as a piece of the teachers’ decision-making process as it related to this study.

The observations took place during the entire 90-minute literacy block in the classrooms, as all activities related to literacy instruction. The first classroom observations took place after the initial teacher interview. The next observation took place in the following month. Observations and interviews continued in this pattern monthly until saturation occurred. The researcher started the observations by scribing field notes, recording the daily events of the classroom, and using a Classroom Observation Protocol for congruence of data collection during the lessons (See Appendix E). The researcher focused the field notes on the implementation of literacy instruction using instructional technology in relation to the research questions (Shank, 2002). The researcher succeeded in complete saturation of the data, where data collected revealed patterns that started repeating themselves within the findings and microanalysis could begin (Shank, 2002). The descriptive field notes recorded the beginning and ending time of each observation (Mertens, 2010). The researcher recorded two types of information. The first type of information recorded was the physical setting, what technology tools were being used, and for what purpose (Creswell, 2009). The second type of data recorded was the specific information about when and how technology was being used for reading instruction in the first-grade classrooms.

To counter any practical inadequacies, the researcher conducted a “practice run” before any formal data collection of classroom observations (Calderhead, 1981). The researcher
observed two 90-minute literacy blocks in a first-grade classroom in her own building, recording field notes during the literacy instruction. An initial interview was not completed, as the researcher was very familiar with the teacher and her background. Follow-up interviews were conducted that assisted the researcher in narrowing her interview questions to stay focused on the teacher’s decision-making process in regard to implementing technology. The researcher’s goal through the observation and interview process was to be able to understand the factors that contribute to the teachers’ use of technology and the decision-making process when implementing technology during literacy instruction.

**Document Review**

Documents provide rich data the researcher can use to “examine patterns and inconsistencies in the evidence” (Mertens, 2010, p. 374). Documents can be used as supplemental information wherein the main data sources come from observations and interviews (Bogdan & Biklen, 2007). The document review gave “the researcher access to information that would otherwise be unavailable” (Mertens, 2010, p. 373). The documents reviewed by the researcher were each teacher’s weekly literacy lesson plans that coincided with the week of the observation. Each of the teacher’s lesson plans were collected when available. The researcher was able to collect all three of Ms. Kasey’s and Mr. Brown’s lesson plans for the three observations and two of Ms. Silver’s and Ms. Adam’s lesson plans. Gentle reminders to the teachers to produce the plans were unsuccessful. The available lesson plans were copied, and reviewed by the researcher on the corresponding week of the observations. By reviewing weekly lesson plans, the researcher gained insight into the teachers’ planning
and instructional decision making by recording patterns and comparing them with previously collected data. Table 1 provides a timeline for the data collection.

Table 1
Timeline for Data Collection for Each Participating Teacher

<table>
<thead>
<tr>
<th>Data Collection Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>December and January</td>
</tr>
<tr>
<td>Initial interview #1</td>
</tr>
<tr>
<td>January and February</td>
</tr>
<tr>
<td>Document Review</td>
</tr>
<tr>
<td>Classroom observation #1</td>
</tr>
<tr>
<td>Interview #2</td>
</tr>
<tr>
<td>February and March</td>
</tr>
<tr>
<td>Document Review</td>
</tr>
<tr>
<td>Classroom observation #2</td>
</tr>
<tr>
<td>Interview #3</td>
</tr>
<tr>
<td>March and April</td>
</tr>
<tr>
<td>Document Review</td>
</tr>
<tr>
<td>Observation #3</td>
</tr>
<tr>
<td>Interview #4</td>
</tr>
<tr>
<td>Saturation occurred during interview number 4 with all participants</td>
</tr>
</tbody>
</table>

Data Analysis

The purpose of the data analysis for this study was to look for themes directly related to answering the research questions (Creswell, 2009). The techniques for analyzing the data collected were the same for each of the three sources: teacher-generated documents, field notes from observations, and transcripts from interviews. The researcher followed the Strauss and Corbin (1998) three-step coding process to identify and categorize the findings. Open coding was used to define and develop categories across the data collected in the interviews, observations, and documents. All categories were color-coded based on the similar concepts. Axial coding followed as subcategories were formed to explain and describe the categories. Finally, selective coding was used to determine a common theme for all data.
collected. Titles were given to each theme. Their relationships to the research questions were reviewed and analyzed.

**Open Coding**

Open coding gives the researcher an opportunity to organize information like a puzzle. The researcher broke down the data “into discrete parts, closely examined, and compared for similarities and differences” (Strauss & Corbin, 1998, p. 102). All written information (data) gained from transcribing the interviews and field notes were carefully read to establish understanding of the teachers’ experiences. Each piece of data was reviewed three times before establishing patterns or themes used to gain a general sense of the overall meaning of the information (Creswell, 2009). Generated thoughts about the data were recorded in the margins in an abbreviated form, noting specific areas of focus. A line-by-line analysis of the data was completed to generate initial categories. The line-by-line analysis was done by hand and was color-coded to represent patterns that answered each research question. During subsequent readings, initial categories were broken down into discrete parts, finding similarities and differences in the teachers’ responses and their perceptions of observed activities. The similarities and differences allowed for discrimination and differentiation among categories and allowed the researcher to create subcategories of information related to the research questions (Strauss & Corbin, 1998).

**Axial Coding**

Axial coding is defined as “the act of relating subcategories along the lines of their properties and dimensions” (Strauss & Corbin, 1998, p. 124). The collected data for the study was divided into subcategories that created answers to “when, where, who, how, and with what
consequences, thus giving the concept greater explanatory power" (Strauss & Corbin, 1998, p. 125). This data was again color-coded to be available for final analysis. These subcategories revealed information of how the categories were linked and connected. By completing the axial coding, overall concepts that were impacting the first-grade teachers were revealed that were not recognized individually.

**Selective Coding**

Lastly, the researcher integrated and refined the categories of data through the selective coding process (Strauss & Corbin, 1998). Through the constant comparing of data, the researcher believed there was no new data to be found through further sampling and reached theoretical saturation (Strauss & Corbin, 1998). Through immersion in the categories and subcategories the researcher found two central categories that integrated all the data used to explain the relationship between the first-grade teachers’ decisions and the implementation of technology for literacy instruction.

**Validation Checks**

The validation checks for this study included member checking, peer debriefing, and triangulation. Member checks are an "interactive process between the researcher and the researched, and the collected data that is aimed at achieving a relatively higher level of accuracy and consensus" (Mertens, 2010, p. 257). After the interviews and observations were completed and transcribed in a Word document, the researcher provided each teacher with a copy of his or her own transcripts of classroom observation notes and interviews for review. After review of the transcripts, when all teachers agreed with the collected data, the data was used for analysis in the study. No additional additions or changes were necessary.
Peer debriefing requires a knowledgeable peer in the field of study who is willing to review and ask questions about the data, findings, and research. This allows for a different interpretation of the study other than that of the researcher (Creswell, 2009). This process adds validity to the account. The researcher enlisted a colleague who was a doctoral candidate whose research was also in technology and literacy. The colleague’s research study was also a qualitative study, therefore ensuring that the peer debriefer had extensive experience in the qualitative research approach used in this study. The researcher had the peer debriefer review at least 20% of the collected data to offer feedback and input about the findings. The data reviewed was randomly selected and electronically sent to the peer debriefer. The peer debriefer was provided with portions of the transcribed field notes, interviews, and lesson plans as well as a draft of the researcher’s findings. The peer debriefer assisted in reviewing the themes and categories that emerged within the study to validate the researcher’s findings. The peer debriefer responded with, “I think your research supports current findings on technology in the classroom. I think your use of quotes and examples were good to support your findings” (peer debriefer).

**Triangulation of Data**

Triangulation of the data collection process was used for this study and was comprised of transcripts of teacher interviews, field notes from classroom observations, and teacher-generated documents in the form of lesson plans. Triangulation of the collected data allowed the researcher to compare multiple data sources to lead to fully understanding the phenomenon being studied (Bogdan & Biklen, 2007). For example, the teachers’ actual use of instructional technology in their reading lessons was not always reflected correctly in their weekly lesson
plans. Triangulation of data from document reviews, observations, and interviews was therefore used, as multiple forms of data provided a stronger argument for the findings. By comparing and converging the data, contributing factors emerged of what influenced first-grade teachers’ decisions to implement technology for literacy instruction (Shank, 2002). Interviews were transcribed and reviewed for general patterns and concerns. They were then compared to the field notes and the lesson plans reviewed to reveal multiple realities and recurring phenomena. Table 2 highlights the alignment of the research questions to the data collection strategies.

Table 2
Alignment of Research Questions with Data Collection Strategies

<table>
<thead>
<tr>
<th>Research Question #1: According to first grade teachers, what factors contribute to their practice and decision making about implementing technology into literacy instruction?</th>
<th>Interview Transcripts</th>
<th>Classroom Observations</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. What role does collaboration play in their decision making about implementing instructional technology into their literacy instruction?</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

| Research Question #2: How do first-grade teachers who implement instructional technology into their literacy instruction describe the development of their knowledge and how is it applied into their practice? | X | X | X |

| Research Question #3: When integrating instructional technology into literacy instruction, what aspects of technology do first-grade teachers perceive as most and least successful? Why? | X | X | |
**Researcher’s Role**

The instructional technology available to classroom teachers today was not available 20 years prior when the researcher was a classroom teacher. As more and more instructional technology was being placed in the classroom in the district in the study, the researcher’s goal was to study the teachers’ decisions on implementing instructional technology for and during reading instruction and what influenced that decision. The researcher sought to seek full understanding of the value of using instructional technology for reading instruction in the first-grade curriculum. The researcher was a principal in the district but not the administrator at the elementary school where the study took place. Therefore, the researcher did not have any supervisory responsibilities or evaluation duties for the teachers in the study and attempted to control any bias by informing the participants that their job performance was not being evaluated. The researcher had no relationship with the first-grade teachers prior to the start of the study. With a master's degree in reading and certification as a Reading Recovery teacher, the researcher had extensive experience in teaching reading. The researcher's knowledge of teaching reading was bracketed to study the phenomenon of what was occurring during the lessons focusing solely on how technology was being used for and during the reading lesson (Fischer, 2009). The researcher focused mainly on how the first-grade teachers used instructional technology tools and programs to deliver literacy instruction and not the quality or quantity of the literacy instruction itself. This was accomplished by the researcher’s attempt to view the implementation of instructional technology for literacy instruction through the eyes of an observer and not a reading teacher (Bogdan & Biklen, 2007).
Delimitations

The qualitative study took place in one elementary school in a large urban district. It focused on a team of four first-grade teachers who were a convenient sample and were easy to access by the researcher due to their location. The study only focused on instructional technology use during the 90-minute literacy block time implemented by the classroom teacher. The results in this study do not necessarily generalize to other first-grade teams in elementary schools in or out of the district. In light of these delimitations, the study focused on the first-grade team decisions and their teaching practice when using instructional technology for literacy instruction.

Summary

Chapter 3 focused on the methods used for this qualitative research study. Information was provided about the research design, data collection, data analysis, and delimitations. Chapter 4 will present the findings of the study.
CHAPTER 4

FINDINGS

Chapter 4 presents the findings of this study. The purpose of this qualitative study was to examine the factors that influenced the first-grade teachers’ decisions when implementing technology into their practice for literacy instruction. Through a qualitative study design, the researcher was able to identify recurring themes and categories that shaped the first-grade teachers’ decision making related to implementing instructional technology for and during literacy instruction.

The observations, interviews, and documents reviewed for this study provided information to help answer each research question. Three research questions were used to address the purpose of the study:

1. According to first-grade teachers, what factors contribute to first-grade teachers’ practice and decision making about implementing technology into literacy instruction?
   a. What role does collaboration play in their decision making about implementing instructional technology into their literacy instruction?

2. How do first-grade teachers who implement instructional technology into their literacy instruction describe the development of the knowledge and how is it applied into their practice?

3. When integrating instructional technology into literacy instruction, what aspects
of technology do first-grade teachers perceive as most and least successful? Why?
The researcher sought to understand what factors influenced the four first-grade teachers’
decisions in implementing instructional technology for and during literacy instruction in
the classroom. The findings are presented as the data related to different categories.

Teachers’ Decision Making About Implementing Technology
into Literacy Instruction

The data collected in this study revealed contributing factors in the teachers’ decisions
about implementing instructional technology for literacy instruction under two categories:
knowledge and acceptance of and access to technology tools, programs, and resources. Under
these two categories, three subcategories emerged: delivery of instruction, obtainable
technology tools, and benefits in student learning.

Current research reveals that a teacher’s knowledge of instructional technology tools and
programs has a direct impact on how much technology is used in the classroom (Hutchison &
Reinking, 2011). Throughout the study, it became clear that teachers’ knowledge and
acceptance of technology and access to the instructional technology tools and programs
available at Stone Elementary played a large part in their decisions to implement the technology
for literacy instruction.

Additionally, resources were defined as instructional technology tools and programs
and technological support for those resources in this study. Resources have been identified as
a leading cause for teachers not to implement technology in their classroom (Carver, 2016;
Shamburg, 2004). Throughout this qualitative study, teachers discussed issues with resources
available to them, including the lack of access to certain technology tools as well as problems with the technology provided.

**Delivery of Instruction**

The teachers’ decisions to use instructional technology allowed for options in the delivery system of their daily reading instruction. The delivery system was defined as how information was presented to the students. The choice of the delivery system was based on the teachers’ knowledge and acceptance of the instructional technology available and its use (e.g., the SMARTboards, individual student computers, and iPads), their comfort level with the technology tools and programs including websites and applications, and their knowledge of what information needed to be presented during the reading lessons. Greenhow et al. (2008) noted that teachers’ knowledge of technology and its use correlates to the integration of instructional technology in the classroom. That was evident as the participating teachers in this qualitative study chose to add instructional technology as one piece of their delivery system during their literacy block. The technology they used provided the teachers with choices of using traditional methods such as chart paper or the chalk board or interacting with the SMARTboards during reading lessons. Teachers made choices of delivery when instructing their students in interacting with text, shared reading, listening to reading, whole group instruction, small group instruction, and individual instruction. These choices were recorded in the teachers’ lesson plans. All four teachers chose to use a variety of multimodalities when using technology to enhance the delivery of their reading instruction, whether it was a video clip, text read to the students, sounds to correlate with correct answers,
music, or video clips. The teachers’ choice to use technology or not to use technology varied for each teacher and is discussed later in the chapter.

**Delivery of Instruction: SMARTboards**

During observations, the researcher found the instructional technology tool used most often by the first-grade teachers to deliver reading instruction during their literacy block was the SMARTboard. SMARTboards, or interactive whiteboards, are a technology tool connected to a computer in the classroom. A projector projects the images, video, and audio from the classroom computer screen to the large SMARTboard screen hung on the wall in the front of the classroom. Teachers and students interacted and manipulated the text and images on the screen with the SMARTboard pens or their fingers. Lesson plans collected from all four first-grade teachers reflected the use of the SMARTboard for literacy activities including identifying high frequency words, oral language development, Scholastic News videos, and word work.

The SMARTboards were used by teachers and students in every lesson observed, but they were used for many different purposes. Ms. Silver stated, “I use the SMARTboard a lot. Anymore it is used more as a whiteboard/chalkboard.” During whole group instruction, for example, Ms. Silver used the SMARTboard to transform instructional practice from the teacher or student writing on whiteboards to interactive writing on the SMARTboards. Interactive writing occurs when the students are participating with the teacher in the act of writing. When asked by the researcher how Ms. Silver combines reading instruction and technology, she responded:

> On the SMARTboard for group instruction-types of things, there’s a phonics game that we play; it’s a word-building game. Basically, I took it out of the manual and put it on the board so it was interactive, so they do a word-building activity on the SMARTboard.
Mr. Brown, on the other hand, had students use the SMARTboard for vocabulary building during whole group instruction. Students located and circled words or word parts using the SMARTboard colored pens. Ms. Kasey used the SMARTboard for similar activities. She stated:

It’s nice they can visually circle; you know, we use the red to circle all the cognates, something like that and we can circle it and have it there. Rather than if it is in this little book in front of you, then you can’t circle it, you can’t color on it.

Ms. Kasey was referring to locating words in Spanish that have the same meaning in English and were visually similar. Her explanation of the activities illustrates her belief that the use of the SMARTboard gives greater opportunity for students’ participation and engagement.

Ms. Adams used the SMARTboard to display a Venn Diagram, comparing two versions of *Cinderella* during her whole group lesson:

We do interactive things [on the SMARTboard]. The last time we did a Venn Diagram they really struggled with it. They wanted to keep going from what they remember. I spent a little longer with it because I felt they were sticking with me so I am going to take advantage of that.

The SMARTboard was also used by the first-grade teachers for shared whole group reading activities. Ms. Adams and Ms. Silver both used the SMARTboard for interaction and engagement with Scholastic New Magazine (SNM), a web-based magazine that helps build reading skills with online resources, videos, and text-to-speech audio. Ms. Adams’s students were reading and interacting with the text projected on the SMARTboard when they were reading about koala bears. She explained:

As far as reading goes, though, mostly right now that is limited to Scholastic News and that’s a real interactive thing. It reads it aloud for you or you can read along with it. If they can see me working up here and reading and touching it and they can get up
here and touch … it’s a lot more engaging than sitting there with a magazine in front of you.

Ms. Adams talked highly of Scholastic News Magazine (SNM) and why she decided to include it in her whole groups’ reading lessons. She said:

I subscribed to it [online] before I came here years ago and we used it for a couple of years over there and over the last couple of years they offered it for the classrooms; with what they are doing with technology, the quality has really improved. Whenever I get a new one, it tickles me pink, because it provides options for you [to choose from on the website] that are dead-on for the skills we are covering in that particular magazine for the week. The topics that Scholastic chooses are almost all the time really good for the first-graders, to get them engaged. It provides a nice rounded experience for them.

Ms. Silver used SNM in her reading lessons for shared reading and literacy skill delivery on the SMARTboard with her students. She explained her decision to include SMN in her reading lessons, too:

The SNM, we re-read that every week. The first day we read it, we read it, at this point, we read it echo reading using the hard copy. The second day we listen to it read to us and we follow along on the SMARTboard and then usually there is video that accompanies it, usually one skill game that goes with it as well. The interactive games that we do for Scholastic News (on the SMARTboard) are very engaging to them. They get much more out of that than, I swear, the reading. I’m glad I use Scholastic. I think it is a big success.

The researcher observed Mr. Brown and Ms. Kasey using the SMARTboard for shared reading using the district basal series, Pearson, with their students. The district basal series provides an online component that can assist with activities for reading instruction. Mr. Brown stated the reason why he incorporated the online reading component in his reading lessons:

Often I’ll do stories that are on Reading Street and put them on the SMARTboard and read them with the students so we are reading off the SMARTboard as well as reading out of the books. I think it is different reading from print than it is reading on a computer and I think it is good to hear the story—for example, to have the author read the story.
So it’s one thing for them to hear my voice drone on with the story….I’ll read the story once and then I’ll … find the video and have the author read the story to them. It just seems to increase the authenticity for the students.

Ms. Kasey shared the reason she decided to use the SMARTboard for shared reading:

I like using the Pearson little books; you know that they have all those things online now. Then the kids get to participate and underline things. This way they start noticing patterns and stuff. We use the SMARTboard like that more than twice a week…. I really like that it has the page and the exact page can be on your SMARTboard. I’ll have the little SMARTboard activity I downloaded from the Pearson website…. Now that I have these lessons it’s really cool to do.

The researcher also observed the SMARTboard being used as a delivery system for one of the literacy activities/stations during Daily 5 rotations (Boushey & Moser, 2006). Daily 5 is a classroom management system used during reading instruction that requires students to be in small groups participating in literacy activities/stations independently (Boushey & Moser, 2006). Ms. Silver gave instructions and modeled an interactive word activity, locating words with /or/ and /ar/ sounds which students completed during their appointed time at that station. She stated that she gave the students opportunities where they could “utilize their reading skills while they are doing other activities.”

The SMARTboard was the instructional technology tool used most often by the first-grade teachers during their literacy block. The SMARTboard allowed the teachers the ability to display large amounts of text, change images, bring sound (voice and music), and show videos, all to enhance their reading instruction. The SMARTboard use let students interact with the text and become physically engaged in the content of the lesson. Mr. Brown and Ms. Kasey relied heavily on the SMARTboard for their basal reader instruction, while Ms. Adams and Ms. Silver extended their use of the SMARTboard to include other web-based reading material.
The first-grade teachers all used their own knowledge of the technology tools, programs and available resources to implement instructional technology into their literacy instruction. All teachers used the SMARTboard during their literacy block for reading instruction. Therefore, data clearly reveals that the first-grade teachers perceived the SMARTboards to be useful and easy to use.

**Delivery of Instruction: Individual Student Computers**

Individual student desktop computers were the second instructional technology tool used most for instructional purposes during the observations of the literacy block in the first-grade classrooms. Each first-grade classroom was equipped with two to four individual student desktop computers located in a cluster on tables in the corner of the classroom. Students were observed working individually and in pairs on the computers. Once again, the teachers’ knowledge of the use of student computers for educational purposes assisted in their decision to include the computers in their reading instruction (Greenhow et al., 2008). The researcher observed three out of the four first-grade teachers—Ms. Silver, Ms. Adams, and Ms. Kasey—using individual student computers for Daily 5 rotations. The teachers’ decisions to use the individual computers for Daily 5 varied, as did the reading selections assigned to students.

Ms. Kasey stated she decided to use the student computers for the listening to reading component during Daily 5. She purchased the online leveled reading program, RAZ Kids A to Z, for the student computers in her classroom. She explained:

> Basically it just gives each of the kids the opportunity to read at their own level. I don’t really know much about using the internet to let kids … listen to books. So I figured this would be the easiest way for me to know that these kids will be listening to things at their level… It’s easier for them to just be on Kids A to Z. When you finish your book then click on a new book.
Also, Ms. Adams used individual student computers for Daily 5 rotations for listening to reading. Her decision to use online books available from the public library was due to the variety of texts available from different online sources. She stated:

\[ \text{Of course, we do the Daily 5. We have them listening to reading. There are a couple of websites, including the ones that come through the Main Town Public Library [pseudonym], the Tumble books, that just has a nice standing array of items to listen to. So rather than having these kids at the tape machine over here and over there, I am fortunate enough to have enough functioning computers for most of my kids in my class.} \]

During the initial interview, Mr. Brown stated he used the individual student computers to listen to readings in Daily 5; however, the student computers were not in use when the researcher was present during the three scheduled observations. He explained:

\[ \text{I use the computers for Daily 5 for listening to reading. So the students are going through the Main Town Public Library Tumble books and so I have those available to students when they are at that station; they’re choosing one of the Tumble books in Spanish to listen to read. So yes, we use the classroom computers for that too.} \]

Though Ms. Silver used individual student computers during Daily 5 rotations for the listening to reading component, she also used the student computers to deliver skill practice and reinforcement. She noted:

\[ \text{We use it in 2 ways. One is during listen to reading. I use books on video as a listen to reading activity…kinda working on fluency because they did not have to read the story, the story is read aloud to them… and also Starfall as long as, particularly in the first half of the year, because they have stories and games that coincide directly [with] the sound we are working on that week. So this week we are doing long /o/ so they do the story and games that go along with the long /o/ sound. It’s good practice for them to use it immediately in a fun way.} \]

Ms. Silver used her student desktop computers as a supplement for student skill practice phonic worksheets and story read alouds. She perceived her students were receiving “good practice” in a fun way by using the technology tool. Ms. Silver also had a number of
other web sites posted above the computers that her students were allowed to use for skill practice and to listen to reading. The websites included RAZ Kids, Starfall, ABCya, and ABC mouse.

Ms. Adams explained how she used the student computers to differentiate her instruction to meet her students’ individual needs.

I have some kids that are kinda struggling with sound identification so they each have a little card made up with sounds I wanted them to work on. Then I gave them an access card to show how to get to the website that I wanted them to go to. Those children, rather than always listening to reading, will sometimes come back and get their card and go ahead and use those websites for extra practice in addition to the Heggerty [phonemic awareness instructional program] and other things we do in the classroom.

By implementing the desktop computers into her 90-minute reading block, Ms. Adams perceived she was meeting each student’s individual phonemic awareness skill needs. After she helped them set up access to the website, students worked independently on the desktop computers for additional reading skills practice.

Ms. Silver differentiated her instruction as well, using the individual student computers during the Daily 5 rotations, stating:

We also give the instruction: if you are not sure what sound /sh/ makes, you should watch the /sh/ video again today. If you are not sure what /ch/ says, if you think /ch/ says /ka/ha/ then you should probably watch the /ch/ video again. That kinda of thing. So mainly the focus is whatever phonics activity is, we are working on for the week.

Ms. Silver used different media modes to engage her students in the phonics skill for the week. Students were able to view and listen to videos independently using the desktop computers in the classroom.

Individual student computers were used during the Daily 5 rotations during the literacy block by all first-grade teachers for listening to reading, fluency practice, and/or reading skill
practice. The first-grade teachers perceived the individual student computers were motivating to the students and also served an instructional purpose. While working on the individual computers, the students appeared to be engaged in their tasks, as they were completely occupied (not bothering others), listening to the online stories, and completing the assigned skill games. The students worked individually or in pairs on the computers on the listening to reading component for Daily 5 or on group or individual reading skills. Student choice in selecting the text when listening to reading appeared to be a high engagement practice. Students freely chose different text at their own pace and listened to 3-5 books during their allotted computer time.

By using the technology tools and programs available, the first-grade teachers perceived they enhanced their reading lessons through high student engagement opportunities. By using the SMARTboards and individual student computers, teachers were able to promote engagement with their students through interacting with text and through different modes of media, such as sound and symbols. The teachers’ decision to implement instructional technology for their literacy instruction allowed for a different delivery system of information and provided more opportunities for students to be physically active with the learning task and more opportunities for students to gain individual learning benefits. The first-grade teachers were able to locate and use websites that matched the current curriculum and provided options for individual instruction and learning. Reading skills and instructional strategies were targeted for individual students with practice and reinforcement activities, read alouds, writing, and instructional games with the use of technology. Nonetheless, according to the first-grade
teachers, more instructional technology could be implemented if some of the technology tools in their building were more obtainable, as explained in the next section.

**Obtainability of Technology Tools**

Currently, Stone school was equipped with three iPad carts with 30 iPads each, for 22 classrooms to share. According to the administrator, they were available for teachers on a rotating basis for student instruction use. Interviews revealed, however, that the first-grade teachers struggled to obtain access to the iPads, creating a barrier to the resource. Barriers are any preventing factor that keeps teachers from integrating technology in the classroom (Ertmer, 1999). The first-grade teachers asserted the iPads were somewhat inconvenient for a variety of reasons, including the process for the installation of applications that the teachers had to go through in order to use them. Ms. Kasey expressed her frustration with the process:

> In the classroom we don’t use the iPads for anything because of the idea of having to get an application on it and then having to talk to whoever to see what time we can use it. I feel like it is such a hassle that I’d rather use the SMARTboard and the computer.

Ms. Kasey’s statement reveals her perception of the inconvenience of using iPads for student instruction due to the lack of support in adding new applications. She also expressed the perceived ease of use with the SMARTboard and student desktop computers, as they were the only technology tools used during the observations.

Ms. Adams shared a similar experience.

> I should bring the iPads in here more often but I don’t … if you would like it [the application] on the iPads, send in a request and then they will get it loaded when they can. And I realize they are busy but at this point in the game I am sure some of the very intelligent people downtown who oversee our curriculum must have a whole slew of websites that would be perfect for us to use. But at some point it is too much. So it means sometimes I don’t pick up on the technology ideas that perhaps I should.
Ms. Adams’s desire to add more instructional technology to her literacy lesson was noted. The inconvenience of gaining additional applications was again shared as well as the need for additional support to help with the technology tools and programs.

Ms. Silver expressed her desire to use iPads this year, but also noted the complications she faced in the process, causing her to withhold implementation.

I have been trying to introduce iPads into the classroom this year. I am struggling to get apps put on. I requested apps at the end of September and they’re just now finishing up and getting them on there. I feel like I am playing catch-up: A. searching for apps to put on them and B. then now finding the time in the routine to teach them…Because now we are halfway through the year and I don’t know when to build that into my schedule. Part of me was going to build [that] into the schedule this week and I don’t think it is going to happen. I don’t think it’s going to happen.

The need for new applications and the lack of support to download applications became a recurring pattern among the four first-grade teachers. Ms. Silver’s intentions to use the iPads were stated but barriers, such as time and lack of support, kept her from using them with her students.

Mr. Brown also desired to add iPads to his classroom literacy instruction. Yet, his decision for not implementing the iPads was much different than most of his colleagues.

I think one thing I would like to get the students more interactive with the iPads, is a good way to go. I think part of my hesitation with the iPads is that we did a little training with our tech people here—this was last year—and it was hard for me to follow what we were doing and it didn’t seem to work well for me so I thought, I’m not sure I want to introduce this to my students yet. I am sure my students would take to it probably better than I do, so perhaps there is a little bit of fear there as to whether or not I can control what they are doing or learning or whether I should control what they are doing. I have an iPad and I don’t know even know how to use it.
Clearly, the use of iPads was seen as a resource barrier. Teachers had difficulty getting applications installed on the tool. They also reported a lack of time for implementation along with a lack of support or training for the device. This created a discrepancy among first-grade teachers’ intentions to use this technology tool and the actual use of the technology tool. The iPads were perceived as difficult to use and therefore not useful. Other factors contributed to the teachers’ decisions not to use instructional technology tools and programs in the first-grade classrooms, too. Ms. Silver described her reservation in using an available website as not “kid friendly”:

To a lesser sense because they are not as comfortable and it’s not that easy—I use Brain Pop—we will use that a few times just because it is not as kid friendly to navigate back and forth and that kinda thing.

Ms. Kasey based some of her decisions not to include instructional technology in her reading instruction based on programs being “not user friendly.”

I finally figured out the Pearson website. I know how to use the computer, but these websites are so not user friendly. It turns out you have to enter into one website to go here, to go there, to go there. That doesn’t make any sense. I couldn’t figure it out by myself, because I am also used to having an iPhone and a Mac which are user friendly. I am not going to waste my time trying to figure out how this stupid website works.

Ms. Adams echoed Ms. Kasey’s frustration with websites.

Many times I feel like the things we need to do to get access, those things [are] a little confusing. You must set up your own account, you must set up a password, you must do this, you must do that. You know, get us hooked up with that and then just give me my information. Here you go, here is the sign-in, here is the password. Feel free to use it. Because I didn’t grow up with it, I could use some of those skills as well.

The first-grade teachers described resource barriers that hindered students’ interactions with technology. Those barriers included low comfort levels with technology, difficulty with the applications, and challenging websites. These barriers influenced user acceptance of the
instructional technology tools. There were other technological resources available in Stone Elementary that also presented as barriers to some of the teachers.

Stone Elementary School was equipped with a computer lab with 30 computers. The lab was created to increase student instructional technology-based learning. During the duration of the study, there was no computer lab aide to assist the teachers and the students with technology issues or programs. Only two first-grade teachers, Ms. Kasey and Mr. Brown, took their students to the computer lab once a week for a 40-minute session, for practice and reinforcement with reading and math skills. The computer lab was not continually accessible, as the room space was used for other purposes. According to Mr. Brown, the computer lab was unavailable during testing windows, school picture day, and dentist visits. It was the only available space in the school not occupied by students full time. Each computer had a variety of websites, downloaded the year prior, that students could access and use. Some of the websites available were ABC, Starfall, Turtle Diary, PBSkids, ABCya, Trueberry, and Brain Pop Jr. Mr. Brown used the computer lab for practice and reinforcement and motivational purposes. He explained:

When we have computer time, when we are in the computer lab and I require my students to first work with words and so with regard to that, they can either read stories or they can write sentences. We usually use ABC software for that or Turtle Diary…I would say [they] were websites that engaged the students and at the same time they learn something from them. I started with ABCya.com which is a little bit more basic or kindergarten level to below first-grade level that can be a little bit more challenging…then we start looking deeper into Trueberry.com and a lot of the kids want to do Starfall. So it’s like a progression. They love being in the computer lab. They love being on those computers.

Ms. Kasey’s computer lab time was also used for reinforcement and practice of skills. Though Ms. Kasey took her students to the computer lab, her perception of its value differed
from her colleague. She stated a lack of familiarity with the websites available. She said, “I
don’t even know about what website[s] we have. We just go and I tell them they can use
Cool Math Games.com, ABCya.com, do whatever they want.”

Ms. Adams’s and Ms. Silver’s past experiences with the computer lab played a large
part in their decision not to use the lab the current year with their students. Ms. Adams
explained:

I have students here, probably a good five or six who when it doesn’t pop up
immediately they click and re-click and re-click and the next thing you know, I had one
kid this year who had 90 windows open because he simply could not wait for the
computer to process his request. To be perfectly frank, I didn’t even try this year.

Ms. Silver had found the computer lab setup to be difficult as well. She stated:

Last year I wanted to use the computer lab but the password was so prohibitive there
was just no way and you couldn’t change it. Is this the password? This is it! There
was just no way.

Overall, the barriers pointed to a pattern of lack of available resources and
 technological knowledge and acceptance. The teachers’ decisions to implement technology for
literacy instruction appeared to be hindered by the resources described in this section. Their
frustrations with the resources, which came in the form of technological barriers, were clearly
voiced. The technological barriers came from lack of support, program knowledge,
experience, and acceptance of the instructional technology tool. Despite the occasional
frustrations with instructional technology, the teachers also described benefits for individual
student learning addressed in the next section.

**Benefits for Student Learning**

Benefits in student learning through practice and reinforcement activities and student
motivation were contributing factors into the decision to use instructional technology for reading instruction in first grade. Ms. Silver described her use of the individual student computers for a variety of practice and reinforcement activities. She shared:

The reason we used it [the computers] was because we were working on /es/ endings. Adding /es/ to the ends of words is one of our phonics focuses for the week. And so it was used as just a general reinforcement as what plural nouns are as well as some practice with singular and plurals. Starfall is my go-to. Just because they have stories and activities that mirror the phonic sounds that we are working on for that week and so it’s a good practice for them to use it immediately and in a fun way. So they are definitely engaged in the story.

Ms. Adams used the website ABCya for practice and reinforcement with her students. She stated:

That is the website that runs the whole schmear…if they need alphabet help they can get alphabet help. They can do listen to reading—they can do that on there as well. …a lot of skills are lower level skills, more beginning emergent reader skills, so it feels like a fun game to them.

Ms. Kasey explained why she decided use Kids A to Z online books for fluency practice with her bilingual students.

The thing is that they’re at the right level and it has English books too….I allow them to get books all the way up to level J so they could be exposed to the text so even if they can’t read themselves at least they are listening to higher level text, hopefully gaining better understanding of high level text.

Ms. Adams shared that she used websites to individualize student instruction for success.

This is one [referring to one of the student’s phonics cards], not this, particularly this student although he has improved a lot, more than I thought he would. There was one little gal who had 18 out of her 30 sounds. We did an intervention [on the student computer]. It was supposed to be for 4 weeks. Some of the other kids are still involved in it. After 2 weeks she had gone from 18 to 28 and nailed it. When I was able to check her sounds it wasn’t like, oh, let me think. It was very automatic. So she was, like, confident with that. I consider that a success.
Mr. Brown found that using the SMARTboard was highly successful with a special education student in his classroom. He reported, “When I let him interact with the SMARTboard he comes to life.” Though the teachers shared individual successes with students using technology, there was no discussion or evidence presented on increased literacy learning benefits for students using instructional technology for reading instruction.

Many factors discussed in this section influenced the first-grade teachers’ decisions to implement instructional technology for and during reading instruction. The next section discusses how teacher collaboration played a role in their decision to use instructional technology in their literacy instruction.

Collaboration and Decision Making for Implementing Instructional Technology into Literacy Instruction

Research has shown that continuous sharing and collaborating helps increase teachers’ knowledge when it comes to the 21st-century instructional design for literacy instruction (Stevenson, 2004). According to the Stone School administrator, all grade-level teams had common planning time each day. The schedule was purposely designed for teachers to collaborate with each other during that common planning time. To the best of the administrator’s knowledge, common planning was occurring with grade-level teams at least once a week. The researcher had intended to include data gathered at grade-level planning meetings as part of the analysis for collaboration; however, while meeting with the first-grade teachers during a pre-observation session, the researcher was informed by the first-grade team that grade-level planning meetings were not occurring this year. It was simply stated by Ms. Adams as, “We don’t do grade-level planning.” Her statement made the researcher uncomfortable, as there was observed tension between the first-grade teachers, so
she did not have the teacher elaborate at that time. Ms. Adams later did explain that this year they had been instructed to conduct PLC (Professional Learning Communities) meetings to look at testing data. The PLC meetings were taking place bimonthly after school and teachers were directed to review results of the district-wide benchmark assessments. Because the teachers were meeting to discuss data two times a month after school, they decided not to meet for grade-level planning. Collaboration and sharing of instructional technology ideas were occurring informally, however, among the first-grade teachers and other colleagues in the building.

The interviews revealed a few collaborative opportunities among the first-grade teachers and others to share ideas for using instructional technology in the classroom. According to Ms. Adams, the literacy coach continuously shared websites she researched that were free and obtainable for teachers to use during listening to reading for Daily 5. She said, “It’s just one of the things that I think our reading coach shared with us. That is how we get to our website. It’s one of many she shared.” On the other hand, no other first-grade teacher cited collaborating with the literacy coach on sharing ideas for technology for literacy instruction.

Ms. Adams stated that she shared instructional technology ideas with her partner, Ms. Silver, when she found something useful for her classroom. She stated:

My partner, Ms. Silver, and I share a lot of stuff....We don’t always do the same things as bilingual classrooms, unfortunately. But it is more of those one of the passing kinds of things. I’ll pop out of my chair and say I found this, what do you think or if you want to take a look at it and tell me what you think. We have a lot of those conversations between the two of us.

Ms. Adams referred to Ms. Silver as her partner, clearly indicating collaboration. The proximity of their classrooms enhanced the collaboration, as Ms. Adams reported that she
“could pop out of my chair to share first-grade ideas.” Ms. Adams also revealed one reason collaboration was not occurring with the entire first-grade team as, “we don’t always do the same things as the bilingual classrooms.”

Ms. Kasey shared how she assisted Mr. Brown with technology. She said, “I gave him the information. I think he brings it up on the SMARTboard because I showed him how to access it and how to get it.” Ms. Kasey also explained how a kindergarten teacher shared a website she used daily:

Mr. D, a kindergarten teacher, told me about it. He had given me, like, an internet password that gave me a logon for, like, for Raz Kids. So I was printing out some books so I decided, whatever, I will pay for it and let the kids use it at home. I have about eight kids who use it consistently at home too, so I like that.

Mr. Brown shared that he does get assistance with technology from colleagues and district technology people when he requests help:

So I have had some assistance at the beginning when I first started but I know there is so much more with the SMARTboard than what I am doing. So I am looking forward to learning more about that.

As a third-year teacher, Ms. Kasey shared how a couple of her colleagues assisted her in implementing instructional technology for reading instruction using the Pearson websites. She said:

They told me about Pearson and they said, “You know, hey on these SMARTboard activities.” It was my mentor I think who really got me interested and then a fourth-grade teacher kinda helped me…so I was finally told how to do the Pearson website.

Ms. Silver explained she does collaborate with other colleagues outside of her building on topics and issues related to instructional technology. Before she was a first-grade teacher, she spent more than half of her career as a special education teacher. At that time, she used different
technology tools and programs with her students, for example, communication devices, which she learned how to program with assistance from colleagues. Ms. Silver explained she attempted to have an application downloaded she heard about from some of her colleagues from her previous school. Ms. Silver said, “[...] because the ones I’ve requested, some of them I heard about from colleagues at other schools. ‘Oh, you have to get his one. I can’t believe you don’t have it.’” At the time of the interview, Ms. Silver’s request for the new application had not been filled.

Ms. Adams also took opportunities to increase her knowledge of instructional technology from others by attending conferences. She shared:

I’ve become attached to my cell phone. And what really made me decide to go ahead and get a smart phone was when I was at a conference not too long ago and they had a scan app that they said you want this app [for your classroom] just scan your phone over it…so I got a new cell phone.

The sparse evidence collected on the teachers’ collaboration to implement instructional technology in the classroom revealed the first-grade teachers and others do collaborate and share ideas, but on a limited, non-structured basis. Ms. Adams and Ms. Silver appeared to collaborate more with each other than the other first-grade teachers on current websites and applications that they brought to their classrooms. Mr. Brown and Ms. Kasey collaborated by sharing worksheets related to the daily basal story. The shared worksheets were reflected on their lesson plans. The worksheets followed the basal reader story and skill that were displayed on the SMARTboard for daily reading lessons. Mr. Brown stated, “We are working through the same stuff.” He continued with, “…we [Mr. Brown and Ms. Kasey] tend to communicate a lot
electronically. Mostly by text.” This gave evidence that Mr. Brown and Ms. Kasey were planning together though not calling their planning “grade-level planning.”

The data revealed two factors that may have contributed to the paired collaboration in first grade at Stone Elementary: one, monolingual instruction compared to bilingual instruction and two, seasoned teachers compared to new teachers. Ms. Adams and Ms. Silver were similar in age and teaching experience, each teaching for over 10 years. They taught English-speaking students and their classrooms were right next door to each other, providing opportunity to form a friendship. During one interview, Ms. Adams stated that the collaboration between Ms. Silver and herself happen informally as, “it is one of those passing kind or things”. Though this collaboration was reported to the researcher, it was never observed or specifically mentioned that a particular program was provided by the other teacher. Mr. Brown and Ms. Kasey taught Spanish-speaking students and their classrooms were on two different floors. Mr. Brown said the communication with Ms. Kasey through texting allowed them to help “each other out” and “ease our burden.” He also stated, “We know we are behind our colleagues downstairs.” The collaboration between Mr. Brown and Ms. Kasey may have been beneficial for both parties as they assisted each other in areas of need. Each of these teachers had been teaching for less than three years and there was a 30-year age difference. Ms. Kasey was stronger in technology tools and programs and was able to help Mr. Brown with technology as she, “…showed him how to access it and how to get it.” As her mentor, Mr. Brown was able to assist Ms. Kasey with polices and produces within the building and the school district.
Although the collaborative conversations were limited and informal, they were useful in addressing some of the teachers’ instructional technology needs and did help did support their use of instructional technology for reading instruction. Teachers’ personal knowledge of the technology tools and programs also assisted in increasing the amount of technology used for reading instruction and will be explored in the next section.

Teachers Applied Their Personal Knowledge of Instructional Technology for Literacy Lessons

After examining the field notes and interview transcripts, it was apparent that all four first-grade teachers brought their personal knowledge of how to use technology, whether gained through previous online course work, professional development, cell phones, laptops, tablet use, and trial and error to the classroom. The teachers transformed their personal knowledge of technology and made decisions on how to apply that knowledge to teaching and learning with the technology tools and programs available in their classrooms. Ms. Kasey said it simply when explaining her personal knowledge of technology and transferring that knowledge to her classroom instruction. She said, “I have never Googled educational websites for children, I just kinda go with what I already know and what the kids already know.” Ms. Kasey revealed some of the applications she used were “pre-setup games” and “things that teachers had or came up with.”

Ms. Silver relied on her previous experiences of how to download items from the internet to access books on video for her students to listen to reading. She explained, “And the big library I made, managed to download, books on video. I’m really glad I took the time one summer to do that. There is quite a library for them to choose from.” Ms. Silver also searched
websites often to bring new learning opportunities into her classroom. She said she does random searches of “online games and activities, learning activities….” Ms. Silver shared about Mystery Match, a website she found, and how she incorporated the website into her reading instruction:

Right, that is a website [Mystery Match] that I found; actually, it is a new website for me because I was struggling to find, now that I am on digraphs, if I can’t find something, that is OK because they can do listening to reading or they can listen to books on the computer during their listening to reading time but if I can help, then I do reinforce whatever the phonic sound is for the week and so that is a newer website for me and I felt like they were able to and I was excited because I was able to use it for a while now…. I did a google search for online phonic games or online diagraph games or something like that. So I am excited to explore that even more.

Ms. Silver continued, saying:

…my website searches are usually a great jumping off point for building activities and building lessons. And just some videos I have come across that I use for phonics because it is more engaging than many other activities, again a great jumping off point.

Ms. Adams shared she has incorporated a particular website as an instructional program weekly. She learned about this website during a district-wide training.

When we got Discovery Education (DEA) a few years ago, I decided I was really going to get into it as much as I possibly could. There is such a nice variety of stuff out there and so I usually check that at least once a week to see what there is to go along with something else that we are doing. Whether it is a video or whether it is something we are going to do in-depth like a comparison of two different types of literature, you know, so I really like the discover ed. tool.

Ms. Kasey used her experiences of searching the internet for information during her lessons frequently, to assist her Spanish-speaking students with visuals to accompany new vocabulary. During the whole group lesson, on February 24, the students were reading the basal story What Can We Observe in Nature from the SMARTboard. The story included the characters finding a four-leaf clover. Ms. Kasey strategically and quickly changed the screen
and Googled “St. Patrick’s Day” to find a shamrock to compare with the four-leaf clover. Students were able to immediately see the physical difference between both plants on a large screen. During a similar lesson observed, the same type of learning opportunity occurred. Ms. Kasey was assisting a student in reading a basal story from the SMARTboard which included a tortoise. Once again she Googled a tortoise and a sea turtle for students to instantly compare and see the differences in the animals.

Personal knowledge, experiences, and high comfort level with technology were enough for successful implementation of instructional technology tools and programs for some of the first-grade teachers in literacy lessons. Ms. Silver said:

I think I’m comfortable, very comfortable using technology I have incorporating [change of thought] I have a tablet at home. I use that. A phone a lot for texting, email, internet searchers. It’s my go-to technology device, internet device. I believe I am well versed in the computer using all of the, for lack of better words, apps that we use for grading and assessment and I’m very good at, um problem solving issues I might have. I am pretty intuitive as far as things like that go with using basic computer technology. And even a little more advance[d] computer technology. So it was fairly early on that I was comfortable and ready, willing and able to use technology in the classroom.

Ms. Kasey shared her comfort level was a 10 out of 10 when it comes to technology:

I have grown up in a generation where . . . I got my first cell phone at, I guess, 13 and so we started from there and we’d play snake on our cell phones, but I feel, I feel really comfortable with it. My iPhone 6, my Apple computer, my Macbook and my FitBit. If a computer is broken and it doesn’t work, I can’t fix it but definitely know how to use a computer.

The comfort levels of the remaining first-grade teachers when implementing instructional technology into their classroom were not as high. Ms. Adams shared her comfort level with technology as simply “mediocre.”

I get the sense that there are people who have finished school more recently than I, that have been exposed to a lot more and they are just more comfortable with
it….Whenever we do things and work together on teams, if someone else wants to take the lead on the technology side I am more than happy to let them do that. And that’s my own comfort level.

Though Ms. Adams shared she was not as comfortable with technology as some of the others, when asked when she started using instructional technology in her classroom, she said:

   Pretty much from day two I would say. It’s always been there for us in some form or another. I have always used the computer for documents, Excel spreadsheets, whatever we needed back before data was more readably available from our systems. As far as putting it in front of the students in the classroom, I probably got most excited about it maybe four years ago when they brought in the DEA and streaming. Here are really good things you can put in front of your kids to go along [with] your lesson plans. Even to this day that is probably the one thing I like the most.

   Mr. Brown appeared to demonstrate the lowest comfort level with instructional technology in the classroom, describing his ability as “a little bit below average.” Though he requested and received assistance with the SMARTboard from his colleague, he explained, “I am only familiar with the SMARTboard by trial and error.” He stated he has not had any “Technology in the Classroom” coursework (a class taken at a local university to assist in implementing technology in the classroom), and that may be the reason he is not as proficient as others. Mr. Brown continued, “So technology in the classroom is on my list to do.”

   Regardless of their knowledge and comfort level with technology, all four first-grade teachers incorporated instructional technology into their daily literacy instruction and were able to use the available resources to provide practice for specific reading skills and strategy activities. For example, Ms. Silver was observed using the website Brain Pop Jr. with her students for practice in identifying plural nouns. Students were instructed to “read, watch, and listen to the whole video, then click the game.” The Brain Pop Jr. game selected was a
memory game that required students to match the plural forms to the single forms of words, for example witch/witches. The game included words and pictures to assist students. The researcher also observed Ms. Silver’s students collaborating in a small group of five while using the SMARTboard. Ms. Silver also used the website Professor Garfield for students to play the game Match of Mystery. The students were instructed to match the words with the same middle sound. The students took turns reading each word to find the match and then moved the magnifying glass with their fingers over the matching words.

Ms. Adams was observed using the website Starfall on the students’ computers for skills practice in her classroom. Students were instructed to read the sentences and choose a word from the word bank that best completed that sentence. When the student got all of the sentences correct the screen would come alive with a celebration. During another observation the students were again using the Starfall website but this time they were matching words with the same consonant blends.

The SMARTboard was observed being used by Ms. Adams for read-aloud activities as well. When discussing specific reading skills, for example details of a story, she stated, “I can usually find either a supplemental video on DEA or even something on YouTube if I want to do a little more flushing out or in another way.” Ms. Adams used the Scholastic News Magazine for a read aloud with her students during two observations. After each story was read aloud, Ms. Adams highlighted important words and discussed their meaning and how they related to the story. For example, during the story Koala Time, Ms. Adams highlighted “bamboo” and engaged the students in a discussion of where bamboo came from and where it can be found.
Ms. Kasey had her students use computers during the observations solely for listening to reading, fluency practice, and comprehension. In pairs, students would take turns choosing book selections from the website Kids A to Z, and they also had the choice to hear the story read in English or Spanish. The students were allowed to read the story out loud to each other or they could listen to the story read to them using the headphones. During Ms. Kasey’s 20-minute station time, the students had the opportunity to listen to up to 6 stories, depending on the length of each story they chose. At the end of each story, the students were given the choice of completing a comprehension quiz. Ms. Kasey mentioned, “I don’t tell them to take the quizzes…they do it if they want to.” She explained, “I think usually the ones who are doing the quizzes are the ones who have worked with A to Z at home and their parents must have them do it.” Most students took advantage of the opportunity to take the comprehension quiz during the observations and reacted positively to the awarded stars for each correct answer.

Ms. Kasey used her SMARTboard for different activities during her reading block. During one observation, she used the basal program’s website to display the weekly story on the screen. The story was read aloud to the students and the words in the story were highlighted, giving the students an opportunity to visually follow along with the text. During another observation, the phonics book story vocabulary for the week was displayed on the screen, and students echoed the words as Ms. Kasey read and pointed to the words on the screen. Students then took turns using the SMARTboard pens to circle the /tr/ sound in all the words. Each word was read aloud as the students circled the /tr/ blend. Next, students took turns reading pages of the phonics book story while it was displayed on the screen. Similar activities were seen during each of Ms. Kasey’s observations.
Mr. Brown was observed solely using his SMARTboard to deliver specific reading skills in the classroom. During the first observation Mr. Brown used the Elmo (document camera) to reflect the basal reader’s printed page on the SMARTboard screen. He read the text aloud as he pointed to the words and the students repeated the text. Next, students were instructed to locate the words that contained the /ll/ sound with the pointer and each word was read aloud. Mr. Brown explained:

I read the story once and I sorta modeled it for them by reading it to them and then they echo read for me and it is to mostly emphasize because almost all of them, their fluency is low, so it really is to emphasize phrasing and words, distinguishing between factual sentences and/or an exclamation—trying to help them with putting the right emphasis on the words and the accents especially, because that all has to do with reading fluency.

During Mr. Brown’s 40-minute computer lab time, students chose from a number of websites to work on individual reading skills. The websites were previously downloaded and the students seemed very familiar with navigating each site. Students were observed adding blends and first-letter sounds, reading short-vowel stories (for example, Zac had a fan), completing sentences using a word bank, and other similar literacy activities. Mr. Brown explained his decision in setting up this activity.

I use it as a way to monitor what they are doing as well as to see if they are staying engaged in either math or the literacy part. And it really allows me to work with the students who are struggling and really they are exploring and I get to see what they like doing.

The examples reviewed in this section illustrated that the first-grade teachers applied what they knew about technology and the available resources to incorporate technology into their literacy instruction. As shown in the examples, no two teachers used technology in exactly the same way. This may be explained by the lack of collaboration in planning. The teachers were
provided with common planning time, yet they did not utilize the common time for collaboration. The differences in their use of instructional technology may also be explained by looking at the experienced vs. the less experienced teachers as well as their knowledge of the technology tools and programs and available resources in the school. The experienced teachers, Ms. Silver and Ms. Adams, used a wide range of web-based programs, and shared applications and websites they found outside of their instructional classroom time. Ms. Kasey and Mr. Brown were observed working mostly with the basal-based web program and included some Internet searchers to help clarify concepts and vocabulary. Being relatively new teachers, Ms. Kasey and Mr. Brown appeared to find comfort in the scripted basal reading program. Each lesson was scripted and explained clearly what was available to use on the website. Limited thought and planning were necessary to implement the basal lesson, which made the program easy to use for these first-grade teachers.

As stated earlier, the school district in this study did not have a required technology component embedded in their primary curriculum. An example of a technology component could include: Primary students will receive 30 minutes of screen time with literacy and math instruction daily. When the researcher inquired about the extent to which the first-grade teachers felt the district technology expectations were a factor in their decision implementing instructional technology, a variety of responses were given. Ms. Kasey’s response was, “They definitely told me.” Mr. Brown replied:

I think we are encouraged to, yes. Not specially but there is always a section of our, where there is a curriculum map or whatever with using technology in the classroom. And so it is always on our mind to do that. So yeah, I think there is a reasonable expectation that we use our technology.
Ms. Adams stated, “I think they put a lot of things out there for us.” Lastly, Ms. Silver stated. “I don’t feel like it is a directive. I don’t feel like I have to. I feel like I want to and I need to. I think it can be a good thing, but no, I don’t feel like I am required to.”

The teachers’ responses to the district technology expectations ranged from a definite “yes we have to” to “I don’t feel we have to.” Though the teachers’ attempts to use instructional technology for literacy instruction were clearly reflected in the data, it mostly appeared as if the teachers were using the instructional technology as a substitute for paper-and-pencil workbooks and worksheets. None of the four first-grade teachers mentioned gaining any recent technology knowledge from professional development sessions, university courses, webinars, conferences, or journal articles. Research has shown that time spent in training and time spent exploring technology is essential for teachers implementing technology in the classroom (Vannatta & Fordham, 2004). In the past, the district offered ongoing technology workshops during the school day and after. Participants were given a stipend to attend the trainings. No such training was offered during the time of the study to help develop the teachers’ technology skills.

The data revealed that none of the teachers were using instructional technology to transform literacy instruction and student learning. This was clearly voiced when Ms. Silver commented, “Basically I took it out of the manual and put it on the board so it was interactive.” The teachers were mainly using the instructional technology to enhance their instruction using multimodalities, such as videos, listening to text, and an interactive whiteboard. There are, however, many ways teachers can use the various multimodalities of instructional technology to enhance student learning. For example, the teacher might
have students use the media to express vocabulary knowledge or to build comprehension.
The teacher could also have students record themselves reading a story using an iPad and
then create illustrations on the iPad to match the story. Without a clear curriculum for
technology in the district, the inconsistency of the instructional technology use and teacher
responses was not surprising. It also helps explain the differences in technological
knowledge among the teachers as well as the different use of the resources. The next
section will address the first-grade teachers’ successes and challenges with implementing
instructional technology in the classroom for literacy instruction.

Teachers’ Perceptions of the Most and Least Successful Use
of Instructional Technology for Literacy Instruction

After examining the first-grade teachers’ interview responses after each observation, it
was evident the teachers perceived the most successful aspect of implementing instructional
technology for literacy instruction came in the form of the teachers’ convenience, individual
student learning, motivation, and engagement. Challenges came in the form of time
constraints, students’ knowledge of technology, and the technology tools and programs. The
teachers’ successes and challenges have been previously discussed, as they played a part in the
teachers’ knowledge and decision making for the use of instructional technology for literacy
instruction. These factors are discussed in further detail in the following sections.

Most Successful Aspect of Technology for Literacy Instruction

There were a number of contributing factors the four first-grade teachers perceived as
successful when implementing instructional technology for literacy instruction. The factors
were convenience, individual student learning, student motivation, and high engagement. These
factors played a major role in their decisions to use and continue to use instructional technology for their daily reading lessons.

**Convenience**

Successes in the form of convenience of the instructional technology tools and programs were shared throughout the interviews. Mr. Brown stated that when incorporating instructional technology into his lessons he was “using technology to simplify [his] work.” Mr. Brown also shared that the Reading Street weekly technology lessons follow the same pattern each week: question of the week, read aloud, shared reading, vocabulary and word work, and a sequencing puzzle. The pattern made planning for whole group reading instruction convenient as well. The simplicity of use made the instructional technology program positive for Mr. Brown.

Ms. Adams shared how convenient it was to use the SNM website: “I just pull it up online and use all the resources from there.” She mentioned the “nice standing array of items to listen to” that were available from different media websites as a huge success for her students when they are participating in listening to reading. Looking for supplemental material to add to her lesson has also been successful and convenient for Ms. Adams. “I can usually find either a supplemental video on DEA or even something on YouTube if I want to do a little more,” she said.

Ms. Kasey and Ms. Silver also expressed successes with easy-to-use websites they used during their literacy block. Ms. Kasey found a particular website, Kids A to Z, convenient for her students when they were listening to reading. She stated, “It’s easier for them to just be on Kids A to Z. When you finish your book then click on a new book.” Ms. Silver found the
convenience of adding technology to her phonics lessons. She said it is so easy to pull up things on YouTube and use them in her lessons. She explained, “So today there were 2, we watched 2 short videos—one was just a review of how silent /e/ works…and then there was a long /o/ video because long /o/ is one of our sounds this week.”

According to the teachers, convenience was also linked to the reliability of the technology tools and programs for class lessons. Ms. Silver shared, “I use quite a few SMART exchange games and activities and very rarely do we have a lot of glitches with [them]. Most of the time it is not an issue. Most of the time it does work.” Ms. Adams added, “We really don’t have problems with it, like, ever being down. And the reliability is very good.”

**Perceived Benefits of Student Learning**

The first-grade teachers used the student computers in their classrooms and in the computer lab for individual learning activities. Both Ms. Adams and Ms. Silver discussed how they were able to provide individual instruction based on the students’ needs through the use of web-based programs on the individual student computers in their classrooms. Ms. Adams valued the “extra practice” the students received and said, “If I have a kid who has a skill that needs to be targeted…I know there is a website where I can find that.” Ms. Silver expressed the value of technology as instructional assistance to her as well, stating:

I like that some apps and programs can track, do some tracking for us. And that you can assign practice for kids that is targeted because there are not enough bodies [teachers] to target all the kids in all the areas that they need. It’s good practice for them to use it immediately in a fun way.
Ms. Adams also shared how the DEA streaming videos impacted learning by explaining that they provided, “good education things you can put in front of your kids. […] Even to this day that is probably the one thing I like the most.”

In the computer lab, Mr. Brown valued the individual instruction time he spent with his students. He shared, “And it really allows me to work with the students who are struggling….” Ms. Kasey liked the fact she could differentiate her reading instruction through the use of Kids A to Z on the individual student computers, noting, “It just gives each of the kids the opportunity to read at their own level.”

The four first-grade teachers voiced a high level of concern for convenience when using instructional technology for reading instruction as well as individual student learning. Convenience came in forms of simplifying their work, easy access to resources, and obtainability of technology. Individual student learning was addressed through the ability to differentiate lessons for individual student needs using web-based programs that matched the current curriculum. The teachers also perceived student motivation and high engagement as a success, in turn, playing a part in their decisions to implement technology for literacy instruction. This will be explored in the next section.

**Student Motivation and High Engagement**

Student motivation and high engagement in literacy tasks were perceived successes for the first-grade teachers when implementing instructional technology in literacy instruction. Student engagement has received significant attention from a number of researchers as it relates to the learning process. Taylor and Parson (2011) conducted an extensive literature review on the definition of student engagement and found differences in
the researchers’ definitions. Most would agree, however, that student engagement at least requires commitment and investment into a learning task. The first-grade teachers perceived their students were highly motivated and engaged when their literacy lessons used instructional technology.

For example, Ms. Adams explained that using the SMARTboard during whole group lessons motivated her students. She shared, “If they know it’s going to be their turn, then they’re excited about that.” During an observation, the researcher noted the excitement of three children when they were given extra computer time for the listening to reading component during Daily 5 in Ms. Kasey’s class. The students quickly put away their writing materials and scampered over to the computers when they were told they could have extra time on the computers. Ms. Kasey explained, “I think they really like using it and it keeps them like engaged, basically they know if they haven’t done well on their writing they don’t get to do the computer, so that keeps some of them working.” Mr. Brown shared how motivated his students were about using the computers in the computer lab. He stated, “They love being in the computer lab. They love being on those computers.” He continued by explaining that he is able to keep his students motivated and on-task by “rewarding them with a little free time for exploring afterwards.” All the students in Mr. Brown’s class were actively working on the learning tasks displayed on the computer screens the entire time they were in the computer lab, which could be perceived as high engagement, too.

Ms. Silver spoke about a website she uses that was factual and engaging for her students. “I am also a big, big fan of a particular website: Brain Pop Jr. I think they are so engaging and they’re really factually correct,” she said.
Additionally, the first-grade teachers discussed perceived successes when students were interacting with technology during their reading lessons. When using the SMARTboard for SNM, Ms. Adams said her students were always engaged. She explained, “They can get up here and touch. It’s a lot more engaging than sitting here with a magazine in front of you.” The researcher observed Ms. Silver’s students using the SMARTboard, in a small group, interacting with the text by moving words together that matched a particular sound. She shared her decision about choosing this activity as, “I think it is very exciting and I think it is a good way to engage kids.” Ms. Silver stated she used technology for reading instruction because “I like the very engaging aspect of it, that is, [what it] can be for kids.” She continued using the word “engaging” when she spoke about different websites she used with her students, such as that Starfall was “really engaging” and Brain Pop Jr. was “so engaging.”

Mr. Brown’s students were observed sequencing a story at the SMARTboard. He explained:

It’s almost like puzzle pieces. There are six scenes and they have to put the scenes in order of sequence from the story. So I have students come up to the board and move the puzzle pieces to go from one to six. And that is really interactive.

Mr. Brown and Ms. Kasey’s students were observed physically interacting with the SMARTboard, circling word parts and locating and underlining vocabulary words that accompanied their basal story for the week. Mr. Brown said he decided to present the lesson this way “because it is more interactive with students.”

Ms. Adams’s students were very engaged when using the SMARTboard to complete a Venn Diagram, comparing two versions of Cinderella. Students sat on the rug very attentive
to the SMARTboard. She explained, “I spent a little longer with it because I felt like they were sticking with me so I am going to take advantage of that.”

Students who were observed working independently on individual student computers also appeared to be highly engaged, as they interacted with the text and stayed on task for their entire allotted activity time. In Ms. Adams’s class, a student was on the Starfall website. He used the mouse to click and drag a word from the word bank and move it onto the correct blank space to complete the sentence. The computer then read the sentence for the student, to check for accuracy. The student had an opportunity to change the incorrect word and choose a different word until the correct word was chosen. The student continued with the word choice until all blank lines were filled. The student was engaged with the activity until the bell chimed and it was time to move to a different station. The student worked on the website the entire time and was not distracted by other learning activities that were occurring simultaneously in the classroom. Another student in Ms. Adams’s class was listening to reading and expressing his excitement and saying aloud, “200 pounds!” The student was listening to a non-fiction text about a wrestler and tapped his neighbor on the shoulder to share what he had learned.

In the computer lab, students in Mr. Brown’s class appeared to be self-directed and were able to individually choose available websites they found most engaging. Mr. Brown explained, “It is really practice. I use it as a way to monitor what they are doing…I would rather see what they are interested in and what they are doing.” The students appeared to be motivated and engaged to a high degree because of the opportunity to choose their own activities.
The first-grade teachers perceived that student motivation and high engagement were strong, successful reasons to include instructional technology during and for literacy instruction in the classroom. During the interviews, some of the first-grade teachers described their students as being excited and engaged when interacting with instructional technology. They also shared that their students really liked being on the individual desktop computers. Throughout the study, however, there was no discussion or evidence provided that students’ literacy skills increased in relation to the implementation of instructional technology for literacy instruction. Individual students’ successes were discussed by two of the classroom teachers, but there was no discussion about the overall success for the broader group of students. The next section discusses the first-grade teachers’ perceptions of what was least successful when implementing technology for and during literacy instruction.

Least Successful Factors

Providing instructional technology for literacy instruction can be challenging based on factors that influence successful implementation. These factors, which included time constraints, student knowledge of technology, and the technology tools and programs, limited the teachers’ use of technology in the classroom in this current study.

Time Constraints

During the interviews, the first-grade teachers expressed that time constraints were an issue, whether they were spending too much time looking for websites, programs, and applications or the lack of time to teach the students new things with technology. For example, when searching for websites Ms. Adams stated, “I don’t mind doing searching but
my time is limited.” Ms. Kasey expressed her feeling on searching for websites saying, “I am not going to spend an hour trying to figure it out. It is definitely not my first priority.”

Ms. Silver felt that the downloading of applications was a big time constraint for her. She also shared when the applications were installed, “learning how to use them yourself and then teach the kids how to use them and so it’s such a time-consuming process.” Ms. Silver noted there was one teacher in the building who was “in charge of getting the applications on [the iPads]…and there is usually a long wait period.” Other teachers in the building cannot download applications to school equipment. As stated earlier, Ms. Silver and Ms. Adams did share applications they found with each other, helping navigate the time constraint to some degree, but the researcher was not aware if they were shared with Mr. Brown and Ms. Kasey.

Finding time to determine the usefulness of a program for literacy instruction was also an issue discussed by the first-grade teachers. Ms. Silver stated when she found a new application she thought she might include in her literacy lesson, “I didn’t have enough time to play around with it, especially the one in particular that I wanted to use.” She stated she tried the application on her phone first and went in as a student to make sure it would be successful for her students individually as well. There was no other discussion of the first-grade team assisting each other with finding applications for their literacy lessons that could be implemented and used successfully for all first-grade students.

Ms. Kasey expressed time constraints were an issue for using the computer lab.

I don’t have time to find different websites. We are only in the computer lab for 20-25 minutes, I think. I don’t think out of the box or make any extra effort to find something different because if I’m going to spend, I don’t know, say 45 minutes
finding a cool website to use and we are going to go into the computer lab and use it for 20 minutes, I don’t know, it’s kinda a waste of my time.

Ms. Kasey stated throughout the study that she knew how to use the computer but did not find it to be a vital tool for her instruction, as the amount of time and planning it took to use the technology was not a priority. She went on to say she was from a “generation of instant gratification,” and that “These kids are even more instant gratification than I am.” That statement helps explain why she did not want to spend time searching for websites for her students, as she expected the websites to be there already. Ms. Kasey continued, “If we spent more time on it [computers], maybe it would be better, but at this point we don’t have the time, and we don’t put the effort into using the computer [for students] as much.”

Time constraints emerged as a pattern for three of the four first-grade teachers while implementing instructional technology for literacy instruction. Time to search for and familiarize oneself with the applications and actual time using the instructional technology tools were all determinants for successful implementation. However, it was revealed in the interviews that time could be conserved with more technology support resources. Ms. Adams explained:

If they already know of things [tech support], I’d love if they would just whip it on me. You know, get us hooked up with that and then just give me my information. Here you go, here is the sign-in, here is the password. Feel free to use it.

Ms. Kasey added:

I think it would be great if someone said, hey Ms. K, we know of this cool website that would be really beneficial and it would be really good if your class could use it three times a week. Something like that. If they [tech support] were there to tell me what to do and how to do it, yeah, I think it would be good, but there is no one around.

When looking for assistance in selecting websites to use with her students, Ms. Silver stated:
I wish they [tech support] would come up with at least a handful of basic apps, especially now that they’re in most buildings, iPads are in most buildings and I’m guessing that every building is requesting the same, at least a handful of the same apps. So I really think that is a problem.

Mr. Brown was the only first-grade teacher who did not specifically mention an issue with time to find websites, but he did express that he was “looking forward to learning more about that [the SMARTboard] and added, “technology in the classroom is on my list to do.” The data suggests that Mr. Brown also felt time constraints were an issue when implementing technology for literacy instruction through his desire to better understand and learn more about technology. The next section presents the first-grade teachers’ perceptions related to how student knowledge of technology factors into their use of technology in their instruction.

**Student Knowledge of Technology**

The interviews and observations revealed that students’ knowledge of how to use technology was an obstacle in implementation. Once again, knowledge and acceptance of technology tools and programs played a factor in the teachers’ decision making regarding implementing technology for literacy instruction. Ms. Adams shared:

The children need to know how to do it. They won’t survive without it. They can’t handle technology. I would love to see…just basic computer navigation skills, internet skills. Most of my issues and stress that we have in here even with just 4 kids on the computer is that they don’t know how to navigate and I call them happy clickers. And I know that part of that is just development but the other part of that is sometimes they just don’t know.

Though Ms. Adams mentioned she feels the students need basic computer skills, it is not something she is willing to invest her time in instructing. She explained:

I am afraid to open my mouth about that because I am sure that will become the classroom teacher’s responsibility and I am not sure when I am going to squeeze that in.
Ms. Adams perceived that the responsibility of teaching computer skills to her students would become her responsibility if the issue was brought forward; therefore, the issue was not addressed or resolved. Ms. Adams continued:

That is going to be their platform. Using paper books is on its way out and these kids don’t know how to navigate the Internet. If they don’t know how to navigate the websites and look for clues there, if they don’t have the vocabulary that they need to use to get to websites, they are in trouble.

Ms. Adams sees the transformation to digital text as an issue for students, but she was unable to supply any explanation of how to assist her students in navigating the Internet. Ms. Silver also shared Ms. Adams’s concerns about students using instructional technology when searching for websites. She said:

Finding time in the routine to teach them how to navigate the apps that I found and when it is appropriate to use them and how to use them how to sign on and how to take the pretest and once the pretest is done, then what do I do, … those kinds of things, so that’s a real frustration. So I really think that is a problem, especially at this level where kids are not great at typing in web addresses and so if we can’t do that and try and get 26 web addresses entered, that’s a huge, huge, hindrance.

Ms. Silver noted time as a barrier in assisting her students to navigate different websites and their lack of technology skills as a hindrance in including more technology into her literacy lessons.

Though students in first grade have access to technology in kindergarten and most also have access at home, the first-grade teachers voiced that students should have some formal training with technology in order to help them better problem-solve. For example, the researcher witnessed students having difficulties locating websites and navigating technology when they were working independently on the individual student computers and even in small
groups at the SMARTboard. While observing in Ms. Silver’s classroom, the researcher saw that a young boy could not locate the assigned website on his computer. The teacher’s aide assisted him in locating the site and he was able to proceed. That particular incident happened twice during the one observation, suggesting that some students had difficulty navigating the websites and needed help to continue with the activity.

During a different lesson, the researcher observed students working in a small group on the SMARTboard playing a word match game. One student pressed the wrong button and the SMARTboard screen disappeared. Collectively the students were unable to bring back the activity on the screen. In order to continue with the word match game, Ms. Silver stopped her small group lesson to assist the students at the SMARTboard in locating the web page.

Regarding concerns about student knowledge of technology, Ms. Kasey shared, “I don’t really put that much emphasis on it [technology]. Some of them know how to use it better than others because they use it at home. I don’t think it makes or breaks their education.” She continued to say, “Everything we do for reading is so paper based, that I feel the 10 minutes they have a day on the computer, if that, doesn’t help them at all.” During a regular school week, Ms. Kasey’s students did use the individual student computers during their 20-minute listening to reading component for Daily 5 each day and for 30 minutes a week in the computer lab. This was slightly more time on the computers than she stated in her lessons plans but variables such as fire drills, testing, and unavailability of the computer lab all factored into the time her students were actually using technology daily.
Though Ms. Silver’s implementation of technology during her reading instruction was more varied than Ms. Kasey’s, the emphasis she put on students’ use of technology mirrored Ms. Kasey’s thoughts. Ms. Silver said:

I don’t want all of their reading to be off of a computer either. I think it is very exciting and I think it is a good way to engage kids. I want it to be like Daily 5 where they do have to have a book in their hand a couple of times during the day. I think there needs to be a balance. Especially, at this level because they spend too much time in front of technology.

The first-grade teachers expressed that the lack of the students’ knowledge of technology tools and programs determined their actual use of technology during literacy instruction. Some first-grade students were unable to demonstrate the ability to navigate the computer, show patience with changing applications, or problem-solve computer glitches. The extent to which technology tools and programs factored into the implementation of technology for literacy instruction is explored in the next section.

**Challenges with Technology Tools and Programs**

During the study, the use of technology tools and programs was sometimes challenging for the first-grade teachers. Whether it was a lack of knowledge as to how to use the instructional technology or a lack of resources, these challenges became a deterrent to implementing instructional technology during reading instruction. Ms. Adams said she was challenged with instructional technology especially when not feeling confident with it, but “If I am confident with it, it’s no problem.” Mr. Brown labeled his computer knowledge as “a little bit below average” and described his hesitation with using iPads as “a little bit of fear there as to whether or not I can control what they are doing or learning.” He continued to state, “I do
want to get my students interacting with them [iPads], definitely. Because that is the real world. And they are doing it at home.” Mr. Brown shared his below-average computer knowledge had been a hindrance for him when implementing technology into his classroom. Mr. Brown’s self-reported below-average computer knowledge or low technology efficacy transferred to the amount of technology his students used during the literacy block. During the three reading lessons observed, the students in Mr. Brown’s class were only using the SMARTboard for a whole group activity for half of the reading block. The other half of the reading block consisted of independent worksheets.

Ms. Adams also shared that sometimes websites were blocked, down, or too slow and she would have to find alternative sources. She explained:

I shy away from making that my first choice for them [if a website is down] because there are a lot of other less challenging fun options for them in the form of games many of them, if I let them go on the website all the time, they would simply play games and not do what they are supposed to do.

Ms. Kasey also expressed challenges with websites, noting, “Our biggest issue is when the website doesn’t work.” She shared, “One time the computers were down and I told them to go to ABCya…and they started to build robots and I had to stop them…they are actually playing games instead of listening to reading.” Ms. Kasey continued sharing that sometimes steps taken to enter into particular websites were extremely challenging. She explained, “So when I was finally told how to do the Pearson website, you have to enter in from the [district] website, then enter into the easy bridge, then from the easy bridge, you enter in here, which seems really silly.” Ms. Silver stated her challenges stem from her computer tools:

When it works and when it doesn’t. I have a computer right there and … now the sound doesn’t work on it. It worked when he came [tech support]; it didn’t work prior
to that and then didn’t work after that. So that’s a challenge with whether or not it works.

Ms. Silver explained she used technology:

…much more interactively and did much more [before Common Core Standards]. Many more games during, like, Daily 5 and things like that. But I think it’s more difficult to individualize from center to center or rotation to rotation and so it’s not used nearly enough in that capacity.

Mr. Brown explained his challenges were the actual technology tools, as well. He said:

I think more than anything I find the SMARTboard a bit cumbersome…I know it is supposed to be…you know the touch part problematic. Sometimes you touch it and nothing happens, which is kinda annoying. And there is also an audio portion that is on a SMARTboard. I can play stuff that goes but it you touch it to make the audio, often most times it won’t work. So like in the Reading Street, it will have the audio and you go to touch it for it to read to the students and it won’t do it.

The individual student computers became a frustration for Ms. Kasey, as she had only two student computers in her classroom, “which makes it really difficult with rotations because they have to double up on the computers …. other classes have four or more computers.” She went on to explain that her administrator was aware of her low number of student computers and her administrator “did tell me she was going to get me another computer a couple of months ago…I don’t have another computer. I don’t care. I’m not going to complain about it.”

Though Ms. Kasey claimed she was not concerned about the low number of student computers in her classroom, it was an issue she mentioned three different times during interviews. Ms. Kasey also expressed challenges with the mechanics of her student computers, saying:

…there is also the knob on the computer that changes the sound and so [students] turning the knob, turning knob, [to increase the sound], oh, it doesn’t work. So that’s like my biggest, honestly my biggest frustration with technology, those stupid knobs.
Overall, time constraints, student knowledge of technology, and technology tools and programs were identified as challenges for the first-grade teacher when implementing technology for literacy instruction. Patterns emerged where some time constraints could be alleviated if more technological support was available. It was revealed students’ knowledge of technology was not as sophisticated as desired by the teachers, as many of the students were unable to problem-solve some of the computer mishaps. Problems arose when the technology tools were not working properly and when websites and applications were unavailable for a variety of reasons or were not user-friendly for the teacher. These challenges help explain some of the issues that hindered the teachers’ use of instructional technology for and during reading instruction.

Summary of Findings

The findings of this study contribute to ongoing research regarding the factors that influenced teachers’ decisions to use instructional technology for literacy instruction. Through data gathered over a five-month period, it was evident that teachers’ knowledge of technology and the resources available to the teachers were the main factors contributing to their decisions to use instructional technology for and during literacy instruction in their first-grade classrooms. In other words, teachers’ knowledge, knowing the instructional technology tools and programs along with obtainable technology resources, determined how the teachers used instructional technology for literacy instruction.

Chapter Summary

Chapter 4 presented findings related to the factors that influenced the first-grade teachers’ decisions to implement instructional technology for and during literacy instruction. The data
revealed that the teachers’ knowledge of the technology tools and programs as well as the obtainable technology resources were the main factors that influenced the four first-grade teachers’ decisions to use technology for literacy instruction. In Chapter 5, the researcher provides a discussion of the findings, conclusions, limitations, implications for practice, and suggestions for future research.
CHAPTER 5
DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

The findings in this current study support the literature of influences educators endure when implementing technology for literacy instruction (Brinkerhoff, 2006; Carver, 2016; Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2011; Ihmeideh, 2010). This study was an exploration into the contributing factors that influenced first-grade teachers’ decisions to implement instructional technology into their literacy instruction. This study used qualitative research techniques, and through the examination of observational field notes, interview transcripts, and teacher lesson plans, contributing factors in the teachers’ decisions were identified. The contributing factors identified were teacher knowledge and acceptance of technology and resources. The following section will provide a discussion of those contributing factors reported in Chapter 4 as well as implications for practice and suggestions for future research.

Teacher Knowledge

The collected data revealed that the teachers’ knowledge of the technology tools and programs available was a contributing factor in deciding whether or not to implement instructional technology for literacy instruction (Putnam & Borko, 2000). The first-grade teachers demonstrated moderate knowledge of how to operate the technology and programs and they did not take full advantage of all the instructional technology tools available for instruction. Research shows that teacher knowledge and beliefs play an important role in
implementing instructional technology in the classroom (Ertmer & Ottenbreit-Leftwich, 2010; Hutchison & Reinking, 2011; Ihmeideh, 2010). In this study, the four first-grade teachers’ knowledge and acceptance of technology guided their decisions to use technology tools and programs for literacy instruction, whether they used the SMARTboards, individual student computers, or iPads, and the amount of time students spent using the instructional technology during their scheduled literacy blocks.

Personal knowledge of technology was applied when teachers brought what they already knew about technology to their classrooms. That personal knowledge, gained through their engagement with their own environments and with their interactions with other teachers, was applied to their literacy lessons (Pella, 2011). The teachers demonstrated their technological knowledge when downloading materials from websites, accessing Google, YouTube, and other Internet resources.

Instructional technology was viewed as a positive addition to the first-grade teachers’ literacy instruction in this study for a number of reasons. The first-grade teachers expressed that using the technology tools provided a convenient way to deliver information, and they reported high student engagement when using technology (Carrington, 2005; Rasinski & Padak, 2011; Reiser & Dempsey, 2012). These technology tools gave students the opportunity to be interactive with the content and supported interaction in the literacy lesson (Rose & Dalton, 2009; Macaruso & Rodman, 2011). The first-grade teachers perceived that the SMARTboards and individual student computers enhanced the engagement of their students in their daily literacy lessons by incorporating multimodalities. This aligns with the research, which shows the integration of instructional technology using multimodalities.
enhances literacy instruction with the combination of the elements from digital text, visual images, audio, design, and graphics (Biancarosa & Griffiths, 2012; Cahill et al., 2012; Ciampa, 2012a; Couse & Chen, 2010; Jewitt, 2005, 2008; Jewitt & Kress, 2008). By using multimodalities, teachers perceived they were successful in increasing the engagement of their students with the content in their literacy lessons; however, this study did not measure the students’ engagement.

Using technology for differentiating instruction for student benefit was noted by teachers as positive in this study. The teachers perceived that the technology benefited student learning when technology was used to differentiate instruction for individual student needs (Goetze & Walker, 2004; Jeffs et al., 2006; Mills, 2006; Stetter & Hughes, 2010; Voogt & McKenney, 2007). Research has shown that integrating instructional technology using multimodalities can benefit students who are emerging and challenged in reading development (Levy, 2009; Macaruso & Rodman, 2011; Mioduser et al., 2000; Tracy & Young, 2007). During the study, the teachers shared their successes with using individual student computers to differentiate instruction. The student computers were used for practicing and reinforcing reading skills and strategies and providing appropriate reading levels for students to listen to reading. Teachers expressed that the self-paced applications (for example, students choosing books for listening to reading and choosing different phonics games on the student computers) were engaging practice tools they could use to customize instruction to individual student skill levels.

Not surprisingly, one of the impeding factors included knowing how to operate the available technology tools, such as iPads, SMARTboards, and desktop computers. Teachers’
direct knowledge and comfort level with the technology tools and programs corresponded to
the amount of time those specific technology tools were used during literacy lessons (Teo,
2002). Certain technology tools and programs were available—iPads, for example—but were
not used by all the first-grade teachers for reasons including insufficient training, lack of
technology support, complicated programs, and time constraints.

Obtaining and maintaining the instructional technology tools and programs also
influenced the first-grade teachers’ decisions to deliver literacy instruction using instructional
technology. The lack of technology support, whether through the curriculum or through the
district’s instructional technology department, factored into the teachers’ decisions to include
instructional technology for literacy lessons. The lack of technology support became a
determinant in using certain technology tools, such as the iPads, as the teachers expressed their
unfamiliarity with the operation of the tool or how to access appropriate applications. Adding
additional applications on the student computers for instructional purposes was difficult to
acquire as well. It was shared by the first-grade teachers that only one person in the
building was responsible for adding applications for teachers for the entire school, and
requests were not granted in a timely manner.

Another factor that teachers identified as influencing their decisions to use
instructional technology for literacy instruction was collaboration with others (Greenhow et
al., 2008; Stevenson, 2004). Evidence suggested the lack of collaborative planning and
sharing of ideas resulted in different use of instructional technology for literacy instruction in
each of the first-grade classrooms. Though limited, collaboration appeared to support the
teachers’ instructional technology use and delivery. The four first-grade teachers planned in
pairs and not as a grade-level group. The paired first-grade teachers only shared instructional technology ideas with each other and not the entire first-grade team. Each pair of teachers was using technology to deliver literacy instruction differently. In this study, the two teachers with more classroom teaching experience used more instructional technology programs for literacy lessons than the two teachers with the least classroom teaching experience. The sharing of technology programs occurred between the more experienced teachers and not the others. Ms. Silver and Ms. Adams used technology for phonics skills practice, differentiating instruction for individual students, whole group reading, and individual choice of listening to reading. Ms. Kasey and Mr. Brown only used the instructional technology for the latter two.

During the study, there were no professional development opportunities with instructional technology provided at the school and there was no district technology staff available to help support teachers’ use of the technology tools and programs (Brinkerhoff, 2006). Teachers brought to the classroom what they already knew about technology and incorporated their technology knowledge to enhance their literacy instruction.

Resources

Instructional technology resources include the technology tools and programs used to support teachers’ instruction and student learning (Lockee & Reiser, 2006). The data in this study revealed that the obtainability of some of the resources was a deciding factor in whether teachers implemented instructional technology for literacy lessons, as they perceived some of the resources as a barrier. Barriers to instructional technology were found throughout this qualitative study as influencing the teachers’ decisions to use instructional technology. The barriers were both external and internal (Ertmer, 1999). External barriers came from difficulties
obtaining new applications, technology not functioning correctly, and lack of technology support for trouble-shooting or repairing devices. Websites, though described as easily accessible by the teachers, were an issue when they were not working properly or were difficult to manipulate. Also, decisions to implement instructional technology relied heavily on the available programs being “user friendly and kid friendly.”

For this group of teachers, the iPads became a barrier, as they were not utilized by any of the first-grade teachers due to their perception of their lack of obtainability and support, whether it was the actual operation of the iPads or lack of applications available on the iPads. The computer lab was also perceived as a barrier by some of the first-grade teachers, as it was not supported by a technology assistant and was therefore used only by two of the teachers for literacy instruction.

Additionally, the teachers’ perceptions and attitudes played an important role in the implementing of technology for literacy instruction (Hutchison & Reinking, 2011). Time to search for and learn new applications for instructional supplementation was perceived as a problem for the teachers and was not resolved or addressed during the study. The inconvenience of requesting new applications from technology support was an overall concern. Teachers spoke of requesting applications as a “hassle” and a “struggle” and discontinued their requests when there was no apparent follow-through with a response.

Internal barriers came from teachers’ low self-efficacy and prior experiences with technology. The amount of technology used generally correlates with the teachers’ comfort level with technology (Teo, 2002). Mr. Brown’s hesitation with using iPads for instruction with his students correlates with research on technology self-efficacy. Teachers with low self-
efficacy toward instructional technology are not as likely to implement it in their lessons (Teo, 2002). Ms. Adams’s decision to withhold computer lab time from her students was due to prior experiences with students’ use of technology. The current students’ knowledge of technology was limited and they needed constant support with the technology tools to be successful. Without technology support to assist her students, Ms. Adams chose not to use the computer lab.

There was no technology support, curriculum, or explicit expectation that the teachers use technology in their instruction. The decision to implement any of the available instructional technology tools and programs for literacy instruction was solely up to the classroom teachers’ discretion. Teachers used the available technology as a replacement tool such as SMARTboards being used as a movie screen or a digital whiteboard. Individual student computers were used for listening to reading and skills practice, replacing worksheets, and teacher read alouds. Other than students’ physical interactions with the SMARTboard activities, all literacy activities observed could have been accomplished without the presence of instructional technology tools. In other words, the literacy activities could have been implemented through traditional instructional tools such as worksheets and workbooks.

The data also showed that the teachers’ perspective of the limited amount of resources influenced their decisions to use instructional technology for literacy instruction. The teachers used only SMARTboards and student computers for their literacy lessons. With only two to four computers in the classroom, students’ computer time for listening to reading and skills practice was restricted. Time in the computer lab was also inadequate, as it was limited to one day a week for no more than 45 minutes. Also, websites used during the observed literacy
instruction did not vary. During twelve literacy lessons, the researcher observed only two
different sites presented to the students on the SMARTboard: Scholastics News Magazine and
basal websites, even though different websites were mentioned as successful during teacher
interviews.

Based on the findings of the study, six conclusions were drawn. In this section, each
conclusion will be presented and discussed.

Conclusions

First, teachers attributed the lack of training as a barrier for implementing more
technology for literacy instruction in their first-grade classrooms. There were no opportunities
for professional development during the study to utilize the technology tools and programs
more effectively and efficiently. All of the first-grade teachers voiced concerns about the lack
of resources in the form of professional development, indicating this was a true barrier for
implementation of instructional technology in the classroom. Research has shown that with
professional development, teachers’ attitudes toward instructional technology in the classroom
can improve and therefore increase technology use (Brinkerhoff, 2006; King, 2002; Moore-
Hayes, 2011; Pan & Franklin, 2011; Swackhamer et al., 2009; Teo 2002; Topkaya, 2010).
Research has demonstrated that through professional development with using technology in
the classroom, teachers have changed their teaching methods and preparation and were
found to have higher self-confidence in using technology for instruction (King, 2002).

According to Mr. Brown, little training was provided on the iPads, which resulted in
his low comfort level, and not introducing the iPads to his students this year. Ms. Kasey
stated she struggled with the online basal reader component and during the December 9th
interview shared: “I really just started using the SMARTboard, like, four weeks ago.” The need for professional development was revealed when the teachers answered other questions during their interviews. For example, Ms. Silver said, “I could use some of those [technology] skills as well.” Mr. Brown stated: “So I am looking forward to learning more about that [Smartboard].” Ms. Adams explained: “So it means sometimes I don’t pick up on the technology ideas that perhaps I should.” The lack of professional development and technology support limited the use of technology in the first-grade classrooms.

Some districts have made technology-focused professional development a priority. Community Consolidated School District 54 in Schaumburg, Illinois, has created ongoing professional development for their staff that focuses on changing teaching methods and making teachers facilitators of technology using a multi-dimensional approach (https://sd54.org/). District 54 committed to improving the quality of teaching and changing instruction to a more student-centered environment. District 54 teachers attended sessions during monthly student early release days using a modeling and peer-coaching method to help teachers integrate technology and become facilitators with technology as the tool. The technology workshops were geared to supporting student learning such as reading, writing, and collaboration. Additionally, each school building in District 54 had a member from the district’s specialized technology team that was in charge of reviewing software programs and websites, creating curriculum resources, and supporting teachers in the classroom with technology.

Secondly, according to the participants, the first-grade teachers in this study did not work as a cohesive, collaborative team, which created a barrier for expanding the use of
technology for literacy instruction in the classroom. Peer and teaching partners have been cited as providing consistent support for instructional technology ideas and applications (Stevenson, 2004). Walker and Shepard (2011) found that when knowledgeable individuals shared their successes with instructional technology innovations with less experienced teachers, the successes influenced the teachers’ use of more technology. The first-grade teachers in this current study did not plan together weekly to share curriculum ideas, resources, strategies, or technology use. This lack of collaboration appeared to stall the use of technology for literacy instruction, as the two monolingual teachers used technology for literacy instruction differently than the two bilingual teachers. The less experienced teachers were unable to gain support through collaboration from their colleagues to increase their instructional technology use in the classroom.

The teachers did, however, collaborate minimally with the teacher who taught the same curriculum, whether monolingual or bilingual education. These paired collaborations consisted of two teachers sharing ideas during convenient times during the school day and not during formal scheduled meetings. These paired collaborations of the first-grade teachers also appeared to be linked to the amount of teaching experience they had. The two monolingual teachers had at least ten more years of teaching experience than the bilingual teachers at Stone Elementary. The monolingual teachers also had teaching degrees which they applied to their curriculum discussions. The bilingual teachers, however, were both working with a provisional teaching certificate. Their required bachelor’s degree to receive the provisional certificate did not have to be in education. In the researcher’s experience, teachers with more experience are usually more resourceful than newer teachers. Generally, seasoned teachers become mentors to
new teachers and work closely together to provide support, ideas, and instructional materials. Mentors are knowledgeable individuals in your specific field who guide you to best practice in your instruction. In this case, however, Mr. Brown was Ms. Kasey’s mentor, appointed by the school’s administrator. Mr. Brown was a relatively new teacher himself, only working in his second year as a bilingual first-grade teacher. Ms. Adams and Ms. Silver appeared to respect the administrators’ decision to appoint Mr. Brown as Ms. Kasey’s mentor and as a result they were hesitant to intervene in terms of sharing suggestions. Another factor that may have caused Ms. Adams and Ms. Silver to be hesitant to intervene with additional support was the fact that as monolingual teachers they did not have knowledge of bilingual education methods and were cautious of providing misinformation. The combination of these factors became a detriment to the complete collaboration of the first-grade team.

Another conclusion from this study was that there was no specific expectation for the first-grade teachers to include technology in literacy instruction in their classrooms. The absence of a technology curriculum or any accountability to use instructional technology resulted in the technology not being utilized to its full potential by the teachers or the students. The first-grade teachers were not unified in their understanding of the district’s expectations for using instructional technology; therefore, they differed in its use. Without a clear standard for technology use, the amount of technology used for literacy instruction was at the discretion of the teacher and was determined by the teacher’s comfort level with technology and the obtainability of the technology tools and programs. None of the four first-grade teachers mentioned gaining any recent technology knowledge from professional development sessions, university courses, webinars, conferences, or journal articles.
Research has shown that time spent in training and time spent exploring technology is essential in teachers implementing technology in the classroom (Vannatta & Fordham, 2004). This training could be supported through a district-wide technology curriculum. By creating an instructional technology curriculum, uniform use of technology instruction can occur as well as accountability to meet the technology standards. Many school districts have adopted the International Society for Technology in Education (ISTE) standards into their technology curriculum to support student learning and teacher instruction (http://cnets.iste.org/). The ISTE, formally known as the National Educational Technology Standards (NETS), has created standards that support instructional technology in the classroom. The standards are divided into six broad categories and describe the skills and knowledge students need to learn to be successful in the 21st century. The 2017 standards listed for students are creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving and decision making, digital citizenship, and technology operations and concepts. The ISTE also has standards for teachers to help model and apply the standards by creating learning experiences that engage students and enrich instructional practices. At time of the current study, the 2017 technology standards for teachers were not available. The 2016 standards listed for teachers were facilitate and inspire student learning and creativity, design and develop digital-age learning experiences and assessment, model digital-age work and learning, promote and model digital citizenship and responsibility, and engage in professional growth and leadership. Plainview-Old Bethpage Central School District in Plainview, New York, for example, has created a technology curriculum guide for grades K-12 (www.pobschools.org/). Their technology curriculum guide states:
Students will utilize powerful technology tools to express their ideas more clearly; to access information beyond anything in traditional classrooms today; and to assist them in collaborating with other students around the globe on projects that have a real impact on the community (p 5).

The six standards are addressed at each grade with performance indicators and instructional guidance. Instructional technology curriculum guides should be explicit, describing the standard, the student outcome, the support indicator, and provide instructional guidance for classroom teachers. Franklin Township School District’s instructional technology curriculum guide (www.ftschool.org/, Quakertown, NJ) provides all of the standards and gives teachers examples of how to measure mastery for each standard. For example, the kindergarten standard for applying existing knowledge to generate new ideas, products, or processes can be accomplished through students using an online application or program to produce a digital alphabet book or other digital stories. By providing a technology curriculum guideline that provides clear instructional guidance, and effective support and training with technology, teachers may have successful experiences with instructional technology and increase effective integration of technology and literacy instruction.

This researcher also concluded that, according to the first-grade teachers, instructional technology did not transform their traditional literacy instruction to student-centered practices. This was clearly voiced with Ms. Silver’s comment: “Basically I took it out of the manual and put it on the board so it was interactive.” The first-grade teachers found ways to use instructional technology to deliver literacy instruction electronically as they previously did without technology. Research has shown that many teachers struggle with transforming their traditional teacher-based literacy instruction to more student-centered instruction
(Greenhow et al., 2008; Hutchison & Reinking, 2011). Data suggests that many teachers do not consider new literacies, such as reading and writing on blogs, online chats, or emails, to be important for literacy instruction, and teachers’ lack of understanding of how to integrate technology into literacy lessons is a problem (Hutchison & Reinking, 2011). Without additional guidance and support with technology, the first-grade teachers used what they knew about the first-grade literacy curriculum and their students’ needs. They were comfortable using the instructional technology tools that were available in their classrooms to deliver pieces of their literacy lessons. The four first-grade teachers were able to combine traditional instruction with digital resources and they all had positive attitudes about implementing technology for literacy instruction, as they perceived they were enhancing their literacy instruction. The teachers enhanced their literacy lessons through the use of different multimodalities found on the Internet and loaded applications on the computers such as a text read to the students, sounds to correlate with correct answers, music, or video clips. Teachers made decisions to enhance their literacy lessons using instructional technology when instructing their students in interacting with text, shared reading, listening to reading, whole group instruction, small group instruction, and individual instruction. Research has shown the integration of instructional technology using multimodalities enhances literacy instruction with the combination of the elements of digital text, visual images, audio, design, and graphics (Biancarosa & Griffiths, 2012; Cahill et al., 2012; Ciampa, 2012a; Couse & Chen, 2010; Jewitt, 2005, 2008; Jewitt & Kress, 2008). Teachers with reputations of utilizing technology successfully with multimodalities for instruction in their classrooms have found using instructional technology improved some learning activities but traditional methods
proved better in other situations (Walker & Shepard, 2011). These teachers made decisions of when the technology tools and programs were the best choice for learning. The teachers also recognized the careful balance between when it was most beneficial to deliver instruction through the use of technology or traditional methods. Traditional instruction and technology integration relied heavily on the students’ abilities.

Another conclusion of this study was that the lack of technology support became a barrier for implementing more technology tools and programs for the first-grade teachers. Equipment availability, whether it is perceived as unavailable due to lack of support or because it is not in working condition, had a great influence the use of instructional technology in the classroom (Carver, 2016). The unused iPads were a direct result of lack of technology help to assist the teachers in working with the students on the iPads. Even though the first-grade teachers expressed desire to use the iPads in their classroom, the perceived difficulty in using this technology tool in their classroom with their students out-weighed the benefits of implementing them in their literacy lessons (Davis, 1989; Davis et al., 1989). The computer lab was also underutilized, at least in part, because the teachers did not have access to support personnel to assist with technology concerns while in the lab. Research has shown the continuous support with technology tools and programs results in higher levels of technology integration (Brinkerhoff, 2006; Vannatta & Fordham, 2004). Teachers who are successfully integrating technology into their instruction report strong technological support as part of their successful implementation (Walker & Shepard, 2011). With technology support, teachers can seek assistance and remedy issues faster.
The Plainview-Old Bethpage Central School District (POBS) technology curriculum guide contains an expectation level that includes an integration support structure (www.pobschools.org). The support structure provides computer technology teacher aides as well as a library media specialist for all grade levels. Through this support system, teachers are provided with ongoing, sustained professional development. This professional development has four characteristics: development is encouraged by doing; learning is relevant to job experience; time is provided for reflection and collaboration; and there are strategies for ongoing communication. The POBS school district recognizes the significant time and effort needed for teachers to learn and use instructional technology for integration in the classroom. They developed and provided staff with an assessment rubric where teachers can measure their own utilization of their technical competencies.

Districts and schools can provide strong technology support in a variety of ways if providing additional personnel is not an option. Providing hands-on practice and opportunities to observe other teachers using different technology tools and programs can result in more implementation in the classroom (An & Reigeluth, 2011; Ertmer & Ottenbriet-Leftwich, 2010).

The last conclusion gained from this study was the first-grade teachers used instructional technology during their literacy instruction because it was perceived as convenient and familiar. Individuals tend to use technology applications if they perceive its usefulness in performing their jobs better and if the technology is easy to use (Davis, 1989; Davis et al., 1989). Ms. Adams shared: “I just pull it up online and use all the resources from there.” Research has shown that teachers’ perceived usability of the technology correlates highly to their intention to use instructional technology in their lessons (Holden & Rada, 2011). The technology was
perceived as easy to use and helped teachers simplify their work, as many programs and websites matched their current curriculum and are readily available. All first-grade teachers used the SMARTboard and student desktop computers to deliver pieces of their literacy instruction, as they were convenient and accessible in their classroom. They used familiar websites and applications such as Discovery Education, Raz Kids A to Z, Scholastic News Magazine, and YouTube to enhance their literacy lessons. Most teachers also used the basal reading series weekly story on the SMARTboard which provided online instruction that followed a familiar instructional pattern that was easy to implement.

The amount of time teachers spend using instructional technology increases their intention to use the tools in their instruction (Brinkerhoff, 2006; Vannatta & Fordham, 2004). The first-grade teachers found these tools convenient because they had spent time working and playing with the technology. They found value in their use for instruction and student learning, as it provided different engagement opportunities. Time was stated by the teachers as a barrier when it came to adding additional technology tools and programs for literacy instruction. By providing teachers time to explore new technology, applications, and websites, more technology may be used in future reading lessons.

Limitations

The present study involved the information gathered about the four first-grade teachers’ planning and technology implementation for and during literacy instruction. This information was provided to the researcher by the school administrator but did not necessarily represent an accurate portrayal of the teachers’ planning and technology use. A more in-depth interview with the administrator about the school expectations, as well as the district’s
expectations with technology and the available technology support, may have provided more insights into the teachers’ decision making for implementing instructional technology. Furthermore, conducting observations outside of the literacy block may have resulted in additional evidence about the use of instructional technology for literacy purposes in other subject areas not addressed during the 90-minute literacy block.

Implications for Practice

The findings of this study and the conclusions drawn by the researcher in this setting suggest a need for continuous professional development with technology and continuous technology support in assisting teachers to increase the use of technology in literacy instruction for student engagement and learning. Teachers’ knowledge and use of technology in the classroom have been shown to increase through professional development (Ball & Cohen, 1999; Brinkerhoff, 2006; Greenhow et al., 2008). Based on the findings of this current study, ongoing professional development on the available technology tools and programs could be initiated for teachers to help implement the technologies and programs successfully in the classroom. The first-grade teachers in this study did not take advantage of the opportunity to bridge the digital divide by using the iPads with their students for more technology use during literacy instruction in the classroom for a variety of reasons stated previously. The idea of the digital divide in this case refers to the gap between underprivileged students who do not have constant access to computers or internet in the home for educational and recreational purposes. It is important that classroom teachers provide more access to technology for these students as most students have learned to adapt
quickly to the technology tools and programs, know what technology tools they prefer to use, and feel comfortable in a digital space. It is important to remember that these 21st century learners today have grown up surrounded by digital technology and may be more comfortable with the tools and programs than their teachers. Mr. Brown explained it clearly:

I’m not sure I want to introduce this [iPads] to my students yet. I am sure my students would take to it probably better than I do, so perhaps there is a little bit of fear there as to whether or not I can control what they are doing or learning or whether I should control what they are doing.

Therefore, specific professional development would be beneficial, especially on using iPads, as all four teachers expressed frustration with obtaining and using that technology tool.

Recommendations for professional development include setting aside professional development time to allow teachers time to explore and use the new applications and programs while getting instructional technology support (Loreman et al., 2013; Topkaya, 2010). Such professional development would also need to start by providing training and support specifically tailored to the needs of the individual teacher, as most teachers are at different stages in their technology skill development. Finally, by scheduling professional development during the school day, teachers will receive the support they need to use technology well.

Each school needs a dedicated technology specialist to support classroom teachers and to trouble-shoot technology problems as well as providing suggested literacy web-based programs and applications that can be used in the classroom at each grade level (Walker & Shepard, 2011). This technology support specialist can provide a professional development plan that moves teachers from moderate users of technology to integrators over time. Additionally, this technology support specialist can provide opportunities for teachers to learn basic computer
skills they can apply to their classroom instruction and when working on the individual student computers in the lab or in the classroom. Increased knowledge of basic computer skills will then allow teachers to feel confident in increasing the use of technology in the classroom.

Teachers’ use of technology also increases through collaboration with other teachers more knowable about the technology (Stevenson, 2004). Therefore, it is recommended that the school leaders put into practice a time where teachers are exposed to new instructional applications, whether it be their common planning time, formal workshops, or during a PLC. School administrators need to encourage teachers and other supportive staff members to share applications and websites that benefit student learning and are easy to use.

Lastly, district leaders should develop a required instructional technology curriculum written for each grade level with guidelines and support for teachers when implementing instructional technology in their classrooms. The instructional technology curriculum guide could be very explicit, explaining exactly what standard is being addressed, a content statement (for example, “students will…”), the student outcome, name an indicator, and provide instructional guidance for classroom teachers so they are able to be successful. The guide also needs to include technology standards for teachers (http://cnets.iste.org/), such as: demonstrate effective use of computer systems and utilize computer software, use educational technologies for data collection, information management, problem solving, decision making, communications, and presentation within the curriculum. To summarize implications for practice,

- Professional development needs to be implemented with a variety of technology tools and programs with continuous technology support for teachers and students.
This support is tailored to the needs of the individual teacher and supports literacy learning goals.

- Each building needs a technology support specialist who rotates through classrooms co-teaching and modeling ways technology can be used to support literacy instruction.
- Continually provide opportunities for teachers to collaborate, share, reflect, and support each other with technology issues in a risk-free environment.
- Develop an instructional technology curriculum guide that is supportive of teachers’ instruction and provides instructional guidance for student outcomes. This guide should be based on the technology standards for students and for teachers.

**Future Research**

The findings of this study offer implications for future research related to the use of instructional technology for literacy instruction. This study focused on four first-grade teachers’ decisions to use instructional technology for literacy instruction, and found that collaboration in their lesson planning with using technology was limited. A follow-up study to the current study could examine the decisions of first-grade teachers who are collaborative in their lesson planning and technology use (King, 2002). The study could examine how they share ideas and plan lessons together, and how that collaboration impacts their use of technology during and for their literacy lessons. In addition, future research is needed to
determine how school administrators can create the climate and space for teachers to collaborate in order to support the implementation of instructional technology for literacy instruction.

Throughout the study, teachers shared that the lack of additional training on the technology tools and programs as well as the lack of technology support assistance impeded full implementation of instructional technology for literacy instruction. Future research needs to focus on schools that have been identified as having exemplary technology integration in the area of literacy and examine the contributing role of professional development related to instructional technology and the role technology support personnel play, within that context. School districts who are successful in integrating technology in the classroom offer continual professional development that is content-specific and have the addition of technology support personnel (Brinkerhoff, 2006). Research should also examine other factors that contribute to the teachers’ successful integration of instructional technology for literacy instruction in these schools. The findings could be significant for other schools that are attempting to effectively increase and enhance the ways instructional technology is used for literacy instruction.

There was no official technology curriculum in this current study that specifically addressed the expectations of technology use for literacy instruction. Without a technology curriculum, the teachers in this study were left to choose how and when to use the instructional technology for literacy instruction, and when to use more traditional methods instead of student-centered technology activities. This created differences in student engagement with technology in the four first-grade classrooms. More research is needed to understand how having a technology curriculum that addresses literacy instruction in student-centered approaches influences teacher practice and decisions (Foster & Wright, 1996). Researchers
could also look at the accountability required across and between grade levels to implement technology for literacy instruction. Findings could assist school leaders in understanding how having a technology curriculum and teacher accountability impact the use of instructional technology for literacy instruction and ideas for future directions with technology.

The first-grade teachers in this study used technology for literacy instruction, but they did not necessarily transform their instructional practices. Future studies need to examine how exemplary teachers use instructional technology to enhance and transform their literacy instruction from traditional approaches to more student-centered ones using technology tools (Walker & Shepard, 2011). Researchers are also encouraged to study teachers who effectively use instructional technology to enhance their literacy instruction to determine how those approaches influence student literacy learning, engagement, and motivation.

Future research studies could provide insights into how educational leaders can create school climates and curricula that support meaningful teacher collaborations related to technology integration in literacy instruction. Such research could include focus groups within the school building where teachers can voice their opinions and share ideas of using technology for literacy instruction. This might generate a technology support system between teachers that was unavailable before. In addition, findings could contribute to an understanding of how exemplary teachers use instructional technology to enhance their instruction, but more importantly, to support literacy learning, engagement, and motivation.

Final Thoughts

Technology has become prevalent in our personal and professional lives. Most classroom teachers are able to assist students with the 21st-century skills they will need for their
future. By using technology for purposes such as reading, writing, research, and analysis, students can improve their skills in communication, collaboration, critical thinking and problem solving, and creativity. The ISTE has released the National Educational Technology Standards for Students (http://cnets.iste.org/). There are six core technology components students will need to master for success in today’s society. According to the ISTE, when using technology students need to be creative and innovative, communicate and collaborate, research for information, problem solve, become digital citizens, and understand technology operations and concepts. Arranging student-centered activities with technology where students take responsibility for their own learning can help students master these skills. Through student-centered activities with technology, for example, teachers can empower students to build up their literacy knowledge by allowing students to be actively thinking about how to generate, obtain, manipulate, or display information they read. To transform literacy instruction and move to a true student-centered environment, teachers need to be creative and effective when using technology to meet students’ needs, knowing that technology is used to access and to differentiate teaching approaches, not replace them.

Though instructional technology has been welcomed in most classrooms, there are some potential issues with student and teacher use of the technology tools and programs. With social media being used by most students, there needs to be an understanding of the human, cultural, and societal issues related to technology so students are able to practice legal and ethical behavior when using technology in the classroom. Technology tools can also be a distraction for students as opposed to a learning tool. Teachers may find it difficult to monitor students closely to see if they are utilizing the educational application they have been assigned
to or if they are browsing another web page or playing a game. Also, teachers need to figure out how to use technology more to develop higher-thinking skills instead of using it as a supplement for instruction.

Though not required at Stone Elementary School at the time of the study, the implications that instructional technology be used for teaching purposes in every subject are imminent. Teachers today are facing challenges in their classroom unheard of fifteen years ago. With the new Common Core State Standards (CCSS) requiring students to have technology skills related to English language arts, integrating technology is one of those challenges. The first-grade teachers in this study found ways to use instructional technology as a supplemental teaching tool in their reading instruction for listening to reading and skills practice. However, instructional technology in the classroom can be used for so much more in literacy instruction, as it allows students to be creative with their learning. Teachers have begun to transform literacy instruction by using instructional technology and software programs in many classrooms today. They realize the importance of students being able to use technology tools and software programs for communication, collaboration, creativity, and critical thinking purposes. For example, extending traditional literacy experiences for critical thinking purposes by having students use effective search engines to locate and comprehend information found on the internet and then organize that information into graphic organizers on the computer. This information can be saved electronically in a file for future use. Other examples include students learning how to use the thesaurus on the computer to gain vocabulary knowledge of particular words in study. The student can then use the word processing application to write a sentence, along with creating a nonlinguistic image of the word with the drawing application,
demonstrating understanding of the definition of the word. Students can be taught to collaborate using instant messaging to pair-share their thoughts and answer questions after share reading time. They can join blogs where other students are reading the same book and contribute and comment on each other’s posting. Students can respond to writing prompts using Quick Write and save their responses in a file to be shared with peers. During worktime or literacy stations, students can use iPads in pairs and compose digital stories that retell a tale they read or turn letters into graphic stories using comic creators. Students can record their voice and a partner’s voice and create images that match their stories. PowerPoint can be used to create a slide show presentation summarizing a story they just read using words and pictures. By using Excel, student can create graphs and compare and contrast different story elements. Students can use Puzzlemaker to develop vocabulary crossword puzzles and word searches. They can also take a digital vocabulary trip or play online vocabulary games. ePals (digital pen pals) can be used to contact another class to carry on book discussions. The possibilities are endless and constantly evolving.

The four first-grade teachers in this study used the instructional technology available to them to the best of their knowledge and abilities. The first-grade English Language Arts technology CCSS states that the students need to use a variety of digital tools to produce and publish a written piece. If these teachers and others just like them are required to have their students meet the CCSS at the end of first grade, then easily accessible technology support is needed. At the conclusion of this study, the first-grade students in Stone Elementary school would have been unable to meet the first-grade CCSS in English Language Arts for writing pertaining to technology. Technology support needs to be a priority for our classroom
teachers to meet the English Language Arts standards. The technology support can take the form of providing ongoing professional development for teachers and for students not only in how to operate, apply, and trouble-shoot the technology tools, but with new programs and applications as well.

Teaching reading to first-grade students will always be a challenge. Teachers today face an increasing number of decisions involving technology and literacy instruction. Teachers and administrators need to understand fully that literacy education continues to change as we try to meet the needs of our 21st-century learners. Educators must make it a priority to be involved in the never-ending changes with the availability and application of instructional technology tools and frequently seek professional development. Only then can we truly meet our students’ needs.
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APPENDIX A

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL
TO: Teresa Schneider  
Literacy and Elementary Education  

RE: Protocol # HS15-0356 “A view of first-grade teachers using instructional technology for literacy instruction: The development of their knowledge and practice”

Your Initial Review submission was reviewed and approved under Expedited procedures by Institutional Review Board #2 on 20-Nov-2015. Please note the following information about your approved research protocol:


If your project will continue beyond that date, or if you intend to make modifications to the study, you will need additional approval and should contact the Office of Research Compliance and Integrity for assistance. Continuing review of the project, conducted at least annually, will be necessary until you no longer retain any identifiers that could link the subjects to the data collected. Please remember to use your protocol number (HS15-0356) on any documents or correspondence with the IRB concerning your research protocol.

Please note that the IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

Unless you have been approved for a waiver of the written signature of informed consent, this notice includes a date-stamped copy of the approved consent form for your use. NIU policy requires that informed consent documents given to subjects participating in non-exempt research bear the approval stamp of the NIU IRB. This stamped document is the only consent form that may be photocopied for distribution to study participants.

It is important for you to note that as a research investigator involved with human subjects, you are responsible for ensuring that this project has current IRB approval at all times, and for retaining the signed consent forms obtained from your subjects for a minimum of three years after the study is concluded. If consent for the study is being given by proxy (guardian, etc.), it is your responsibility to document the authority of that person to consent for the subject. Also, the committee recommends that you include an acknowledgment by the subject, or the subject's representative, that he or she has received a copy of the consent form. In addition, you are required to promptly report to the IRB any injuries or other unanticipated problems or risks to subjects and others. The IRB extends best wishes for success in your research endeavors.
APPENDIX B

TEACHER CONSENT FORM
PARTICIPANT RESEARCH CONSENT FORM

ADULT (18 OR OLDER)

I agree to participate in the research project titled, A View of First-Grade Teachers Using Instructional Technology for Literacy Instruction: The Development of Their Knowledge and Practice, being conducted by Teresa Schneider, a graduate student at Northern Illinois University. I have been informed that the purpose of this study is to understand the knowledge, practice, choices, and influences of first-grade teachers who implement technology for literacy instruction.

I understand if I agree to participate in this study, I will be asked to be interviewed a minimum of four times with each interview lasting approximately 30 minutes and to be observed teaching a minimum of three lessons during the literacy block lasting up to 90 minutes each. The interviews will take place in a location of my choice at a time that I approve, and the initial interview questions will focus on the teacher’s technology experience, use, and comfort level with technology (See Appendix A). The following interview questions will focus on the teacher’s decision making and thought processes in using technology for literacy instruction (See Appendix B). In addition, I understand that I will be observed during team planning meetings that will take place in one of the first-grade classrooms as well as asked to share teacher generated documents such weekly literacy lesson plans pertinent to the study.

I understand that I will be audio recorded during individual interviews and team planning meetings and interviews to provide accurate data.

________________________________________  _______________________
Signature                                      Date

I understand that my name will not appear on the audio recording or field notes in order to keep my identity confidential.

I am aware that my participation is voluntary and may be withdrawn, at any time without penalty or prejudice, and that if I have any additional questions concerning this study, I may contact Teresa Schneider at 815-961-8524 and Laurie Elish-Piper at 815-753-8487. I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern Illinois University at 825-753-8598.

I understand that the intended benefits of this study include heightening my awareness of my development of the knowledge and practice, as well as the influences and choices related to using technology for literacy instruction. I am also aware of the potential benefits this study could have on future professional development for using instructional technology for literacy instruction.

[Signature]

APPROVED

NOV 20 2015

BY M.U. I.R.B.
VOID ONE YEAR FROM ABOVE DATE
I have been informed that there are no foreseeable risks to participating in this study. I understand all information gathered during this study will be kept confidential because pseudonyms will be used for participants’ names, the school building, and the district where the study will take place. All research documents and recordings will be secured at all times as they will remain with the researcher or locked in a secure space in the researcher’s home office. Electronic files will be saved on a password protected computer stored at the researcher’s home office.

I understand my consent to participate in this project does not constitute a waiver of any legal rights or redress I might have as a result of my participation, and I acknowledge that I have received a copy of this form.

I have read and understood the information above about this study, and I give my consent to participate in the research study.

Signature                      Date

APPROVED
NOV 20 2015
BY M. L. R. S.
VOID ONE YEAR
FROM ABOVE DATE
APPENDIX C

INITIAL INTERVIEW QUESTIONS
Initial Interview Questions:

1. Tell me about the technology you use in your everyday life?
2. Tell me about your comfort level with technology in the classroom?
3. Tell me when you first got interested in technology for instruction?
4. How do you combine reading instruction and technology in your classroom?
5. Tell me how your district curriculum directs you to use technology for reading instruction?
6. What resources do you have in your classroom for reading instruction using technology?
7. Give some specific examples of student engagement in technology for reading instruction?
8. What are some of the challenges you find when using technology for reading instruction?
9. What are some of the successes?
10. What is your opinion of using technology for reading instruction?
APPENDIX D

PROBING AND CLARIFICATION QUESTIONS
In order to understand the teachers’ processes and keep the participants’ focused on the issue, the research will ask probing and clarification questions during the interview such as (Bogdan & Biklen, 2007):

1. What were your thoughts of doing this activity?
2. What do you mean?
3. Would you explain that?
4. What were you thinking then?
5. How important was it to use technology for this lesson?
6. Tell me more about that decision.
APPENDIX E

CLASSROOM OBSERVATION PROTOCOL FOR TECHNOLOGY IMPLEMENTATION FOR LITERACY INSTRUCTION
Classroom Observation Protocol for Technology Implementation for Literacy Instruction

Classroom Observation
Teacher ___________________________ Time start ________ Time end ________
Date ____________________________
# of students __________________________

1. Classroom Setting:

2. Teacher’s role with technology:

3. Technology available to the student during the lesson:

4. Student grouping when using technology:

5. Students use technology during observation to:

Select from scale: 0=not observed, 1=minimal, 2=somewhat, 3=most of the time

<table>
<thead>
<tr>
<th>Technology Use</th>
<th>Scale 0</th>
<th>Scale 1</th>
<th>Scale 2</th>
<th>Scale 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students use technology to develop understanding of a literacy concept (letter sounds, letter ID)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students use technology to explore familiar or unfamiliar reading and writing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students use technology to manipulate representations of a text</td>
<td></td>
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<tr>
<td>Students use technology to listen to a story</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students use technology to interact and change text or story</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students using technology were engaged and remained on task</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other use of technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. How essential was instructional technology in learning during the literacy instruction?

Adapted from: ISTE classroom observation tool (ICOT): Technology Checklist, Illinois Classroom Technology Integration Observation Protocol.