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Moving from Theory to Practice: Integrating Mobile Devices in Elementary Reading Instruction

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Walden University
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Abstract

Moving from Theory to Practice: Integrating Mobile Devices in Elementary Reading

Instruction

by

Lisa-Marie Bald

MA, University of Southern Maine, 2000

BS, University of Southern Maine, 1991

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Technology integration continues to be a professional development concern, especially in elementary schools. It remains unclear why there is a difference between how teachers talk about using technology and how they apply it in teaching reading. The purpose of this study was to explore professional development options that would help teachers connect theory to practice by studying their decision-making process. The conceptual framework was based on elements of the knowing-doing gap and reflective practices. The research questions explored (a) the decision-making process, (b) reflective practices used during decision-making, (c) professional development that facilitates closing the knowing-doing gap, and (d) recommendations from participants to improve upon professional development. In a case study design, 10 K-4 teachers participated in one 60-minute interview, one follow-up interview, and one 45-minute focus group. With the use of typological analysis, transcripts were coded for initial and emerging themes. Results indicated that integrating mobile devices was highly dependent upon teachers being self-directed learners. Teachers relied on informal collegial interactions when deciding to use mobile devices. Continuous professional development that addresses adult learning styles was recommended by the teachers to support technology adoption. Improvements to reading instruction lead to positive social change by increasing student achievement, thereby preparing students to be world citizens in a competitive global market.

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Dedication

This dissertation is dedicated to my husband Raymond and our three sons, Zachary, Nathaniel, and Ethan. My 'four Bald men' have been there every step of the way cheering me on, wiping away my tears, and always believing in me. I also dedicate this dissertation in memory of my mother, Yvette. It was her dream that I continue my education. She taught me to dream big and push myself to attain my goals.

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Chapter 1: Introduction to the Study

Introduction

Elementary classroom instruction has changed with the introduction of one-to-one technology options. Young children are entering classrooms with digital competencies, having had at-home experiences with a variety of mobile devices. Families with children ages eight and younger have seen an increase in tablet ownership (Common Sense Media, 2013). With this increased familiarity, some schools have moved forward into a "digital conversion" (Project Tomorrow, 2013, p. 2), investing in mobile devices such as tablets and iPads, to transform classroom instruction. As elementary schools invest in mobile devices, classroom teachers have new options for integrating technology into their instruction. Even with this accessibility, teachers struggle to use technology in reading instruction (Hutchinson & Woodward, 2014). In the past, teachers have questioned the effectiveness of technology use during reading instruction, especially in elementary classrooms (Burnett, 2009). In the twenty-first century, teachers need to determine how to use mobile devices effectively to support print-based literacy skills.

Perceived usability and perceived ease of use influence how teachers make decisions about using mobile devices (Holden & Rada, 2011). The perceptions of both usability and ease of use will change as teachers participate in on-going professional development. As teacher knowledge is cultivated, the learning capacity will increase, which will enable teachers to intentionally plan for instruction. Furthermore, learning capacity matures when teachers participate in job-embedded professional development (Burke, 2013). Teachers learn by sharing their experiences. They no longer learn in the

isolation of their classrooms, but form communities of practice (Burke et al., 2011).

These professional learning communities prompt critical reflection about how teachers

use technology in the classroom. In addition, peer coaching and mentoring can support

the adoption of mobile devices (Glazer & Hannafin, 2009). Teachers learn by observing

one another, discussing their experiences, and making changes to their practices. Even

with professional development, teachers lack an understanding of the benefits of mobile

devices in reading instruction (Hutchinson & Woodward, 2014). As teachers take

ownership of their learning about how to use technology for instruction, they positively

contribute to school improvements. Most especially, they enhance learning opportunities

for student reading achievement. These positive contributions support better decision

making for improving instructional practices.

In this chapter, foundational information is introduced in the background section.

The problem and purpose of the study is described followed by the research questions. A

conceptual framework is established followed by the nature of the study, definitions,

assumptions, and scope of the study. The last two sections introduce limitations of the

study and the study's significance. Lastly, a summary concludes the chapter with a

transition to Chapter 2.

Background

The arrival of computers in schools signaled a potential educational reform to

improve teaching and learning (Papert, 1993). Teachers and administrators viewed

computers as the key to shift pedagogical choices to support innovative instruction and to

inspire creative learning. Papert recognized that the lack of accessible technology could

be a social barrier for children from low-socioeconomic backgrounds. Educators could use technology to combat these economic barriers by providing equitable educational opportunities. Papert (1993) foresaw schools providing individual computers so that all students could learn with technology. A single computer per classroom could not sustain the type of educational reform anticipated with the use of technology. At that time, schools assembled computer labs and technology curricula in order to provide individual students time with a computer. Unfortunately, computer labs provided limited accessibility and isolated activities. True technology integration needed access to computers in the classroom (Papert, 1993). While computers have been available in classrooms since the 1980s, there have been limited shifts in educational pedagogy until the recent inclusion of mobile devices (Brantley-Dias & Ertmer, 2013).

While interactive whiteboards and SMART boards have been widely accepted instructional tools (Turel & Johnson, 2012), mobile devices have swiftly offered an alternative option for individual student use. Interactive whiteboards endorse traditional whole-group instruction with limited one-to-one (1:1) technology options (Warwick & Kershner, 2008). Mobile devices afford use in both whole group and individual instruction. In addition, these 1:1 digital devices offer flexibility to foster reading skills through multimodality.

Earlier studies on technology in primary schools examined the general use of technology with few studies specific to technology use and reading development (Burnett, 2009; Levy, 2009). In a relatively short time period, new studies have investigated using 1:1 technologies as potentially developmentally appropriate for young

children (Hutchinson, Beschorner, & Schmidt-Crawford, 2012). Mobile devices offer

students multitouch screens with a large range of applications. In addition, mobile

devices can easily store a variety of digital books. Many digital books have interactive

options such as hyperlinks to explore related topics on the internet and text-to-speech

functions. Thoermer and Williams (2012) found that digital tablets promoted access to

the text for struggling readers, which motivated them to continue reading. In addition,

mobile devices provide teachers the opportunity to develop print-based reading skills

(Northrop & Killen, 2013). However, even with the promise for supporting instruction,

some teachers continue to have difficulty integrating mobile devices into reading

instruction.

The gap addressed in this study is the lack of understanding about how to close

the discrepancy between knowing about mobile device use and actually applying the

knowledge during reading instruction. The effective use of mobile devices requires

teachers to have an understanding of the relationship among technological, pedagogical,

and content knowledge (TPACK). Several studies have explored the potential of the

TPACK framework as a tool for reflective practice (Brantley-Dias & Ertmer, 2013;

Pierson & Borthwick, 2010). In addition, Hutchinson et al. (2012) examined how a single

teacher used TPACK for planning reading instruction with mobile devices. Through

reflective practice, teachers can explore their decision-making process. These reflective

practices support not only autonomous learning, but learning in community.

To continue to gain an understanding about using mobile devices, teachers can

participate in continuous professional development. Professional learning communities

and job-embedded professional development support subject knowledge and operational understanding of technology (Cifuentes, Maxwell, & Bulu, 2011). Teachers need time to plan and then practice what they have learned. By participating in continuous professional development, teachers engage in collegial discourse (Nehring, Laboy, &Catarius, 2010). This discourse enhances instructional decision making. However, it also could lead teachers into the Knowing-Doing Gap (KDG) or talk without action. It is imperative to find better ways to help teachers to connect theory to practice through professional development.

Problem Statement

Since young children are entering classrooms with digital competencies, it is important for teachers to use technology to help students construct knowledge rather than only playing with technology. Technology integration continues to be a professional development issue in elementary schools, especially as classrooms gain accessibility to mobile devices. Even with additional professional development, teachers continue to have difficulties incorporating 1:1 digital devices, such as iPads and tablets into reading instruction (Hutchinson & Woodward, 2014). Digital devices, such as iPads, tablets, laptops, and SMART phones enable a one-device-to-one student accessibility. In addition, these devices are mobile, which provide options for individual instruction as well as home use. According to Hutchinson and Woodward (2014), teachers lack an understanding of the benefits of using 1:1 technologies. These findings concur with current research findings that teachers often have limited proficiency and confidence levels to apply technology within classroom instruction (Anthony, 2012). There is an

inconsistency between teacher perceptions of technology integration when compared to their actual use of technology (Hoffer, Grandgenett, Harris, & Swan, 2011). Little is known about how elementary teachers infuse their understanding of mobile device use to actual reading instruction applications. This research filled this gap by focusing on a shift in mobile device use from theory to practice in elementary school reading instruction.

Purpose of the Study

The purpose of this case study was to explore reflective practices that teachers employ when making decisions about integrating mobile devices into reading instruction. I explored which professional development options support a shift from theory about mobile device use into practical applications of technology during reading instruction. The focus of the study was the use of mobile devices to teach print-based skills. The knowledge gained from this study provided recommendations for supporting the transfer of knowledge to reading applications. With improved professional development, teachers can be given the opportunity to examine their pedagogical knowledge in order to change instructional practices.

Research Question

The overarching question for this study was: How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?

In addition, there were four subquestions:

RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?

RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?

RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?

RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?

Conceptual Framework

The conceptual framework of this research study was based on Reflective Practice (Killion & Todnem, 1991; Schon, 1983) and the KDG (Pfeffer & Sutton, 2000). In attempts to improve student achievement, schools have purchased 1:1 technologies for classroom instruction (Ortlieb & Marinak, 2013). However, teachers have struggled to integrate their content, pedagogy, and technology knowledge into practice (Brantley-Dias & Ertmer, 2013; Hutchinson & Woodward, 2014). In order for mobile-device adoption, teachers need to reflect upon their instructional practices and experiences (Blackwell, Lauricella, Wartella, Robb, & Schomberg, 2013). According to Schon (1983), teachers make decisions based on reflective practices conducted during and after instruction. By reflecting in action, the practitioner draws upon introspective behaviors during an experience, which brings about immediate changes in behaviors. Killion and Todnem (1991) added to Schon's framework with a reflective stance prior to instruction that they

referred to as Reflection for Action. Reflection for Action is defined as knowledge used for planning action (Killion & Todnem, 1991).

The infusion of the KDG (Pfeffer & Sutton, 2000) with Reflective Practice (Killion & Todnem, 1991; Schon, 1983) compliments the decision-making process. A gap exists in learning organizations when they confuse talk for action. School reform models capitalize on de-privatization of practices by promoting communities of practice. These professional learning communities focus on sharing experiences and continuing to learn about instructional practices. Administrators and teachers need to generate information about student performance in order to use this knowledge for improving instruction (Pfeffer & Sutton, 2000). The inclusion of feedback within professional development options could bridge the KDG by supporting changes in practice. Further explanation of the conceptual framework follows in Chapter 2.

A case study approach was used to describe the reflective processes teachers apply to make decisions about mobile device use during their instruction. The conceptual framework is a process-oriented structure. According to Ravitch and Riggan (2012), conceptual frameworks are used to classify relationships among the features being studied. Interviews and focus groups were used to develop a description of how teachers engaged reflective practices during the decision-making process to move from theory to practice. The typological analysis used for data analysis relates to the conceptual framework since it is a process of confirming and reforming questions to capture further descriptions of the decision-making process.

Nature of the Study

A case study design was used to explore reflective practices that teachers employ when making decisions about integrating mobile devices into reading instruction. I explored how elementary teachers transfer their knowledge about using mobile devices to support print-based literacy skills into practice. There is a gap between the way teachers discuss the use of mobile devices and the ways teachers apply these in teaching reading (Ertmer et al., 2012). A case study design develops an in-depth description of a case or multiple cases (Creswell, 2007). The result of using a case study is a deeper understanding of the phenomenon. An advantage of using a case study design is the variety of data collection forms. For the purposes of this study, semi-structured interviews were conducted. Follow-up interviews were conducted by either phone or email. Lastly, a focus group session was used with open-ended questions. Participants were able to provide further information by contacting me by either phone or email. Typological analysis (Hatch, 2002) was used for this study.

Definitions

In addition to the following definitions, a specialized technology and reading instruction terms chart can be found in Appendix J.

Change in practice is a term related to organizational change (Fullan, 2007). The term can be found in other disciplines, such as nursing and business. In this study, changes in practice referred to educational change specific to reforms in instructional practices teachers apply in their classrooms (Parise & Spillane, 2011). Change in practice

is the result of application learned from reflection-in and reflection-on-practice (Prytula, 2012).

Deprivatization of practice, according to Burke, Marx, and Berry (2011), "is a characteristic of school culture associated with a professional learning community that enables teachers to develop deeper understanding of curriculum, instruction, and how student learn, thus, how to increase teaching effectiveness" (p. 37). Rather than learning in isolation, teachers collaboratively learn through sharing their expertise and experiences.

Digital competencies are skills acquired to navigate digital technologies. According to the National Council of Teachers of English (NCTE, 2014), "Digital technologies have increasing capacity for individuals to adapt the tools for their own information and communication purposes" (para. 31). Digital-literacy skills and digital competencies were used interchangeably in this study.

Knowing-Doing Gap refers to a gap between knowledge and action (Pfeffer & Sutton, 2000). Originally, the KDG was acknowledged in the business organizational management. More recently, KDG has become a topic in educational organizational change and leadership (Nunnally, 2012; Palmer, 2013). For this study, KDG identified the gap between theory and practice. A key component of KDG in this study was demonstrated when teachers confused talking with action. In order to close the KDG, theory must be put into action.

Multimodality refers to the construction of meaning through a variety of communication modes that include text, speech, music, video, images, and sound (NCTE,

2014). In reference to this study, multimodality is related to digital-tablet functions used to create meaning (Walsh & Simpson, 2013).

One-to-one (1:1)technology involves "equipping each student and teacher with an Internet-ready device, with an aim of ultimately enhancing teaching and learning" (Stanhope & Corn, 2014, p. 253). One-to-one technology can include mobile learning devices such as iPads, digital tablets, Androids, Chrome books, laptops, SMART phones, Nooks, and Kindles. For this study, 1:1 technologies examined were iPads and digital tablets.

Perceived ease of use is a perception of the degree of effort needed in order to use technology during instruction (Holden & Rada, 2011). In this study, perceived ease of use was a key component in the decision-making process teachers apply when determining technology adoption and integration. If the technology is difficult to apply, teachers are less apt to include its use during instruction.

Perceived usability is a term associated with a perception of the usefulness of technology during instruction (Holden & Rada, 2011). According to Holden and Rada (2011), "there is a reasonable assumption that usability is a prerequisite of acceptance; thus, if a technology is considered highly usable and useful, it will most likely be highly accepted by its targeted users" (p. 343).

Print-based reading skills are reading skills needed in order for an individual to interact with the text. There are five instructional categories, which need to be included for a balanced approach to reading instruction. These categories are known as the *Five*

Pillars of Reading Instruction (Cheung & Slavin, 2013) and include phonemic

awareness, phonics, reading comprehension, vocabulary, and fluency.

Reflection-for-Action (RfA) is the planning for action based on knowledge gained

from reflective practice (Killion & Todnem, 1991).

Reflection-in-Action (RiA) is an instantaneous examination about a practice that

calls on introspection during the event (Schon, 1983). It usually brings about immediate

change in the direction of an activity.

Reflection-on-Action (RoA) is a post-event examination about practice that calls

on making changes in future application (Schon, 1983).

Reflective practice is the ability to examine and evaluate instructional practices

through reflecting upon in and on action of classroom experiences in order for continuous

learning to be attained (Schon, 1983).

Technology integration (TI) is the use of technology tools to assist students in

problem solving. These tools are used in content learning areas. Technology integration

does not drive instruction, but rather the use of curriculum designs promote technology in

order to engage problem solving skills (www.iste.org).

Technological, Pedagogical, and Content Knowledge (TPACK) is a framework

used to guide technology integration created by Mishra and Koehler (2006). The TPACK

framework represents the interrelationships among different aspects of teacher

knowledge needed for technology integration. The TPACK framework can assist teachers

in recognizing their own understanding of the subject matter, selecting instructional

practices, and how technology can benefit instruction and learning (Harris, Mishra, &

Koehler, 2009).

Assumptions

One assumption for this study was that the participating teachers had proficient

skills in reading instruction. Proficiency-levels were not evaluated for this study. Instead,

it was presumed that the teachers had adequate skills in reading instruction, which would

inform their consideration of how to effectively use technology. A second assumption

was that the teachers had participated in some form of professional development

addressing the use of technology during instruction.

Scope of the Study

This study was conducted with elementary school teachers. By narrowing the

selection of participants to elementary educators, the examination remained specific to

the gap in the current literature. Few studies had been conducted at the primary grade

levels concerning technology use within reading instruction (Burnett, 2009). An

additional delimiting factor was restricting the technology tools to mobile devices. The

increase in elementary schools purchasing 1:1 technologies signaled the need to explore

how these are being used in the classroom. Conversely, there might be a case to study the

larger grouping of mobile devices, which includes SMART phones. While many middle

and high school teachers have instituted Bring Your Own Devices (BYOD) policies, the

use of BYOD and SMART phones was not covered in this study.

Limitations

A limitation in this study was the use of a small sample size. Purposeful sampling was suggested as a case study sampling method (Patton, 2002). An advantage of this sampling method was selecting information-rich cases. However, purposeful sampling can suggest that participants respond in an expected way, thus providing only a narrow view of the experience.

While building trust provides for an open environment, becoming too familiar with either the individual's or researcher's own experiences can negatively impact the conclusions of the study. As a former elementary educator, I have had similar classroom and school experiences that allowed me to enter into the individuals' experiences. Yet, I recognized that their experiences might not be the same as my own and that I must avoid assumptions without clarification from the participants.

Significance of the Study

The existing social problem of this study was to improve the basic reading-skills of elementary children. Basic reading-skills support the twenty-first century skills students need to be successful world citizens in a competitive global market (Partnership for 21st Century Learning, 2015). The basis of critical thinking, problem solving, communication, and collaboration skills is the proficient use of reading skills. Current national and international assessments show little to no gains in the reading skills of American students. According to the National Assessment of Educational Progress (NAEP), there was no significant difference in the 2013 report in reading scores for both fourth and eighth grade students when compared to the same scores in the 2011 report.

Reading scores did not show statistical difference within any of the three student levels, which include advance, proficient, and basic. Furthermore, the percentage of eighth grade students at the basic level increased from 68% and fourth grade students increased to 78%. The NAEP (2013) defined basic level as a partial mastery of prerequisite knowledge and skills. The increase of more students at this level is cause for concern. Limited proficiency of basic reading-skills might negatively affect student success in high school. Evidence of this can be seen in the 2013 NAEP reading scores for twelfth grade students with no statistical change demonstrated when compared to the 2011 assessments. In addition, the United States ranked 24th worldwide in reading scores of 15-year-old students (Program of International Student Assessment [PISA], 2013). The PISA (2013) reported that the reading scores of American students displayed no significant difference since the year 2000. The 2012 reading scores of American high school students averaged 498 when compared to their Shanghai, China counterparts, whose average reading scores of 570 ranked them first in the world in reading.

To address this discrepancy, the use of mobile devices has the potential to improve student learning (Ortlieb & Marinak, 2013). However, a KDG exists between knowing about using mobile devices and application of this knowledge by integrating mobile devices to teach reading skills. By describing the experiences of elementary school teachers, I explored how teachers use reflective practice to make choices regarding using mobile devices in K-4 reading instruction. School administrators and teachers benefit from this study by applying its findings to the processes used to determine if and how reflective practices bring about a change in the way mobile devices

are used. Administrators and curriculum coordinators benefit from this study by understanding the types of professional development that support reflective practice and how to validate the purchase of 1:1 technologies. Students benefit from this study through exposure to effective practices that can assist in reading acquisition and digital literacy skills. By increasing pedagogical and technological knowledge, elementary teachers can enhance reading acquisition for young children. Such instruction may yield improvements in reading achievement. Young children can gain the reading skills they need for future educational success.

<div align="center">**Summary**</div>

Throughout this chapter, the central focus has been the gap that occurs when transferring knowledge that teachers hold about mobile device use to the application of this knowledge during elementary reading instruction. The KDG is well known in the business world (Pfeffer & Sutton, 2000), and has been introduced to education as a framework to examine a possible bridge when transferring knowledge into action (Palmer, 2013). Reflective practices have the potential to assist teachers in making decisions about how to use technology during reading instruction. However, there are barriers that teachers must overcome to make change in their practices. One approach may be the type of interactions teachers have within professional development.

Chapter 2 includes a literature review that examines relevant research and theory related to the KDG and reflective practices. Additionally, the literature review discusses the use of mobile devices in K-4 reading instruction, factors that affect teacher use of

mobile devices, and ways of supporting mobile device adoption through professional

development.

Chapter 2: Literature Review

The problem addressed in this study was the lack of knowledge about how teachers transfer their understanding of mobile device use to the application of this knowledge in their reading instruction (Hutchinson & Woodward, 2014). The purpose of the study was to describe the reflective practices teachers use when making decisions about how to use mobile devices in their reading instruction. The goal of this study was to close the KDG to find better ways to help teachers connect theory to practice through professional development.

As elementary teachers gain more access to mobile devices, schools, parents, and the public anticipate that young children will learn through digital technologies. A central concern among early childhood teachers is the use of Developmentally Appropriate Practices (DAP) (Ciamp, 2012; Ortlieb & Marinak, 2013). Earlier research reported trepidation in using technology with young children (Burnett, 2009). In comparison, current literature considers how to apply mobile devices in primary classroom instruction to support print-based literacy skills (Hutchinson, Beschorner, & Schmidt-Crawford, 2012). Both internal and external factors affect teacher use of technology. An essential aspect of promoting mobile-device adoption lies in cultivating schools that have motivated teachers who transfer knowledge into practice (Burke, Marx, & Berry, 2011; Schrum & Levin, 2013). In an attempt to leverage technology, administrators and teachers have formed a variety of professional development options to foster technology adoption. Peer coaching and mentoring have the potential to bridge the gap created by

teachers who know about technology but lack the confidence to apply mobile devices (Mama & Hennessey, 2013).

      This literature review is organized into three sections. The first section establishes the literature search strategies used to locate current research. The second section outlines the conceptual framework theories. The theories highlighted in this section are the KDG (Pfeffer & Sutton, 2000), Schon's (1982) reflective practices, and reflection-for-action (Killion & Todnem, 1991). The third section of the literature review has three major headings. The first explores mobile devices in K-4 reading instruction. Topics discussed in this section include developmental use of mobile devices, multimodality, motivation, and supporting print-based skills with eBooks. The second heading examines factors that affect teacher use of technology, which includes TPACK, self-efficacy, and perceived usability and ease of use. The third heading explores supporting technology adoption through professional development. The central themes of this section include external factors such as school culture, deprivatization of practices, and critical reflection. The end of the section then explores job-embedded learning, peer coaching and mentoring, teacher knowledge, feedback, and observations. This literature review ends with a summary and conclusion that identifies the gap in the literature.

<p align="center">**Literature Search Strategy**</p>

      The search for current research published in peer-reviewed journals began with terms associated with early childhood literacy education and digital technology. Databases selected were EBSCO Database, ProQuest, the Educational Resource Information Center (ERIC), Education Research Complete, Academic Search Complete,

and Education from SAGE. Based on the initial search, the additional search terms were included to broaden the literature review. These terms included mobile devices, iPads, tablets, TPACK, digital literacy skills, print-based literacy skills, eBooks, and multimodality in reading instruction. Further databases were later included such as Google Scholar and Education and Information Technology Digital Library (Ed/ITLib). Additional terms were added, which included job-embedded learning, school culture, professional development, professional learning communities, peer coaching, mentoring, deprivatization of practice, teacher knowledge, observation, and feedback. Some of the professional journals included the *Journal of Technology and Teacher Education*, *Education Technology Research Development*, and *Journal of Digital Learning in Teacher Education*.

Due to limited sources on the KDG, a dissertation search in ProQuest yielded six published dissertations published in the years 2009-2013. These dissertations were not topic-specific to this study; however, they were related to the transition of the KDG from business organizational theory to educational considerations. The considerations included effective implementation of theory into practice and the need for intentional planning for instruction. These dissertations were considered when discussing the conceptual framework.

Two professional organization websites were included in the literature review. The first organization was the National Association for the Education of Young Children (NAEYC), which supports developmentally appropriate practices (DAP). The second organization was International Literacy Association (ILA), formally known as the

International Reading Association (IRA), which holds positions in appropriate use of digital technology and the use of the National Reading Panel Five Pillars of Reading Instruction.

Conceptual Framework

The central concept of this study is the KDG. According to Pfeffer and Sutton (2000), the KDG is defined as the gap between knowledge and action. The gap between knowing and doing comes from the misrepresentation of considering talking about action as actually doing the action. While the KDG originated in the business world, the organizational management components transfer to the field of education. Teachers have knowledge in the areas of technology, pedagogy, and content; however, for varieties of reasons, they fail to effectively implement this knowledge within their instruction. By addressing the KDG, teachers ultimately look at refining their teaching performance with the goal of improving student achievement.

Organizations easily generate a wealth of knowledge concerning performance. Pfeffer and Sutton (2000) acknowledged that "there are fewer and smaller differences in what firms know than in their ability to act on that knowledge" (p.243). Even with the knowledge to act, many organizations respond contrary to what they know they should be doing. Change in performance is dependent upon applying what is already known within the organization rather than implementing a new practice. A major barrier of action is the mistake of considering talk for action. Pfeffer and Sutton stated that smart talk is highly valued in today's society. Smart talk persuades those who are fearful of change that, by discussing an organizational issue, action has occurred. People become resistant to

change, which further increases the KDG. To eliminate the KDG, Pfeffer and Sutton

advocated the following eight themes:

1. Why before how: Philosophy is important

2. Knowing comes from doing and teaching others how

3. Action counts more than elegant plans and concepts

4. There is no doing without mistakes.

5. Fear fosters KDGs. So drive out fear.

6. Beware of false analogies: Fight the competition, not each other.

7. Measure what matters and what can help turn knowledge into action

8. What leaders do, how they spend their time, and how they allocate resources matters (pp. 246-260).

As learning organizations navigate through these eight themes, they begin to be proactive

in creating a bridge between knowing and doing.

Of the eight themes, this study focused on learning by doing. When teachers

implement what they know, they have opportunities to acquire knowledge within the

context of their classroom instruction. The practical experience of learning by doing

generates new knowledge to adjust future instruction. In addition, the act of doing

prompts reflective practice, and these reflective experiences develop conceptual

knowledge, also known as theory. According to Pfeffer and Sutton (2000), knowledge is

"intangible" making it difficult to observe (p. 21). Organizations tend to "underestimate

the importance of the underlying philosophy that guides what they do and why they do it"

(p. 21). Through reflection, teachers examine the process along with the outcomes of their instruction.

Reflective practice is the ability to examine and evaluate instructional practices through reflecting upon in-and-on action of classroom experiences in order for continuous learning to be attained (Schon, 1983). *Reflection-in-action* (RiA) is an instantaneous examination about a practice that calls on introspection during the event that often leads to an immediate change (Schon, 1983). Through repetitive experiences, a professional will look for expected patterns of behaviors. When an unexpected problem arises, the mind will recognize the disturbance. Schon (1983) stated that "the situations of practice are not problems to be solved, but problematic situations characterized by uncertainty, disorder, and indeterminacy" (p.15). People become surprised when predictable behaviors are disrupted from what is expected; therefore, they pay closer attention. Ideally, the RiA instigates making adaptation during the action. Professionals can become complacent with repeated experiences in their discipline. They begin to miss aspects of their trade and can eventually stop reflecting on their performance. At this point, people develop "patterns of error" (Schon, p.60) that they begin to accept. Reflection-on-action, especially with a coach, becomes a crucial process in developing professional knowledge (Schon, 1983).

Reflection-on-action (RoA) is a postevent examination about practice that calls on making changes to future application (Schon, 1983). The RoA process scrutinizes the knowledge generated from learning by doing. As teachers reflect upon their action, they examine both the process and the outcomes. They then can determine how to address

discrepancies in their instruction. Additionally, RoA can help teachers to "reveal the

wisdom embedded in their experiences" (Killion & Todnem, 1991, p. 14). The reflective

process develops "context-specific theories that further their understanding of their work

and generate knowledge to inform future practice" (1991, p. 14).

To complement Schon's *Reflective Practice*, Killion and Todnem proposed a third

form of reflection known as *reflection-for-action (RfA)*. The purpose of RfA is to guide

future planning. In comparison, RiA examines metacognition, while RoA reflects upon a

past episode. The addition of RfA in the conceptual framework advances the importance

of strategic planning to improve instruction. By planning for action, teachers can use the

knowledge they have generated from learning by doing. To reinforce application of

knowledge, teachers can reflect with others.

Collegial support received during the reflective process can lead to change in

practice. Professional learning communities, community of practices, and critical friends

group offer relational learning that is job-embedded. Peer coaching has the potential to

forge support systems among teachers that can enhance instruction. The dialogue

between student and coach develops a working relationship based within the context of

learning (Schon, 1987). Schon (1987) further observed that peer-coaching can address

knowledge that needs to be clarified or unlearned. The peer-coach uses messages

"primarily through action" (p.95). The coach can demonstrate the action as well as

provide feedback that is in "context of the student's doing" (p. 102). Similarly, Pfeffer

and Sutton (2000) noted that those who generate knowledge should be the ones who also

disseminate that knowledge to others through peer-coaching.

For this study, the conceptual framework established the relationship between reflective practices (Killion & Tondem, 1991; Schon, 1983) with the KDG (Pfeffer & Sutton, 2000). A concern within any organization is the misunderstanding that talk is action. In this study, the goal was to help teachers move from theory to practice, thereby learning by doing. The literature review addressed the necessity of using reflective practices in collaboration with others as a means to support using technology. A concept further discussed is how de-privatization of practice draws teachers out from learning in isolation. The inclusion of feedback (see Figure 1) establishes the need for collaboration in order to actualize change in practice (Allen & Tolpolka-Jorissen, 2013; Leclerk, Moreau, Dumouchel, & Sallafrance-St. Louis, 2012). Even though teachers need autonomy in their practices and professional development, collaboration fosters a collective knowledge. This collective knowledge challenges teachers to change their mindsets and encourage new instructional practices (Lasagabaster & Sierra, 2011). The use of feedback engages teachers in collegial discourse especially in the area of reflection (Parson & Vaughn, 2013).
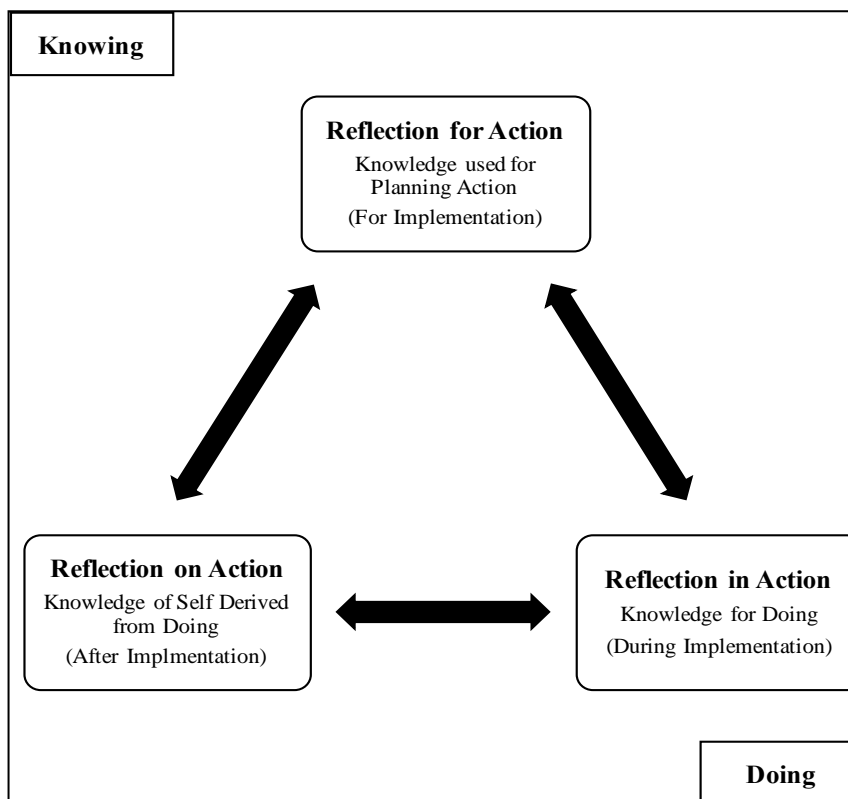
Figure 1. Closing the Knowing-Doing Gap

　　This framework demonstrates the relationship of using reflective practices

(Killion & Tondem, 1991; Schon, 1983) to address the KDG (Pfeffer & Sutton, 2000).

This study focused on moving from talk to action where theory about technology use

results in application during reading instruction.

Literature Review: Key Concepts

Mobile Devices in K-4 Reading Instruction

　　Mobile devices have become commonplace in everyday American life. From an

early age, children interact with mobile devices such as Smartphones, iTouches, and

iPads. Even though elementary classrooms house these devices, many teachers struggle

to integrate this technology into classroom instruction, especially for reading instruction (Hutchinson & Woodward, 2014). Within the last 10 years, the body of knowledge on reading instruction and technology integration has drastically changed. Earlier studies indicated a lack of research in the primary grades in reading instruction and technology (Burnett, 2009; Voogt & McKenney, 2007). However, recent studies specified a need to integrate technology into the classroom (Hutchinson, Beschorner, & Schmidt-Crawford, 2012; Wright, Fugett, & Caputa; 2013). The flexibility of mobile devices, such as iPads, enable "anytime, anywhere learning in schools" (Hutchinson et al., 2012, p. 15) when compared to the isolation of traditional computer laboratories. Additionally, mobile devices are changing how children interact with text. For instance, students can "manipulate the font size, dictionary use, text-to-speech features, and note-taking faculties" (Thoermer & Williams, 2012, p. 441). While technology appears to offer advantages in reading instruction, teachers need to use guidelines to apply technology within developmentally appropriate practice.

Considerations for Developmental Use of Mobile Devices

Developmentally appropriate practice (DAP) is a framework based on the developmental learning needs of young children from birth to age 8. According to the National Association for the Education of Young Children (2015b), there are three core considerations of DAP, which include knowing about child development and learning, knowing what is individually appropriate, and knowing what is culturally important. Additionally, NAEYC (2015b) believes education in grades 1-3 should build upon a child's prior knowledge and hands-on-learning experiences. In addition, teachers should

prompt students for explicit explanations with detailed information. Elementary teachers should use direct instruction to support new concepts, as well as provide ample time for students to practice what they have learned (NAEYC, 2015b). Beyond these DAP core considerations, NAEYC provides guidance for appropriate use of technology. For instance, technology use should be intentional and appropriate to support learning. In particular, technology use for elementary children should promote creativity, collaboration, and experimentation (NAEYC, 2015a). Most importantly, NAEYC (2015a) recommends that children use technology to communicate with others. A DAP approach to technology integration encourages planning especially aligned with the Five Pillars of Reading Instruction.

According to the National Reading Panel (NRP), the Five Pillars of Reading Instruction, also referred to as the Five Pillars, are the key components of effective reading instruction (National Institute of Child Health and Human Development [NICHHD], 2000). The Five Pillars are phonemic awareness, phonics, reading comprehension, vocabulary, and fluency (Cheung & Slavin, 2013). The NRP recommended that all Five Pillars be represented in a balanced-literacy approach during the elementary grades. In addition, the International Literacy Association (ILA) posited reading instruction should be evidence-based and should not advocate for a "single instructional program or method that is effective in teaching all children to read" (ILA, 2002, para.2). Evidence-based reading instruction should be objective, valid, reliable, systematic, and refereed. Furthermore, the ILA position reinforced that the NRP Five Pillars are central to building effective reading programs. While the NRP did not take a

position on the use of technology, it did state that research appears to support technology

use in reading instruction. In contrast, the ILA aligned with NAEYC regarding the

appropriate use of technology. For instance, ILA stated that a literacy curriculum needed

to incorporate collaboration, as well as creating learning environments that support

students using technology to communicate with their classmates and global peers.

Additionally, IRA supported technology used in a "range of literacy purposes and

settings" (ILA, 2009, para. 2). Mobile devices afford a variety of possibilities for reading

instruction, especially in multimodality.

Multimodality Use in Reading Instruction

An advantage of mobile learning is the flexibility of using multimodality in

reading instruction. Multimodality is the process of making meaning through a variety of

communication modes that include text, speech, music, video, images, and sound (NCTE,

2014). Earlier studies (Burnett, 2009; Levy, 2009) questioned the use of technology in

early childhood reading development, especially the use of multimodality. Burnett (2009)

critically reviewed 38 empirical studies that focused on the use of technology in the

primary grade level. The meta-analysis reported the lack of research in the primary grade

levels supporting technology in print-based learning. A common theme of the meta-

analysis was teachers questioning the validity of technology to reinforce print-based

reading skills. Few teachers agreed that the use of technology is necessary to support

reading skills. Furthermore, teachers did not find value in multimodality for reading

instruction. Burnett noted that without multi-modal options, flexible ways to express

understanding were limited.

Similarly, Levy (2009) studied multimodality in connection to early childhood literacy education. Twelve children between the ages of three and six years old participated in a three-phase longitudinal qualitative study. The authors studied the connection between at-home digital literacy skills children could use in print-based literacy programs. While the children appeared to use multimodality naturally in their home experiences, the at-school activities limited the integration of digital literacy behaviors. Children gained knowledge through symbolic representations such as pictures, symbols, sounds, and color, as well as computer text. They easily navigated both computer programs and websites at home. Recognition of these same skills did not occur in the schools. Teachers did not capitalize on these skills to assist print literacy. Thus, many of the children who were capable of making meaning from screen text lost confidence in using these same skills for mastering print literacy. While earlier studies questioned multi-modality, current studies reinforced multimodal learning on mobile devices.

In a relatively short period, researchers shifted focus from questioning technology use in reading education to accepting the necessity of multimodal learning afforded by mobile devices. In a single case study using one classroom teacher, Hutchinson et al. (2012) noted the benefits of iPads, asserting that things such as touch screens and a variety of applications give teachers a wide range of possibilities to improve print-based literacy skills. For instance, the teacher planned to teach within a curriculum-based technological integration framework. During the three-week observations, Hutchinson et al. monitored learning goals, pedagogy, and technology choices. To assist the planning

process, the researchers provided the teacher with a graphic organizer, which included three reflective phases that promoted intentional use of the mobile device. These phases used the TPACK framework discussed later in this chapter.

While the length of the study was relatively short, the researchers found that the intentional planning process assisted the teacher with integrating technology to support print-based literacy skills. The teacher used iPads for mind mapping and sequencing, and used drawing and doodling tools for main idea details. With only 15 learning experiences, there were no significant changes in reading achievement. Further study is necessary to determine if the reflective practice incorporated into the planning process has any effect on student achievement. According to Hutchinson et al., mobile devices should enrich curriculum and instruction to improve upon how students learn. By doing so, teachers can support struggling readers using the applications needed to support teaching and learning.

Motivation

In addition to meeting curricular goals, mobile devices can motivate reluctant readers (Thoermer & Williams, 2012; Walsh & Simpson, 2013). For instance, though digital text is accessible on desktops and laptops, handheld devices like Kindles, iPads, and Nooks are portable and easier to handle. Students can manipulate text size, gain access to on-line dictionaries, and use text-to-speech features (Thoermer & Williams, 2012). In an on-going case study, Walsh and Simpson (2013) investigated the meaning-making process of elementary students who used iPads during reading instruction. iPads were given to 28 elementary boys at the beginning of the school year. Data collection

included weekly classroom observations that were video and still-image recorded. Walsh and Simpson looked for specific examples of reading behaviors linked with teacher pedagogy.

The reluctant readers easily navigated eBooks because of the touch pad features. Walsh and Simpson (2013) found that the touch pads provided the readers the ability to "control their physical reading environment" (p.149). A struggling reader could access text-to-speech to hear the pronunciation of a word. On-line dictionaries addressed understanding unknown words, thereby expanding vocabulary, as well as reinforcing learning within the context of the sentence. Lastly, mobile devices provided access to multi-media applications. New applications assured digital interaction so that children could manipulate text by adding comments to a text, responding to text through audiotaping, developing photo libraries, and creating videos from built-in cameras on iPads (Hutchinson et al., 2012). According to Walsh and Simpson, there are multiple ways to construct meaning. Therefore, multi-media options could foster and contribute to meaning making, as well as increase motivation to read. The benefits of mobile devices, especially in multimodal learning, provided opportunities to reinforce print-based literacy skills.

Supporting Print-Based Literacy Skills with eBooks

Mobile devices can support print-based literacy skills with eBooks (Hutchinson et al., 2012). In the past, few classrooms were equipped with computers and laptops making eBooks a less viable option (Moody, Justice, & Cabell, 2011). Consequently, eBooks were considered optional or enrichment activities. Additionally, Roskos and Burstein

(2012) reported that early eBook designs were unexceptional and used unsophisticated multimedia. Teachers questioned the validity of using eBooks to teach print-based literacy skills (Moody et al., 2011; Roskos & Burstein, 2012). Moody et al. found that eBooks made a significant difference in a child's persistence in attending to the text compared to traditional storybooks. However, there was no significant improvement in literacy skills between traditional print and eBooks. For example, labeling references were significantly greater in the traditional printed stories. This difference might have been the result of different instructional formats. Adults worked with the children during the traditional printed-story sessions. In comparison, children worked in isolation during the eBook sessions. Moody et al. assumed the eBooks had interactive components that would support independent reading sessions. Regardless of the medium, comprehension results were not significantly different. Even though eBooks are interactive, they do not instantly respond to the particular needs of each child. The study by Moody et al. appeared to support the necessity of adult and child interaction regardless of digital or traditional print.

The DAP and ILA position statements supported this assumption. For example, one DAP statement included that teachers should know about child development and learning needs. Direct instruction was applicable to the traditional printed-story sessions due to the interactions between the teacher and students. The eBook session had limited interaction. Students independently worked with the eBooks with little direction and support from the teachers. Teachers model literacy skills during direction instruction (Roskos & Burstein, 2012). Children need context for the literacy skills they are learning.

Teacher interaction is an integral component of reading instruction. Mobile devices are tools that teachers use to support print-based literacy skills (Northrop & Killeen, 2013). Teachers should engage students in explicit instruction regardless of the medium (Northrop & Killeen, 2013). Direct instruction, such as shared reading, provides learning within context of the task. Rosko and Burstein (2012) conducted a four-week case study to examine vocabulary instruction during a shared-reading format. The participants included eight pre-school teachers and 28 children. Prior to the study, teachers participated in eBook training. In addition, classroom libraries received additional eBooks. Data collection included webcam and digital cameras to capture the shared-reading sessions. Traditionally, teachers used large printed text so that the entire class could see the text and pictures. Rosko and Burnstein used iPads to facilitate the shared-reading sessions. The researchers found that the eBook shared-reading was similar to traditional storybook reading. For young children, shared-reading reinforces emergent reading skills such as book language, written symbols, listening skills, and print concepts (Rosko & Burstein, 2012). Rosko and Burnstein recommended the continuation of before, during, and after reading strategies to guide the sessions. During the shared reading, teachers should point to various text components while thinking aloud to discuss print concepts and reading skills.

While the study used iPads during the reading experiences, it is plausible to use interactive whiteboard technology for the same purpose. An advantage of the interactive whiteboard is the ability to use whole group instruction (Warwick & Kershner, 2008). In the qualitative study by Warwick and Kershner, seven primary teachers scaffold whole

group engagement of collaborative activities. Though the children participated in the activities, the teachers questioned to what degree the children were applying independent reading skills. The use of individual iPads coupled with teacher guidance could add accountability to individual skills, as well as develop language skills.

Teacher interaction also supports student achievement by addressing individual student needs (Huang, Liang, Su, & Chen, 2012; Northrup & Killeen, 2013). In a mixed-methods study, Huang et al. (2012) investigated the effects of shared-reading eBooks sessions to support comprehension skills. The 12 in-service teachers participated in focus groups and questionnaires over an eight-week period. Teachers developed eBook shared-reading sessions that incorporated the use of e-annotate, bookmarks, and content searching. Huang et al. (2012) reported that scaffolding procedures were crucial during vocabulary instruction with eBooks. The researchers also stated that eBooks have greater flexibility and accessibility to differentiate vocabulary instruction.

Similarly, Northrop and Killeen (2013) noted teacher explanations and modeling with eBooks was essential to the particular application used on iPads. With teacher interaction, children used appropriate digital texts and iPad applications. Northrop and Killeen pointed out that as children gain proficiency in their reading skills, teachers would introduce independent practice with applications. Northrop and Killeen cautioned that children need clear expectations so that they would not "race through the app, clicking to get the correct answer, not paying attention to decoding and reading the words" (p.535). Likewise, Biancarosa and Griffith (2012) found that text-to-speech options on iPads supported independent reading sessions, especially in scaffolding

decoding skills. Yet, the study failed to discover whether or not children could apply these decoding skills without the technology options. Even with the popularity of mobile devices, classroom teachers still struggled with technology integration.

Factors that Affect Teacher Use of Technology

For several decades, classroom teachers have become familiar with the term *technology integration*. According to Sterling (2009), technology integration is "a term used by educators to describe effective uses of technology by teachers and students in K-12 and university classrooms" (p.6). In spite of this articulate definition, there is a wide range of perceptions about what constitutes effective technology use. While classroom teachers should acquire a specific knowledge base for integrating technology, there are barriers that can hinder technology adoption (Brantley-Dias & Ertmer, 2013; Walker & Shepard, 2011). Teachers should have a solid foundation about content and pedagogical knowledge, as well as an understanding about the capabilities of digital technology. The participant pool for this case study was teachers who use mobile devices during reading instruction. They exhibited practices that showed they had moved beyond technology barriers and were no longer resistant to technology integration. However, the teacher decision-making process was still affected by their teacher knowledge in technology, pedagogy, and subject matter. Furthermore, self-efficacy affected their decisions to use mobile devices. Lastly, the decision-making process was affected by the perceived simplicity and versatility of the mobile devices.

TPACK

The introduction of TPACK by Mishra and Koehler (2006) established a framework for teachers to recognize the interrelationship among the various aspects of teacher knowledge needed for technology integration. The three main domains of TPACK are Technology, Pedagogy, and Content Knowledge. The intersection of these domains represents the type of information teachers bring to their teaching craft (Brantley-Dias & Ertmer, 2013). Pierson and Borthwick (2010) stated that TPACK would provide information concerning to what degree teachers applied meaningful use of technology in a variety of learning situations. The framework assisted in evaluating relationship formed from technology used in content and pedagogical knowledge. In essence, TPACK promotes reflection about how well teachers understand the subject matter, select an appropriate instructional practice, and to what degree the inclusion of technology benefits instruction and learning. There is a need for published empirical studies to corroborate the potential that TPACK offers in designing curriculum.

There were a limited number of studies published that focused on in-service teacher implementation of TPACK (Brantley-Dias & Ertmer, 2013). The body of literature mainly focused on either pre-service teachers or reviews of theoretical articles (Graham, Borup, & Smith, 2012; Shina, Yilmaz-Ozend, Mouza, Karchmer-Klein, & Glutting, 2013). Harris and Hofer (2011) studied how TPACK informed instructional planning of seven high school social studies teachers. The teachers participated in an on-line professional development experience. During the five-month study, data collection consisted of in-depth interviews, unit plans, and reflection about lesson planning and

technology integration process. Based on the data collection, the researchers created

descriptions of the planning process representing the before, during, and after experiences

teachers had with the professional development series. The case study descriptions

provided concise details of each participant's experience. From these descriptions, Harris

and Hofer found that teachers used their previous teaching experiences to assist in

making decisions on new lesson designs. The teachers stated that they simultaneously

reflected about a variety of factors such as time and resources when making decisions for

the technology integration. Harris and Hofer pointed out that the teachers were "thinking

more consciously and strategically about both choosing learning activities to implement

and technologies to use to support them" (p.225). An interesting point teachers made was

their recognition of complacency in their teaching prior to the professional development.

This point implies the necessity of professional development to support technology

integration. However, the authors did not specify the relationship between TPACK and

professional development.

In a case study by Hutchinson, Beschorner, and Schmidt-Crawford (2012), the

researchers modified the TPACK framework to include specific curriculum goals for

inclusion of iPads into a fourth grade teacher's literacy instruction. To infuse the use of

iPads into the curriculum, the researchers focused on curriculum integration rather than

technological integration. Hutchinson et al. consulted with one teacher to verify specific

curriculum goals. Then the researchers added iPads and applications, referred to as apps,

to the Technology Knowledge area of the TPACK diagram. The researchers added

visualization to the Content Knowledge (CK) section to address comprehension

strategies. Lastly, the researchers addressed instructional groupings in the Pedagogical

Knowledge (PK) section. Instructional groupings included whole-group instruction and

student-paired instruction. The teacher implemented literacy activities based on the

information generated from the TPACK framework. While Hutchinson et al. stated that

the teacher reached the goal of curriculum integration, the researchers did not clearly

discuss their data analysis. Hutchinson et al. collected written journals about each of the

learning experiences. The study would benefit from further discussion about the results.

Regardless, the study established the importance of setting learning goals and

pedagogical decisions prior to selecting technology tools.

Instruments and Tools used to Study TPACK

TPACK, as an observation instrument, provides the opportunity to assess teacher

knowledge about technology integration (Hofer, Grandgenett, Harris, & Swan, 2011). In

a quantitative study, Hofer et al. (2011) created an observation rubric to assist teachers in

understanding decision making about adding technology into instructional practices.

Based on the complexity of TPACK, the researchers questioned the validity of self-

reporting. Hofer et al. wrote a history of data collection tools from previous studies on

experienced versus inexperienced teachers. Most of the data collection tools involved

self-reporting systems such as journals, self-assessments, and surveys. To address this

concern, the researchers created an observation rubric that was evidence-based rather

than subjective. The observation tool delineated the various components of the TPACK

framework. The participants included 12 experienced technology-using teachers, who

observed videotaped lessons of six pre-service and six in-service teachers. The

participants were part of a professional development initiative or student teachers. A

limitation of the study was the videotaped sessions. The researchers noted there were

"complexities of classroom environments," (Hofer et al., 2011, p. 4357) which could not

be captured by the videotaped sessions. Despite the limitation, Hofer et al. countered that

the videotaping provided a "common point of reference for the reviewers" (p. 4357). The

isolation from the classroom surroundings reinforced the reliability of the observation

tool. The researchers pointed out that teachers are more familiar with observing lessons

than with reading a lesson description from a document. One area addressed for future

consideration is modifying the tool to include the effectiveness of the lesson. The

TPACK observation tool holds promise for both pre-service and in-service teachers.

Structured interviews can further explore teacher knowledge of experienced

teachers. In a subsequent TPACK study, Harris, Grandgenett, and Hofer (2012) examined

teacher knowledge of experienced teachers concerning technology integration. Harris et

al. recognized that experienced teachers have internalized lesson-plan nuances. A

consequence of this is the lack of details in written lesson plans. Experienced teachers

"focus upon guiding students' thinking more so than inexperienced teacher's plans do,

anticipating difficulties that students might have" (Harris et al., 2012, p. 3). Twelve in-

service teachers participated in semi-structured interviews. Harris et al. generated a

lesson interview protocol that recorded the essential lesson plan components about

technology integration. Twelve experienced technology-using teachers listened to the

audiotaped interviews. The reviewers used an assessment rubric to score the quality of

the interview. The researchers used criterion-referenced scoring to analyze the results.

Harris et al. concluded that the assessment rubric and semi-structured interview lesson protocol showed initial reliability. Further research is necessary to validate the TPACK assessment rubric and interview protocol.

Self-Efficacy

While skills and knowledge are important factors for technology integration, self-efficacy might in fact be more valuable an indicator as to the successful inclusion of technology. In a phenomenological study, Walker and Shepard (2011) studied 10 elementary teachers known for successfully integrating technology. The researchers selected teachers who were involved with computer-based learning. The data collection included open-ended questionnaires and two in-depth interviews. In addition, the researchers used field note logs to capture teacher mannerisms and behaviors during classroom instruction. The results revealed that experienced users of technology were more confidently able to apply technology in their classroom instruction. The participants reported that students were more attentive during instruction. Moreover, teachers felt that using digital technology saved instructional time. The use of technology was less time consuming, which provided teachers more time to assist students. Lastly, Walker and Shepard reported that most of the participants were self-motivated. Eight of the 10 teachers held beliefs that they could use technology. They actively sought out professional development to support their skills. Overall, they were interested in using technology and were willing to learn how to overcome barriers to technology use.

Likewise, Fanni, Rega, and Cantoni (2013) found that motivation to apply integrated technology is essential in building teacher confidence. Unlike Walker and

Shepard (2011), Fanni et al. studied teachers who lacked prior computer skills and had limited access to computers. However, participants needed to be willing to learn how to use technology in the classroom. Seventy-nine teachers participated in questionnaires on computer self-efficacy. The teachers participated in professional development that focused on integrated technology. Although the teachers demonstrated an enthusiasm for learning how to use technology, the questionnaire results reported a hesitation to apply technology to instruction. Their hesitation to use technology aligns with what others have found in the review of literature (Ertmer et al., 2012; Prestridge, 2011). The teachers in Fanni et al. were at a disadvantage having limited exposure to technology use. Their enthusiasm to include technology to their teaching needs further nurturing in order to adopt technology use. The researchers pointed out how self-efficacy could make a difference in technology adoptions. Other studies have addressed self-efficacy as a contributing factor to adopting technology (Badia, Meneses, & Sigales, 2013; Holden & Rada, 2011). Equally important are the beliefs teachers hold concerning integrated technology.

Internal factors such as beliefs and attitudes can influence teacher confidence levels in using technology (Badia et al., 2013; Prestridge, 2011; Walker & Shepard, 2011). For instance, beliefs and attitudes towards the importance of technology can negatively affect teacher change. When technology is valued, it will become an essential means to achieve student-learning outcomes (Holden & Rada, 2011; Walker & Shepard, 2011). Ertmer and Ottenbreit-Leftwich (2010) concurred that developing teacher

confidence will enable teachers to freely apply integrated technology. Teacher

perceptions can make a difference in implementing technology.

In a mixed methods study, Prestridge (2011) explored how Information and

Communication Technologies (ICT) beliefs informed teacher practices. Forty-eight

elementary school teachers from four primary schools participated in teacher surveys,

interviews, and submitted documents. The teachers discussed their own beliefs about the

role of ICT, the value of ICT for student learning outcomes, and their own personal

confidence and competency in ICT. Prestridge (2011) stated, "pedagogical beliefs are

formed over many years of experience" (p. 450). He found that experienced teachers

looked at future skills students would need in the workforce. The teachers stated that

future skills needed to include technology. Teachers in this study reported integrated

technology was prevalent in their classroom instruction. Document analysis did not

substantiate these claims showing evidence of marginal inclusion of technology. While

the teachers held positive beliefs about technology use, few were integrating technology

into their instruction. To develop a positive attitude toward technology use often means

nurturing perceived usability of technology.

Perceived Usability and Perceived Ease of Use

Perceived usability of technology refers to a teacher's perception of the perceived

usefulness of technology. Holden and Rada (2011) found that psychological variables,

such as self-efficacy, cognitive style, and perceived usability of technology were major

factors in acceptance of technology into classroom practice. The researchers stated that

teachers would become ready for the inclusion of technology once they develop an

understanding of how technological tools can enhance student learning. As teachers continue to have practical guided experiences with technology, teachers' perceived usability will influence how daily instructional practices integrate technological tools. In spite of these experiences, Ertmer and Ottenbreit-Leftwich (2010) pointed out that teachers tend to see technology as a supplement to learning rather than an essential means for accomplishing learning outcomes. Both Ifenthaler and Schweinberz (2013), and Holden and Rada (2011) concurred that technology acceptance is related to perceived usability.

In a qualitative study, Ifenthaler and Schweinbenz (2013) explored teacher acceptance of Tablet-PCs (TPC) in classroom instruction. Eighteen teachers, who were members of a pilot program, participated in semi-structured interviews. The researchers noted all the participants were experienced with technology integration. The majority of teachers appeared to have positive attitudes towards using the TPC. In contrast, six teachers were more critical about adopting TPC noting some students did not complete their assignments, most prevalently reading assignments. In addition, one teacher noted how the sheer number of applications on TPCs was overwhelming. Of interest, this same teacher stated linking the applications to specific school curriculum would encourage teachers to use the TPCs. The researchers reported a contradiction that of 13 of the 18 participants needed some form of assistance with the TPCs. Five participants stated they were confident users of TPCs; however, they used the TPCs in low-level technology functions. Perceived ease of use develops as teachers continue to build upon positive personal experiences with technology.

Perceived ease of use of technology refers to "the degree to which a technology will be free from effort" (Holden & Rada, 2011, p. 346). Perceived ease of use affects the attitude teachers have about technology. Teachers might dismiss technology tools if these tools are considered management issues or too time-consuming. Holden and Rada (2011) addressed perceived ease of use within the Technology Acceptance Model (TAM). Kindergarten through twelfth grade teachers from Virginia participated in a TAM survey. The results revealed that perceived usability and perceived ease of use technology influenced curriculum design. Teachers were more apt to adopt technology if curriculums included specific references to technology use. Ifenthalher and Schweinbenz (2013) considered using TAM as a data analysis tool in their qualitative study. However, they did not find that the performance expectancy was accurate. Therefore, they opted to administer the Unified Theory of Acceptance and Use of Technology (UTAUT). Though UTAUT had primarily been a higher education tool, Ifenthalher and Schweinbenz stated that the introduction of mobile technology into K-12 educational settings moved the authors to use UTAUT. The researchers conducted semi-structured interviews that included 37 questions. One finding was that the intended use of technology effected perceived ease of use. If the TPCs would not enhance teacher job performance, teachers were not apt to adopt the technology. One teacher stated it was "not quite clear to me what benefits the iPads offer over our two well-equipped computer rooms" (p. 531).

Similarly, Blackwell, Lauricella, Wartella, Robb, and Schomberg (2013) found that adoption and use of technology was influenced by internal factors especially in personal beliefs about technology for learning. Blackwell et al. also used UTAUT in an

online survey with 1329 early childhood educators. A major finding was that teachers limited the use of technology based on the perceived ease of use. Many teachers stated that they had little confidence about using technology in a useful context. This finding correlated with Ertmer and Ottenbreit-Leftwich (2010), who pointed out that, while teachers could easily adopt curricular changes in program and instruction, they hesitated to implement technology. Teachers reported that technology tools are constantly changing, making it difficult to manage the implementation of these tools. With new changes in technology, teachers often lack a sense of accomplishment, which can negatively influence how teachers value technology. Their perception of ease of use can hinder adoption of technology.

Supporting Technology Adoption through Professional Development

The previous section focused on intrinsic factors that influence teacher use of technology. Teacher beliefs and attitudes affect adoption of technology specifically in the areas of perceived usability and perceived ease of use. School culture, professional learning, and professional development models are external factors that affect technology adoption. Recent research conducted by Hutchinson and Woodward (2014) stated that even with professional development, some elementary teachers are still struggling to integrate technology into reading instruction. Traditional professional development models lack job-embedded and collegial experiences, which seem to assist in technology adoption (Masuda, Ebusole, & Barrett, 2013; Riveros, Newton, & Burgess, 2012). Cifuentes, Maxwell, and Bulu (2011) concurred, stating past professional development has had a limited impact on integrating technology into instruction. Furthermore, teachers

often return from professional development sessions to the isolation of their classrooms (Huffman, 2011; Leclerc, Moreau, Dumouchel, & Sallafranque-St. Loui, 2012). To encourage change in practice through collegiality, schools have promoted continuous professional development (CPD) (Burke, Marx, & Berry, 2011; Leclerc et al., 2012), which offers a variety of models to foster collaborative learning opportunities.

The role of CPD is to engage teachers in yearlong, reflective practice in order to improve teaching practices (Burke et al., 2011; Tidwell, Wyman, Garza, Estrada, & Smith, 2011). New models of professional development offer teachers the ability to de-privatize their practices by welcoming them into learning communities. No longer learning in isolation, teachers interact among their colleagues to promote new instruction and support the use of integrated technology. In collegial settings, teachers share experiences, offer suggestions, and become critical friends. In addition to collaboration, CPD nurtures reflective learning. As teachers reflect upon their craft, they become aware of their strengths and weaknesses (McArdle & Coutts, 2010). Through a reflective stance, teachers can become strategic planners who address changes in practice. As elementary schools continue to promote integrated technology, teachers need school cultures that are encouraging and accepting learning environments.

School Culture

School cultures influence teacher attitudes for adopting technology. School cultures that support collaborative environments endorse changes in practices (Burke et al., 2011; Huffman, 2011; Riveros, Newton, & Burgess, 2012). When teachers participate in CPD, they build relationships forged around the common goal of improving student

learning. In a mixed-methods study, Cifuentes, Maxwell, and Bulu (2011) examined effectiveness of technology integration by teachers who participated in learning communities. The two participating school districts had similar student populations with approximately 22% of their students living below the poverty line. The 50 participants formed learning communities comprised of 35 teachers, nine administrators, three ICT staff members, two university professors, and one university graduate student. Cifuentes et al. reported that teachers felt the learning communities were directly responsible for their inclusion of technology into classroom instruction. The common goal of student improvement assisted the teachers in adopting technology. Teachers reported that student achievement scores improved after the addition of technology to instruction. They also stated that they had developed a sense of belonging. Since the study was conducted in 2011, a follow-up study could address consistency of technology use, and investigate whether teachers were still working in learning communities or had drifted back to their individual classrooms.

Professional learning develops a sense of belonging amongst teachers. Relationship building develops cohesiveness to the learning organization. In an interpretative research study, Leclerc et al. (2012) examined factors, which influenced the function of learning communities during the initiation and implementation formation phases. During the initiation phase, teachers felt professional development was imposed upon them. The researchers noted this might have been due to the lack of a common goal. Also noted during the implementation phase, many teachers still had not developed relational trust. The researchers found that teachers had a difficult time leaving the

isolation of their classrooms. Leclerc et al. (2012) and Prytula and Weiman (2012)

pointed out isolation as a major concern in promoting change in practices. Prytula and

Weiman conducted a case study that examined the factors that influenced collaboration

among teaching colleagues. Eight high-school teachers shared their experiences during

interviews and written reflections. The goal of the PLC was to support discourse about

teaching practices. The researchers reported teachers shared experiences about new

practices and strategies. Most importantly, the teachers stated they had developed a sense

of belonging due to their common-goals. Prytula and Weiman discussed how traditional

professional developed encouraged isolated changes in practices. This is consistent with

Leclerc et al. who found that school cultures needed to promote collaboration in order for

sustained change in practice. Prytula and Weinman also noted that a consequence of

isolation was teacher complacency of their teaching practices. In isolation, teachers

limited their exposure to a variety of instructional practices. They also stated that with

common goals, they were more apt to sustain changes made to their instructional

practices. Deprivatization facilitated a deeper understanding of curriculum and

instruction.

Deprivatization of Practices

Deprivatization of practices refers to teachers learning from one another rather

than in the isolation of their own classroom (Burke et al., 2011). Through deprivatization

of practices, teachers learn more about how to integrate technology (Schrum & Levine,

2013). In an in-depth case study, Schrum and Levine studied eight award-winning

secondary schools that have successfully adopted technology use. Schrum and Levine

selected the schools to explore what key factors ensured school reforms through technology integration. School culture was one of the eight factors listed. The researchers stated the atmosphere at school encouraged teachers to use a "trial and error" approach to integrated technology (p.39). The administrators knew teachers would need time to engage in collegial discussions about instructional practices. In addition, teachers were encouraged to share their mistakes with their colleagues in order to learn from the experience. This form of deprivatization is unique to the literature review making it a novel dimension for other schools to consider. The administrators also knew that professional development needed to be job-embedded with practical application providing opportunities for technology planning and support. In addition, teachers held a shared vision about the importance of technology use, and participated in distributed leadership. The implications of the Schrum and Levine study suggested that teachers need the opportunities to discuss not only their successes, but also what they have learned from practical application of new practices.

Critical Reflection

An important facet of CPD is critical reflection. Prytula (2012) defined reflective practices as a form of metacognition, where teachers can "understand their thinking," hence regulating how they determine implementation of practices (p.112). While CPD promotes a collective learning environment, teachers still have autonomy to personalize their own teaching skills. Critical reflection enables teachers to think about their own practices, as well as to challenge their own teaching assumptions. Furthermore, teachers are able to begin to make plans for changes in practice (Prytula & Weiman, 2012).

Professional learning communities welcome autonomous learning amongst its members (Poekert, 2011). Teachers challenge their colleagues to look beyond the isolation of their individual practices. Both Prytula (2012) and Burke et al. (2011) found that CPD formats promote collective and individual reflection. In agreement, McArdle and Coutts (2011) emphasized the need for school cultures to welcome critical reflection that develops "professional identity" (p. 202). Collegial discourse supports critical reflection.

Collegial discourse can foster professional discussions for improving instructional practices (Nehring, Laboy, & Catarius, 2010). Conversations anchored in collegial discourse support examination of teaching practices. In an exploratory study by Nehring et al. (2010), the researchers examined reflective dialogue during Text-Based Seminar sessions. High school principals, school district leaders, and university graduate-instructors formed three integrated-learning communities. In preparation for each session, participants read chapters from an assigned professional text. The participants selected two passages to discuss at the seminars that were of personal interest or held a connection to the learning communities. The seminars followed a strict format focused on collegial discourse. Nehring et al. found that the conversations developed around personal connections that were job-embedded. The discussions fostered both individual teacher improvements, as well as school-wide initiatives.

There were to two limitations to this study. First, the study needed to address accountability that a change in practice had occurred. Secondly, the study lacked evidence of a follow-up component to monitor teacher change in practice. The researchers provided limited evidence of how the transformation of beliefs changed

teaching practices. Further studies in reflective dialogue might include classroom observations to see the change of practice put into action.

While the previous studies focused on in-service teachers, Cornish and Jenkins (2012) studied teaching embedded-reflective practices of pre-service teachers. Both university professors, Cornish and Jenkins used a teacher development model in which teachers progress from novice to distinguish. The researchers noted three approaches to professional development, which included apprenticeship, learning by applying research and theory, and reflective practices. Cornish and Jenkins established that the students participated in learning by modeling. They also stated that their students struggled with applying theory to practice since it was more challenging for the students to see the relevance of considering theory in their instruction. Lastly, the researchers noted how explicit instruction in reflective practice was lacking in their undergraduate program. The background section included the reflective theories of Kegan, Brookfield, and Schon. An interesting idea from this study was the identification of self-assessment as a "powerful tool" (Cornish & Jenkins, p.160). According to the researchers, self-assessment was a distinguished teacher trait that new teachers achieve upon feeling they are competent in their teaching. Reflective teachers were considered autonomous teachers, who are "more sophisticated" in their teaching (Cornish & Jenkins, p.160). The researchers did not address if length of service should be considered when identifying autonomous teachers. Another area for further discussion is adult human development. It is plausible that young teachers might have emotional, social, and cognitive development needs to address prior to applying self-reflective skills.

Data collection for the Cornish and Jenkins (2012) study included

autobiographies, Venn diagrams, and peer analysis. The use of Venn diagrams to

compare before/after reflection is a unique data collection tool. Cornish and Jenkins

stated that the pre-service teachers struggled to write an analysis of their before/after

reflections. The pre-service teachers wrote descriptions rather than analysis. The

reflections lacked rationales about what happened during their lessons. This seems to

align with the findings related to learning by applying theory and research. The benefit of

this study is the explicit instruction of reflective practices. While the pre-service teachers

were not able to assess their teaching experiences, they were introduced to reflective

practice. As new teachers enter schools, administrative staff can continue to foster the

reflective practice. The Cornish and Jenkins study reinforces the necessity of teaching

reflective practice to both pre-service and in-service teachers. Continual professional

development that is job-embedded supports critical reflection, as well as encourages

active learning.

Job-Embedded Learning

Job-embedded learning can provide opportunities for teachers to become active

participants in their own learning. Job-embedded learning is a professional development

model that encourages teachers to learn-by-doing in the context of their own classroom

instruction. In a qualitative study by Burke (2013), four high school World Language

teachers participated in a 10-week study that examined the effects of experiential

professional development. The inside-out approach of experiential professional

development model reinforced job-embedded learning. Teachers read about teaching

practices, implemented the practices, and then reflected upon the learning experience. The benefit of job-embedded learning is the implementation of practices within the daily teaching routine. The teachers were able to use their experiences to improve their practices. Burke reported that the learning community continued to support the four teaching colleagues in their search for change in practice. The researcher also found that the longer the professional development lasted, there was more time to "integrate new knowledge into practice" (Burke, p. 250). In addition, working in a collaborative group meant the teachers were more apt to continue to apply the new instructional practices in the future. Burke's study also included coaching and feedback opportunities. While the study used specific observation periods, the teachers naturally began to conduct peer observation on their own. They frequently visited one another as observers and sometimes as a coach. One dimension stated was that teachers needed to want to improve upon their practices. Burke found that collaboration was a key element of the experiential model. However, teachers needed to take ownership as well as leadership in selecting areas for improvement. This point aligns with Tidwell et al. (2011) who found that self-selected topics that were relevant to teachers were set within the context of the classroom.

In a qualitative study by Tidwell et al. (2011) investigated the effects of a collegial partnership on self-selected professional development topics. Three dual-language elementary teachers and two university professors participated in the study. The researchers used lesson plans, field notes, student responses, and artifacts as their data collection tools. Tidwell et al. found that collegial discourse was a major focus during the professional learning community sessions. Due to this discourse, teachers planned to use

specific instructional practices. Tidwell et al. reported that the specific professional development topics encouraged further collegial discourse, which promoted critical reflection. Teachers planned specific action research plans to address areas of improvement. This form of job-embedded professional development reinforced the necessity of forming learning communities. The teachers worked as teams to address similar instructional concerns. Teacher collaboration was not an imposition, but a focus on reaching a common goal.

Masuda et al. (2013) found that participation in mandatory professional development could create a feeling of imposition. In a qualitative study, Masuda et al. investigated how different teacher career-stages engage in different forms of professional development. The researchers found that job-embedded professional development engaged all teachers at each career stage. Similar to Burke (2013), Masuda et al. found that job-embedded learning provided time and support for teachers to experiment with different instructional practices. Job-embedded learning is practical and motivating since teachers are applying what they are learning about on a daily basis. In addition, job-embedded learning involves peer coaching.

Peer Coaching and Mentoring

During peer coaching, teachers conduct peer observations for providing critical feedback (Burke, 2013; McArdle & Coutts, 2010). Groups of two to three teachers form learning communities to reflect on current practices and then build new teaching skills. Student learning is the central focus of the learning community. The peer coach can be a facilitator or an expert of the instructional practice. In Burke's (2013) study, the role of

peer coach shifted among the team of four teachers. By sharing the role of peer coach, the teachers were taking ownership of the learning experience. This form of leadership motivated the teachers to implement the practices. The teachers stated that the peer coaching provided a support system that encouraged new practices. During the debriefing meetings, the coach provided specific feedback that stimulated reflective practices. The discussion also developed examination of pedagogical beliefs. Critical reflection reinforced that teachers needed a theoretical understanding about new practices. By developing a foundational understanding of the practices, the teachers were able to make considerations affecting lesson designs. Burke stated that teachers were able to understand and apply theory and research into practice.

Mentoring is a form of situated-professional development that addresses professional learning (Kopcha, 2012). In a qualitative study, Kopcha (2012) investigated how mentors could support technology adoption within job-embedded experiences. Thirty K-5 teachers participated in a series of surveys, interviews, and classroom observations. Kopcha stated that there was a gap between the amount of technology currently available in elementary classrooms and the actual use of technology for instruction. During the yearlong study, the 30 teachers worked with a technology mentor, who guided professional development to address knowledge and skills learning. The mentor worked with teachers during instruction. In addition, the mentor explained and modeled technology options during training sessions. Kopcha noted that situated professional development "played a key role in shaping teachers' perceptions about technology use" (p. 118). The teachers stated the mentor was a contributing factor in

dealing with common barriers of technology. For instance, the mentor assisted in creating

a vision for using technology. The mentor also promoted positive beliefs about

technology use. According to Kopcha, those teachers who worked with the mentor

"integrated technology more frequently over time than teachers who did not learn with

the mentor" (p.110). A contributing factor of technology adoption was the specific

training by the mentor within the classroom setting. Additionally, the teachers

participated in a community of practice (CoP) following the sessions. The CoP is a form

of continuous professional development. The mentor continued to reinforce positive

beliefs about technology use through specific sessions on pedagogical decision-making.

Glazer and Hannafin (2009) also looked at a mentoring option to support

technology integration. The researchers found that a gap in professional development for

incorporating peer coaching that would encourage technology integration. Glazer and

Hannafin reported that teachers received adequate technical support but limited assistance

integrating technology into teaching practices. The researchers examined the type of

interaction teachers had with technology mentors within a Collaborative Apprenticeship

approach. The study included 11 fifth grade elementary teachers, who were familiar with

peer mentoring. The researchers collected data through a series of interviews, teacher

journals, and field notes. Glazer and Hannafin took field notes of the discussions held

during group mentoring sessions. The researchers found that teachers, who were part of

group mentoring, supported brainstorming sessions around technology use. However, the

teachers often held off-task discussions that did not address individual concerns. One

teacher reported that transferring the suggestions into practical classroom application was

difficult. In addition, the teacher stated students rarely found that the technology activities interesting. This insight is a concern that teachers should address in their planning. The development of technology activities should offer students an authentic use of technology. If the activities are contrived, teachers risk limiting student motivation and engagement to learn.

The goal of Collaborative Apprenticeship (Glazer & Hannafin, 2009) was to increase peer interactions and networking. In fact, the study demonstrated that both occurred. However, some teachers did report they still felt isolated and unsuccessful with integrating technology into instruction. The teacher-leaders selected as mentors were qualified users of technology. They often told the teachers how to use technology. Perhaps a gradual release of responsibility would have assisted a shift in the apprenticeship from teacher dependence on the mentors to a partnership with the teachers. It is possible that the teachers did not feel ownership of the technology activities. In addition, it is plausible that teachers' underlying beliefs in perceived usability and perceived ease of use interfered with technology adoption.

Cornelissen et al. (2013) examined transfer of knowledge into practice in a longitudinal multi-methods case study. Cornelissen et al. questioned the generation and sharing of knowledge used during reciprocal school-university networks. The participants were two masters-level students and two university professors. Data collection consisted of interviews, teacher journals, and a questionnaire. The researchers administered the questionnaire to 17 school colleagues. Cornelissen et al. included these participants to

collect data on the frequency the two masters' students interacted with their colleagues rather than their university partners.

According to Cornelissen et al. (2013), two organizational changes occurred that supported changes in practice. The first was moving away from university-centered approach to a school-centered approach. By making this adjustment, the university focused on what the school acknowledged as a need for improvement. The university professors became research advisors that supported teacher inquiry. The researchers defined teacher inquiry as job-embedded professional development that focused on improvements of student learning in both school-wide initiatives and individual classrooms. A second change was a shift in relationships. Instead of the university directing the change in practices, they become mentors who provided support to teachers. In addition, the relationships were reciprocal, allowing for flexibility in leadership. The expert-to-learner dynamics changed to view all participants as equal partners in the change process. With teacher inquiry, teachers generated knowledge about their teaching methods and shared this information with their colleagues and university partners. The university partners in turn assisted the masters students in critical reflection that closely examined instructional practices.

Similarly, Vocco (2011) found that the shift in relationship with her graduate students supported change in practice. Vocco conducted a hermeneutic phenomenological self-study focused on professional relationships with former graduate students. Like the Cornelissen et al. (2013) study, Vocco used a form of teacher inquiry, called action-research, as a form of professional development to increase teacher learning-capacity.

After the conclusion of the year-long action-research course, Vocco continued a working relationship with several high school teachers in the capacity of professional friend. Vocco found that the collaborative nature of professional friend strengthened reciprocal learning and self-improvement. By altering the role of mentor to professional friend, Vocco was able to have exchanges with former graduate students. The researcher applied a gradual release from being mentor to being a professional colleague. By scaffolding the shift in relationship, Vocco encouraged the teachers to generate individual knowledge so that they could then learn how to apply that knowledge in their decision-making processes.

Teacher Knowledge

Teacher knowledge is acquired by classroom experience (Ertmer et al., 2013; Rohaan, Taconis, & Jochems, 2012). The development of subject matter knowledge and pedagogical content knowledge can affect attitudes and self-efficacy of using technology. Ertmer et al. (2013) studied the alignment of pedagogical beliefs with classroom technology practices. Unlike Kopcha (2012) and Glazer and Hannafin (2009), Ertmer et al. did not use a mentoring or peer coaching system. Instead, the researchers selected 12 K-12 teachers who earned awards for their use of technology. The teachers displayed a student-centered pedagogical belief, which included learning experiences that had real-life context, provided students with choice of activity, and were collaborative. Ertmer et al. stated that the most cited barrier for technology use was professional learning. The researchers recommended that job-embedded professional development should introduce

new kinds of pedagogy. In addition, administrators needed to support teacher innovations in technology.

According to Ertmer et al. (2013), technology adoption can occur by increasing knowledge and skills. By focusing on teaching and learning, teachers make changes to pedagogical beliefs. An interesting point Ertmer et al. discussed was the inner drive that some teachers displayed when incorporating technology into their teaching practices. The barriers did not appear to deter those teachers from implementing new pedagogical practices. Mama and Hennessy (2013) also found that even with limited access to technology the 11 primary teachers in first through sixth grades were able to implement technology into their practices. The limited access to technology did not hinder some teachers from reaching their goals to integrate technology into their teaching practices. The multi-case study investigated teachers' technology beliefs compared to their actual practices. Mama and Hennessy pointed out the discrepancies with self-reporting systems. Instead, the researchers conducted classroom observations. There were four distinct attitudes towards technology use that ranged from complete acceptance to no acceptance in classroom instruction. All but one participant noted that the value of audio-visual function of technology increased teaching and learning. Neither Ertmer et al. (2013), nor Mama and Hennessy (2013) included a mentor or peer coach. In the case of Ertmer et al., the participants were confident users of technology. In contrast, the participants from Mama and Hennessy's study had limited experiences with technology. The teachers had partial competency in both technical and pedagogical aspects of technology use.

Rohan et al. (2012) found that teachers had basic subject matter knowledge and inadequate pedagogy and content knowledge. The data collection included self-efficacy tests and questionnaires to explore "what teachers needed to know in order to become high quality technology teachers" (p.272). The participants included 354 primary teachers that represented 7,000 primary schools in the Netherlands. The researchers stated that a weakness in the educational system is a lack of technology training. The expectation was for teachers to master technology use without formal professional development options. Attitude and self-efficacy of technology use improved as teachers became more proficient in both subject matter and pedagogy. One implication of this study was developing teacher knowledge of pedagogical approaches that will support technology use. Rohaan et al. suggested inquiry-based and problem-based learning. A second implication is the more teachers actually use technology, the more confident they become applying technology within their instruction.

Parsons and Vaughn (2013) also looked at developing teacher knowledge in their multi-case study. The researchers explored the gap in research about the nature of teacher adaptation and metacognitive thinking during reflective practices. One finding was that teachers were constantly monitoring student learning. The researchers attributed this to Schon's reflection in action. Parsons and Vaughn connected Schon's reflection on action to the teachers' reflections stating that the teachers had a "deep knowledge about their students" (p. 314). To monitor adaptive teaching, the researchers used classroom observations, post-observation interviews, and artifacts, which included teacher reflective statements. According to Parsons and Vaughn, top-down mandated programs were

"restrictive environments" with negative learning consequences. This type of mandate is a one-size-fits-all approach that ignores individual learning needs. One aspect of the study that would benefit from further discussion is "teaching is complex and unpredictable" (Parsons & Vaughn, p.300). While this statement holds true, it is questionable if it implies teachers are not able to anticipate student reactions. Perhaps this position was implied when the researchers noted how teacher reflections displayed they knew each student.

Concerns Using Peer-Observation and Feedback

Though peer mentoring and coaching are potential support systems for technology adoption, Liu (2013) found that teacher anxiety existed during instructional observations. Liu's qualitative study focused on the effects of long-term, collaborative, school-based peer coaching. Six elementary teachers participated in a form of learning community called research lesson design. Teachers designed lessons and then observed one another in order to improve upon their instructional practices. Liu reported teachers hesitated to provide feedback to their peers due to negative reactions to criticism. Similarly, McArdle and Coutts (2010) found that teachers objected to challenging one another during feedback sessions. The authors noted that the peer review process lacked in-depth reflection, especially in theoretical foundation for their choices of instructional practices. In Lui's study, the teachers reviewed peer video recording to alleviate teacher anxiety. The author concluded that the teachers demonstrated instructional improvement based on self examination rather than peer feedback. Examination of own practices appears to be a consideration for change in practice.

Necessity of Trusting Relationships

In a multi-methods study, Huffman (2011) studied the long-term effects of professional learning communities. Huffman focused on shared personal practices. Within this dimension, teachers observed one another and provided feedback to support knowledge, skills, and management. Peers also become mentors, coaching one another through feedback meant to improve instruction. During this process, teachers began to share their experiences in order to discuss improvement options. Huffman also discussed the necessity of building trusting relationships among peers. Successful peer-to-peer learning is constructed through caring relationships that develop from trust and respect. Additionally, these relationships are committed to making change in practices. An interesting point was the identification of relationships promoting risk-taking. Risk-taking appears to hold a negative connotation; however, in Huffman's study, risk-taking refers to innovation. Peers support one another to try new instructional strategies.

The cultivation of teacher knowledge is a result of the supportive network. According to Huffman (2011), teaching and learning environments increase the learning capacity of an organization. By sharing experiences, teachers develop in their teaching craft (Bozak, Yildirim, & Demirtas, 2011). Huffman stated that even with its importance, shared personal practices are the least apparent in schools. Bozak et al. (2011) concurred, writing that peer feedback lacks substantive feedback. They further stated that the deficiency of constructive feedback is a result of a sensitivity people have with criticism. This aligns with the findings of Liu (2013), and McArdle and Coutts (2011). Bozak et al. also pointed out that teachers are under qualified to conduct peer observations and to

write informative feedback. The implication of this is adequate training to support shared personal practice. Without proper training, the merits of peer observation and feedback process diminish.

Alternative Approaches to Peer Observations and Feedback

To gain a deeper understanding about current practices, Tondeur, Kershaw, Vanderlinde, and Van Braak (2013) studied the use of stimulated recall. According to Tondeur et al., stimulated recall is a verbal reporting technique in which teachers review recordings of their classroom instruction. The researchers asked teachers to verbalize their thoughts while reviewing the videos. The six selected elementary school teachers were proficient users of technology. Like Ertmer et al. (2013), and Mama and Hennessey (2013), Tondeur et al. reported an inner drive motivated the teachers to use technology to support teaching and learning. Tondeur et al. highlighted several commonalities among the participants that included using technical and human resources, being innovative, a command of technology, and similar beliefs about education. Additionally, teachers shared the same school vision, which was student-centered and focused on learning outcomes. Stimulated recall holds promise as a systematic reflection approach. The metacognitive aspect of the approach maintains self-reflection within job-embedded professional development. A complementary approach is the use of mobile devices to support feedback.

Seven literacy coaches participated in using mobile devices as a means to improve their observation and feedback skills. Bates and Martin (2013) stated that literacy coaching is a job-embedded professional development approach that supports individual

teacher needs and interests. The role of literacy coaches varies depending on the focus of

the sessions. For instance, Bates and Martin described one literacy coaching session

where the coach provided instant feedback during the reading session. The teacher then

redirected the student by using several of the prompts suggested by the literacy coach.

Other descriptions included debriefing immediately after the reading sessions, and

follow-up emails with detailed narratives about the reading sessions. While literacy

coaching is relatively new, research used by, Bates and Martin reinforced the change in

practice that the one-on-one coaching provided classroom teachers. One area unique in

the literature though was the use of mobile devices as a means to maximize the coaching

sessions. The teachers in Bates and Martin's study used iPads and an app called Evernote.

The digital note taking was new for all of the participants. With digital note taking, the

coaches were able to "capture, store, organize, retrieve, and share" (p. 61) observations

and feedback with the classroom teachers. Data collection included structure and

unstructured interviews and blogs. Blogging offered the literacy coaches a forum to

discuss their reactions with their colleagues. The blogs naturally developed into

exchanges about ways other coaches used Evernote.

The initial data revealed teachers needed a workshop day to become more familiar

with the iPads and Evernote. For instance, the shorthand system traditionally used was no

longer an option with the iPads. The coaches needed time to experiment with the iPad

keyboards to create a new cueing system. One coach reported how the digital note taking

at first made her take less notes as she could not use shorthand coding. She realized her

old system caused her to take too many shorthand notes that were not used in her reports.

The feedback then became more meaningful and specific to a particular dimension of the literacy session. Another concern was learning how to use the audio and video tools on the iPad. The coaches discussed when to use each of these tools to support their observation and feedback skills. For example, the literary coaches could video segments of the lesson that pointed out particular teaching patterns that were successful or needed improvements. The audio segments recorded students' reading fluency. The coaches taught teachers to identify discrepancies in fluency rates to determine an instructional plan for the student. In addition, hyperlinks could easily be included during the coaching session. Each coach used an online resource program of best-practice videos. The iPads provided the coaches with easy access to place a hyperlink into the digital notes. The coaches used the videos as learning resources for improving instruction. Overall, Bates and Martin (2013) found that this initial investigation held promise for supporting change in practice. The literacy coaches improved their skills in feedback that was more specific to each teacher. Lastly, the literacy coaches modeled use of mobile devices. The additional exposure of mobile technology for job related tasks was an additional bonus for this study.

Summary and Conclusion

Mobile devices are changing how teachers teach and students learn. A challenge for elementary teachers is using these tools in developmentally appropriate ways during reading instruction (Hutchinson & Woodward, 2014). More and more children are entering elementary schools with sophisticated digital competencies. These same children are still developing print-based literacy skills. Teachers can use technology to leverage

student learning. However, adoption of mobile device use during reading instruction depends upon the perceived usability and perceived ease of use of the digital tools (Holden & Rada, 2011). Teachers need to understand the benefits of using mobile devices for adoption to occur.

The inclusion of multimodality to this literature review highlights the potential of engaging students in the reading process through a variety of modalities (Biancarosa & Griffith, 2012; Northrop & Killeen, 2013). The interactive dimensions of mobile devices can encourage participation in reading instruction due to various options within eBooks and other applications (Moody et al., 2011; Roskos & Burstein, 2012). As teachers learn more about the benefits of mobile devices, they can plan how and when to use these digital tools during their instruction. Confidence to use mobile devices can increase when teachers share their practices.

Teachers often learn in the isolation of their classrooms and in single professional development events (Huffman, 2011). These forms of teacher development limit how teachers learn and then transfer knowledge to their instruction. As schools implement job-embedded learning approaches, school cultures change (Schrum & Levine, 2013). Schools become places where both teachers and students learn. The formation of professional learning communities and communities of practice incorporate collegial discourse, which can lead to critical reflection upon practices (Nehring et al., 2010). Teachers can reflect upon the relationship among TPACK to inform their decision-making process. As learning capacity increases, teachers can plan how and when to use mobile devices in their instruction. Additionally, peer coaching and mentoring cultivate

learning by doing (Mama & Hennessy, 2013). Peer coaches and mentors facilitate reflective discourse and prompt generation of new knowledge to improve instruction. As a collective, teachers learn from one another. They can then support each other to use mobile devices. Lastly, collegial learning is a recursive process that encourages teachers to reflect upon their experiences and make changes in practice.

This study addressed how to close the KDG that exists between teacher ability to transfer understanding of using mobile device to application of these digital tools in reading instruction. This literature review focused on the necessity of participating in reflective practices in order to transfer knowledge about technology use to application. The theme that emerged from the review of literature was that forms of professional feedback appear to stimulate transfer of theory to practice. In general, the literature review explored the role of peer coaching and mentoring as potential professional development options to fortify teacher-learning capacity. Relational trust, development of continuous professional development, and collegial learning were themes generated in relationship to peer coaching and mentoring.

I used a case study to explore the decision-making process teachers employ when planning to use mobile devices in K-4 reading instruction. This literature review included both qualitative and quantitative methods. The benefit of this literature review was that the majority of studies were qualitative case studies. These studies used interviews, surveys, observations, and focus groups to collect data. These studies also provided examples of data analysis plans that will assist in developing the methods for my case study design as seen in Chapter 3.

Chapter 3: Research Method

Introduction

The purpose of this study was to explore reflective practices teachers employ when making decisions on how to integrate technology, specifically mobile devices, in K-4 reading instruction. In this chapter, I outline the research design and rationale for selecting a multiple case study approach. I describe my role as researcher, which included any possible biases. Next, I provide details concerning the sampling strategy, recruitment criteria, data collection, and data analysis procedures. Then I discuss strategies that address credibility, transferability, dependability, and confirmability for my study. Finally, the summary transitions to Chapters 4.

Research Design and Rationale

I used a qualitative, case study design to explore the overarching question: How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?

In addition, there are four subquestions:

RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?

RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?

RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?

RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?

The conceptual framework of this study included the KDG and reflective practice. Though teachers participate in professional development and have access to mobile devices, a KDG exists in practical application of technology to reading instruction (Hutchinson & Woodward, 2014). Teachers face a variety of barriers in using technology that affect the transfer of knowledge to action. The KDG is created when teachers mistakenly confuse talk for action. In an effort to use mobile devices during reading instruction, elementary schools have organized professional development sessions to support collaborative learning among teachers (Cifuentes, Maxwell, & Bulu, 2011). Teachers have also formed professional learning communities in their efforts to support reflective practices. Reflective practices refer to the tasks of examining and evaluating instructional performance (Schon, 1983). Both in- and on-action reflections contribute to the decision-making process. Teachers base their future actions from their prior experiences (Killion & Todnem, 1991).

A case study was used for this study for several reasons. For this study, each school was a single case. The unit of analysis for this study included individual elementary school teachers representing grades K-4. The teachers were required to have

access to mobile devices during reading instruction. Secondly, case study ensures that the central phenomenon is well explored revealing multiple aspects of the phenomenon within context of the natural setting (Yin, 2014). Without the context of this study, classroom settings, and professional development, the investigation of the decision-making process teachers apply when considering technology use would be lacking.

Other qualitative approaches could have addressed "how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (Merriam, 2009, p. 5). A phenomenological approach could have been considered for this study based on capturing and describing a phenomenon (Patton, 2002). This study was focused more on describing a process rather than isolating the phenomenon. Also phenomenology relies on in-depth interviews with people. In comparison, case study approach has the advantage of using all forms of data collection (Merriam, 2009). A second option could have been grounded theory. Grounded theory focuses on generating a theory. Merriam stated that grounded theory is "particularly useful for addressing questions about process" (p. 30). I chose not to use grounded theory since I described an event or series of events (Yin, 2014). I described a cognitive activity that teachers engage in during their planning process. The goal was to have teachers discuss their metacognition about their decision-making process.

Role of Researcher

My role as researcher was that of observer with the purpose of describing real-life situations. The reader will be engaged in understanding more about the phenomenon due to the descriptive nature of the study (Merriam, 2009). As the primary instrument for data

collection, I had the opportunity to observe teachers as they communicated with one another about how they make decisions about technology use in their reading instruction. As a "human instrument" (Merriam, 2009, p.15), I was able to immediately process and clarify information.

My teaching experience has been in both private and public education in grades K-8. My undergraduate degree was elementary education from the University of Southern Maine. I have a K-8 teaching certification from the State of Maine. Additionally, I hold a Master's Degree in Education with a specialization in literacy also from the University of Southern Maine. From 1997-2001, I taught in the public school system in York, Maine teaching second grade and then kindergarten. During this time, I served as an educational leader on the literacy committee. There were potential biases from these teaching experiences that I could hold. I also risked personalizing my own teaching experiences with those of the participants. To address these biases I took care to bracket any "impressions and preliminary interpretations" that reached beyond direct observations and field-notes (Hatch, 2002, p. 77).

Method

Participant Selection Logic

For this case study, I first identified the criteria for the bounded system in time and place, and then selected the participants who best fulfilled the criteria recommendations (Merriam, 2009). The criterion for the unit of analysis was elementary schools that had some combination of K-4 classrooms. Criterion sampling strategy was used to select individual cases. The criterion included elementary teachers in grades K-4

who use mobile devices during reading instruction. Teachers met these categories to ensure information-rich data (Patton, 2002). The participant pool was comprised of 10 teachers who met the criteria. Age, gender, and length of service were not predetermined though each was considered in data analysis.

The first step in my recruitment plan was to contact several local elementary schools. My initial contact with the three elementary schools was to email an introduction and request for either a phone conference or meeting (see Appendix A). In my email, I introduced myself, highlighting that I was a former employee of the school district. I then stated that I was a graduate student doing a research study and described my research topic. The participant time commitment and expectations were highlighted. As part of the Institutional Review Board (IRB) requirements, I provided an overview of the study. I also included the criteria list for participant consideration to ensure that the school principals knew that I required volunteers for this study who were K-4 teachers with access to mobile devices during reading instruction. I included my contact information. Later, I sent a follow-up email thanking the principals for their time.

Upon school principal approval, a school leader made an introduction to the teaching staff. The school leader shared details about the study and provided the teaching staff with my contact information. After hearing from potential participants, I sent an email to these teachers to introduce myself, share details about my study, and a description about their participation (see Appendix B). The letter also explained that their participation was voluntary, told how their identity would be protected, and that they could withdraw from the study at any point for any reason without negative

consequences. A consent form was attached to the email for participants' electronic

signatures. I added my contact information to the email so that they could reach me via

email or by phone.

After consent forms were submitted, participants were asked to complete an

introduction survey (See Appendix C). I used Survey Monkey, an online technology tool,

to generate the survey. The survey was designed to collect general background

information about each participant such as age, gender, number of years of teaching, the

grade levels that have been taught, current teaching grade level, technology use,

endorsements, continuing education, and the number of years using mobile devices.

Participants were asked to identify their name and school. Participant identification was

kept confidential. The participants were assigned a code that was used throughout the

study to manage data from each participant without using their original names. I then

matched the survey to the appropriate teacher and school codes. I was the only one with

access to the online data. The survey was a single password-protected event that took

approximately 10 minutes to complete. The data was recorded onto a master spreadsheet

with distinct categories. Any questions or clarifications about the information were asked

during a subsequent in-person interview. The information gathered ensured that the

participants met the criterion sampling criteria. This information was also used for

purposeful selection in the event that there were more than 15 participants. Additionally,

the demographics data could be used in the data analysis. Any questions or clarifications

about the information were asked during a subsequent in-person interview.

Qualitative studies rely on smaller sample sizes in order to support thick description of the phenomenon (Patton, 2002). For this study, the anticipated participant pool target was 10-15 teacher volunteers to accommodate drop-outs. The bounded case for this study was elementary schools within two school districts during a specified time frame. Since the initial recruitment resulted in too few participants, I submitted a second request to the schools to see if teachers would reconsider participating in the study. However, in the event that the participant pool search had to be expanded, I could have contacted a principal of a second neighboring community elementary school. Additionally, my former school district curriculum coordinator was willing to write letters of introduction for me to several other neighboring school districts. The possibility of several different schools and school districts provided the opportunity to replicate the study at each site. Yin (2014) stated that replication provides a more robust study since the multiple cases are like "conducting a second, third, and even more experiments" (p. 57). In the event that there were more than 10 volunteers, I would have needed to determine which cases would provide information-rich data. The introduction survey would have been used to further discern criteria to narrow the purposeful selection.

Instrumentation

An advantage of a case study approach was the use of multiple forms of data collection tools (Merriam, 2009; Yin, 2014). A variety of data collection tools provides an in-depth look at the phenomenon in order to "uncover the interaction of significant factors characteristic of the phenomenon" (Merriam, 2009, p. 43). Use of several different sources of evidence created a broader understanding of the phenomenon (Yin,

2014). Instead of being limited to one source of information, case study builds a holistic view of the phenomenon. The data collection methods in this study included individual interviews, follow-up interviews, and a focus group.

One of the most powerful data collection tools for case study approach is interviews (Yin, 2014). I interviewed individual teachers twice during the study for approximately 45-60 minutes. An interview protocol was used to organize the open-ended questions (see Appendix D). The predetermined questions focused on technology in reading instruction, reflective practices, and the decision-making process anchored in the conceptual framework and the literature review (see Table 1). While probing questions could be anticipated and planned, the interview guide approach invites open conversations and spontaneous follow-up to prompt more in-depth and personalized information (Patton, 2002). I audio-recorded the initial interviews for later transcription. The audio recordings and transcripts were name and school coded to match the survey responses. This provided confidentiality for the participants. Participants were encouraged to email or phone call me if they had further information or examples to share. In addition, a follow-up interview was used after the initial interviews. A follow-up interview was conducted with each of the 10 participants. Predetermined questions were emailed to the participants (see Table 2). The participants were given the choice to email responses or to contact me via phone. All 10 participants emailed their responses. Follow-up questions were conducted by email.

Table 1.

Research Questions, Interview Questions, and Initial Codes

Overarching Research Question		
How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?		

Research Questions	Interview Questions	Initial Codes
RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during reading instruction?	IQ 1: What tools or strategies helped you to explore how to use mobile devices in your practice? (For instance, peer-observations, workshops, collegial discourse, independent research) IQ 2: What developmental reading aspects influence when and how you determine to use mobile devices in your instruction? **Probe: What made you decide if the technology would be easy to use during instruction?** **Probe: What made you decide if your instruction would be enhanced by using mobile devices?**	Reflective Practice (RP) Developmental Reading Aspects (DRA) Knowing-Doing Gap (KDG) Perceived Ease of Use (PEU) Perceived Usability (PU)
RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?	IQ 3: What self–monitoring strategies did you apply while using mobile devices during your reading instruction? IQ 4: After teaching your reading lesson, how do you track what worked or did not work in the lesson that would help you to modify future instruction. IQ 5: As you prepare for your next lessons, how do you access your previous self-reflections? **Probe: What types of support systems assist you with accessing your previous self-reflections?**	Reflection-in-Action (RiA) Reflection-on-Action (RoA) Reflection-for-Action (RfA)
RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?	IQ 6: What have you used as a resource to support the use of mobile devices in your teaching? IQ 7: How do the resource people in your school specifically help you with integrating technology during reading instruction? IQ 8: Tell me about an activity you learned about during professional development about the use of mobile devices that you then implemented into your classroom instruction. **Probe: What factors contributed to your decision to use this activity?**	Professional Development (PD) Professional Development (PD) Peer Mentoring (PM) Knowing-Doing Gap (KDG)
RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?	IQ 9: What recommendations do you have that would improve professional development options for mobile device use during reading instruction? **Probe: What conditions need to be in place to foster implementation of mobile devices during reading instruction?** **Probe: What would aid you in transferring your understanding about mobile device use to application?**	Improving Professional Development (IPD) Knowing-Doing Gap (KDG) Technology Adoption (TA)

Table 2.

Research Questions, Follow-Up Questions, and Initial Codes

Overarching Research Question		
How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?		
Research Questions	Follow-Up Questions	Initial Codes
RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?	FI 1: What types of challenges have you faced when deciding to use mobile devices? **Probe: What has affected your confidence level in using mobile devices in your teaching?**	Perceived Ease of Use (PEU) Perceived Usability (PU)
RQ 2: What reflective-practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?	FI 2: How do you share the experiences you have had using mobile devices in your teaching with your colleagues? **Probe: How has that engagement informed your future instruction?**	Collegial Sharing (CS) Reflective Practice (RP)
RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?	FI 3: Describe your ideal reading lesson that uses mobile devices. **Probe: What in particular makes that an ideal lesson?**	Technological, Pedagogical, and Content Knowledge (TPACK)
RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?	FI 4: How has the school culture affected how you use mobile devices? **Probe: Describe the expectations your school has concerning the use of mobile devices.**	Improving Professional Development (IPD) Knowing-Doing Gap (KDG) Technology Adoption (TA)

At the conclusion of the study, I conducted a focus group. The advantage of a focus group is that the members share similar knowledge about the topic (Merriam, 2009). The focus group for this study provided an opportunity for participants to talk to one another about their practices. Merriam (2009) stated that the best topics for focus groups are those everyday occurrences that should be discussed but often are not, due to

time constraints. As an exit procedure, the focus group was asked open-ended questions as a follow-up to previously collected and analyzed data (see Appendix E). The interview included reflective questions about what the teachers have learned from their experiences and recommendations (see Table 3). The participants were asked to provide suggestions and recommendations about how and when to use mobile devices during reading instruction. The data generated from the group interaction added a new layer of understanding to the topic. I conducted one focus group that included five participants. The focus group lasted no longer than 45 minutes. I audio-recorded the session for later transcription with participant permission.

Table 3.

Research Questions, Focus Group Questions, and Initial Codes

Overarching Research Question		
How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?		
Research Questions	Focus Group Questions	Initial Codes
RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?	FGQ1: How does your school support mobile devices as a natural part of your planning for reading instruction?	Decision-Making Process (DMP) Technological, Pedagogical, Content Knowledge (TPACK)
RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?	FGQ2: What types of follow-up professional development have been used to foster teacher reflective-practices concerning mobile devices during reading instruction? **Probe: How have these sessions encouraged future use of mobile devices in your reading instruction?** **Probe: How have you used these sessions with other colleagues to promote mobile device use?**	Professional Development (PD) Knowing-Doing Gap (KDG) Developing School Culture (DSC)
RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?	FGQ 3: What forms of professional development have been used at your school to aid in using mobile devices in your reading instruction? **Probe: How have these forms of professional development fostered continued use of mobile devices in your reading instruction?**	Technological, Pedagogical and Content, Knowledge (TPACK) Knowing-Doing Gap (KDG) Improving Professional Development (IPD)
RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?	FGQ4: What changes would you like to see in professional development that would support your continued use of mobile devices during your reading instruction?	Knowing-Doing Gap (KDG) Technology Adoption (TA)

Procedures for Recruitment, Participation, and Data Collection

The recruitment plan included making initial contact by email with the two elementary schools from my former school system and a third elementary school in a neighboring community (see Appendix A). These schools were selected based on teacher use of mobile devices during reading instruction. I included in the email that I was a graduate student doing research and describe my research topic. I also itemized the criteria for the selection process for possible teacher participation. The participant time commitment and expectations were highlighted.

In the event that there were too few participants, I went back to the three elementary schools asking again for volunteers. A second option would have been to find another local elementary school to participate. A third option was to contact my former district curriculum coordinator, who works for a local university. She was willing to write a letter of introduction for me to several neighboring school districts. I would follow the same recruitment procedure with the other school districts once the former curriculum coordinator would have sent her introduction letters.

The data collection for this study included two interviews and a focus group. I collected data from three elementary schools. The interviews were conducted with individual teacher participants, and each interview lasted approximately 45 to 60 minutes long (see Appendix D). In addition, participants were welcomed to email or phone call me to share further information. I audio-recorded the interviews for later transcription. The audio recordings and transcripts were name and school coded to match the survey

responses (see Appendix C). This provided confidentiality for the participants. In addition, follow-up interviews were scheduled with individual participants. These interviews were conducted by either email.

A focus group was conducted that included participants from the three site schools. I collected the data at each focus group session. The focus group lasted approximately 45 minutes long. As an exit procedure, the focus group participants were asked open-ended questions as a follow-up to previously collected and analyzed data (see Appendix E). The interview included reflective questions about what the teachers have learned from their experiences and recommendations. I audio-recorded the focus group for later transcription. The audio recordings and transcripts were name and school coded to match the survey responses. This provided confidentiality for the participants. Participants were encouraged to email or phone call me if they had further information.

At the conclusion of the study, I sent a copy of the interview transcripts to individual participants for member checking. For those who participated in the focus group, I transmitted a letter that highlighted the salient points of the meeting. As a follow-up procedure, participants were given the opportunity to add any necessary information and clarification to the transcripts and the executive focus group summary letter.

Data Analysis Plan

The data analysis process for case study design began with the careful construction of a case study database (Yin, 2014). The use of a case study database was necessary due to large amounts of information generated from the variety of data

collection tools. Unlike the final report, the case study database organized evidence about the study for easier use in the analysis process. Patton (2002) referred to the case study database as a "primary resource package" (p.449) where the researcher placed like items together either in a chronological or typological manner. I organized my case study database by using typological analysis (Hatch, 2002).

The first step of typological analysis was the construction of initial categories based from the interview questions (see Tables 1 and 2). Each question was linked to a particular topic and then to a related initial coding category. I based these initial codes on the conceptual framework and literature review themes.

As the data analysis process continued, I read the data and marked the entries to the related initial typologies. According to Hatch (2002) the process includes "marking those places in the data where evidence related to that particular typology is found" (p.154). Then the case study database was constructed by grouping the smaller sets based on the predetermined topics and categories. I continued to add themes that held "possibilities to be checked out later" (Hatch, 2002, p.156) as they emerged from the data collection. I reported comments that were outliers and explored their meaning with the participants. It was important during the interview process and focus group to probe participants with outlier responses to give an example of their experiences. By doing this, the participants were able to tell their stories, thereby offering further information-rich data.

Summaries were written about each typology set. The summaries were meant to be brief statements that identified the main idea of each typology. The data was then

reviewed for patterns and relationships within typologies to assist me in the meaning-

making process. I then decided which patterns were supported by the data. At this stage,

categories needed to be justified by the data to determine if my judgment was

consistently evident. I then searched for non-examples of my patterns asking, "Is there

anything in the data that contradicts my findings?" (Hatch, 2002, p.158). After this phase,

I looked for relationships among the patterns across the data. Hatch then recommended

that patterns be written in one-sentence generalizations to assist in organizing the thought

process. Generalizations, also known as findings, are statements about the relationships

found in the data. Lastly, data excerpts to support the findings were located. I used the

program Microsoft Office Word 2007 to organize and store data for this study.

<div align="center">**Issues of Trustworthiness**</div>

Credibility

Credibility, also known as internal validity, refers to "how closely research

findings match reality" (Merriam, 2009, p.213). An assumption of qualitative research is

that reality is holistic and continually changing based on how people construct reality. A

second assumption is that researchers can assess interpretations of reality since they

directly make observations or conduct interviews (Merriam, 2009). However, issues of

researcher bias and experiences must be addressed. Reflexivity is the process of the

researcher openly discussing bias, dispositions, and assumptions about the study. I kept

bracketed notes in a researcher journal to track personal connections I made during the

data analysis process. In addition, I used triangulation to address internal validity by

crosschecking and comparing data from the multiple data collection tools. Lastly, I used member checking when I asked the participants to review the transcripts for accuracy.

Transferability

Merriam (2009) referred to transferability as the ability for the results of one study to be applied to another study. To address transferability, or external validity, I provided rich, thick description of the setting, participants, and findings. These descriptions supplied crucial study information for future researchers to consider in their own studies. According to Merriam, the readers of my study would need to determine how to apply the findings to their own situations.

Dependability

Dependability or reliability addresses the consistency of how findings can be replicated by other researchers (Merriam, 2009). Merriam stated that reliability is an issue in qualitative studies since "human behavior is never static" (p.220). There is no true basis in which to guide replication for human experiences. However, triangulation and audit trails (see Appendix H) provide reliability to case studies. In this study, triangulation was multiple sources of data to confirm emerging findings. Secondly, an audit trail was used to keep track of the procedures, methods, and decisions made during the study.

Confirmability

Confirmability refers to how the results of a study can be confirmed by other people. Prior to the study, a peer reviewer was asked to verify the content validity of each data collection tool. The purpose of this peer review was to ensure that the tools would

provide rich information for this study. The selection criteria for the peer reviewer

included a current K-4 elementary classroom teacher who currently implemented mobile

devices during reading instruction. The peer reviewer held a Master's degree in Literacy.

Based on the recommendations from the peer reviewer, I made the appropriate revisions

to the data collection tools.

To address confirmability during and after the study, I applied audit trailing,

triangulation, and reflexivity. An audit trail was used to monitor what procedures were

done during the study. Triangulation was used to cross-check data by comparing the

different data collection tools. Reflection was used to clarify any prior experiences I have

had with the topics. I used a journal to write when these experiences, bias, or assumptions

were encountered during the analysis process. I also asked an experienced qualitative

researcher to review and code a portion of interview responses. These results were

compared with my own interpretations to ensure that the findings were aligned and

confirmed for accuracy.

Ethical Procedures

The approval from the Institutional Review Board (IRB) was necessary since I

was interacting with human subjects. The IRB examined the proposed study to provide

recommendations that enhanced the protection of the participants and researcher. Walden

University approval number for this study is 07-08-15-0020424, and expires on July 7,

2016. Additionally, permission from the participating schools and consent forms for

participants were obtained. A consent form outlined the background information

explaining the purpose and details of the study. Contact information for the participants

to reach the University's Research Participant Advocate and me was included on the informed consent form.

Participants were informed that their involvement was voluntary; therefore, they could withdraw from the study at any time without any negative repercussions. In addition, their names were kept confidential to ensure teachers could freely express their experiences and concerns. I will store the data in a locked file and password-protected computer files for five years, at which time I will destroy paper and electronic copies of the data.

Summary

This case study explored how elementary teachers infuse their understanding of mobile devices use into application in reading instruction. In this chapter, I described the research design and rationale, and data collection tools needed for this study. The chapter included a data analysis plan needed to analyze the interview and focus group transcripts. Initial categories were suggested. Lastly, issues of trustworthiness were addressed for credibility, transferability, dependability, and confirmability. Chapter 4 presents the results from data collection and analysis.

Chapter 4: Results

Introduction

Mobile devices are changing the way children learn and teachers teach. More children are entering elementary school with home experiences using mobile devices. Teachers can leverage both the digital competencies of their students and daily accessibility of 1:1 devices to increase student learning. However, technology integration continues to be a professional development concern for many elementary teachers. The purpose of this study was to explore reflective practices that teachers employ as they decide how to use mobile devices during reading instruction. The focus of the study was exploring how reflective practices within professional development aided in transferring what teachers know about how to use technology into practical application.

The overarching research question for this study was: How do teachers transfer their understanding about how to use mobile devices into pragmatic application during K-4 reading instruction?

In addition, there were four subquestions:

RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?

RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?

RQ 3: What forms of professional development facilitate closing the Knowing-Doing Gap that exists between learning about use of mobile devices during K-4 reading instruction and implementation?

RQ 4: What recommendations from participants could be used to improve professional development to support using mobile devices during K-4 reading instruction?

In this chapter, I describe the setting of the study and provide a description of the participants. Next, I present the data collection, followed by an explanation of the data analysis. This chapter also includes evidence of trustworthiness and the results for each of the research questions. Lastly, a summary of answers to the research questions is provided.

Setting

The setting of this case study included three elementary schools from two public school systems in the Northeast region of the United States. Each school had a different grade-level configuration. Elementary Schools X and Y were located in the same school system. Elementary School X services kindergarten through second grades, while Elementary School Y is a second through fourth grade school. The population for each of these elementary schools was approximately 315 students. Elementary School Z was located in a neighboring community and was a pre-kindergarten through third grade school with a student population of approximately 291 students. These schools were selected for this study because of teacher use of mobile devices during reading instruction. All three schools had iPad accessibility. Two of the schools, Y and Z, had Chromebooks and MacBook Airs used by third grade students.

Demographics

Ten teachers volunteered to participate in this case study. Originally, only classroom teachers were considered but due to summer vacation, the participant pool expanded to include special education teachers and support staff. The participants included three kindergarten teachers, a special education teacher, a reading interventionist, an instructional coach, a school librarian, and three third grade teachers. This broader participant pool provided a cross-section of teachers involved throughout the schools with reading development. All the participants were certified professional teachers with three teachers holding Master's degrees and five participants earning Masters or higher. Participant information was kept confidential throughout the study. A pseudonym was assigned to each participant along with a numerical code (see Table 4).

Introduction Survey

Each participant completed an introduction survey after returning consent forms. The introduction survey collected demographic information such as age, gender, and number of years of teaching. Additionally, teachers were asked about the grade level they taught, technology use, and how long they had been using mobile devices (see Appendix C). The information gathered was used to ensure that participants met the criterion sampling criteria (see Table 4). All the participants were females between the ages of 30 and 60. Of the 10 participants, six had 11 to 20 years of teaching experiences, and one teacher with 6 to 10 years of in-service. One participant had been teaching for less than five years, and two participants had over 30 years of teaching experience.

Table 4.

Participant Demographics

Pseudonym/ Number Code	Age	Gender	Teaching Position	Number of Years of Teaching Experience	Degrees
Mary, T1	60+	F	K	38	Masters +
Emma, T2	30-39	F	Grade 3	11-15	Masters
Abby, T3	40-49	F	K	0-5	Masters
Taylor, T4	40-49	F	Special Education	16-20	Masters +
Helen, T5	50-59	F	K	31-35	Bachelors
Carly, T6	30-39	F	Instructional Coach	11-15	Masters +
Lauren, T7	50-59	F	Grade 3	6-10	Masters +
Grace, T8	50-59	F	Librarian	20-25	Bachelors
Celeste, T9	40-49	F	Grade 3	20-25	Masters +
Maddie, T10	40-49	F	Reading Interventionist	16-20	Masters

Additionally, the introduction survey asked participants about what mobile

devices they personally owned. The participants were given the opportunity to check all

that applied. Nine out of 10 participants owned a Smartphone and eight out of 10 owned

iPads. This information signaled the familiarity that these participants had with the

personal use of mobile devices, which could have made a difference in their ability to use

the tools within their classrooms (see Figure 2).

**Which mobile devices do you personally own?
(check all that apply)**
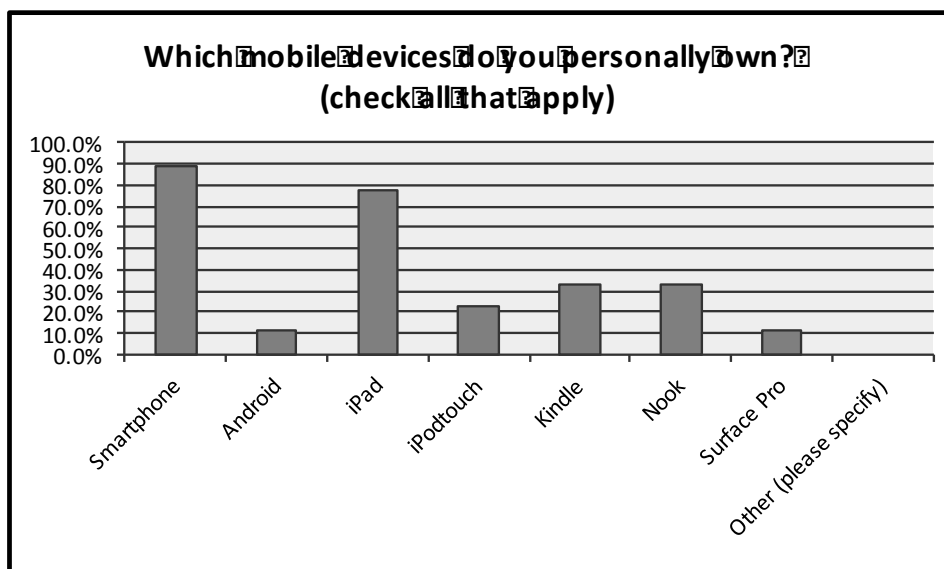
Note: Figure generated at www.surveymonkey.com

Figure 2. Mobile Devices that Participants Personally Own

Participant Descriptions

Mary. After a warm welcome, she suggested we conduct the interview in the

conference room since her classroom was being cleaned. With almost 40 years of

teaching experience, Mary easily engaged in sharing her classroom experiences. She was

attentive to the interview questions either asking for clarification, or pausing to

contemplate her response. She provided details about using mobile devices in a

developmentally appropriate practice. While she admitted to having limited skills with

mobile devices, she was willing to use them in a student-centered approach.

Emma. Emma, a third grade teacher, met me in her classroom. The configuration

of her classroom was designed to encourage students to work in groups. During the initial

interview, she would refer to specific areas of the classroom to reinforce her points. For

instance, her reading program combined the Daily Five approach with an online reading

program called Raz-Kids. She had her students access Raz-Kids on the class iPads. With her 11 to 15 years of teaching experience, Emma demonstrated confidence in her ability to plan and execute instruction. She made the transition from skills-based practice on iPads to students generating products with iPad apps.

Abby. Abby had less than five years of teaching experience. Her responses were insightful, which provided information-rich details about her decision-making process. She admitted that formal reflective practice was relatively new for her. Yet, she naturally engaged in self-reflection throughout the interview. We sat at a table that was located in the center of her classroom. During the interview she would look at different sections of the classroom in reference to a response. The classroom supported emergent reading skills such as the use of environmental print supported by written language. While new to teaching, she spoke confidently about her reading program and the ways in which she integrated iPads into instruction.

Taylor. Taylor was a K-2 special education teacher with 16 to 20 years of teaching experience. We met in the nurse's office as her classroom was being cleaned. Taylor articulated that she wanted more support with integrating mobile devices into her curriculum. She recognized that some of her students would benefit from the use of iPads. She demonstrated her expertise as she spoke with authority concerning the developmental needs of her student population. Taylor described how some of her students cannot express their understanding; therefore, she needed to interact with them in order to determine academic achievement.

Helen. Helen, an educator with over 30 years of experience, led me through her early experiences using computers, then a Smartboard, and ended with her current use of iPads with kindergarten students. Helen portrayed a realistic progression of technology integration, referring to herself as a nonnative to the technology; therefore, she was constantly thinking about how to improve her skills. She conveyed a self-assurance in her understanding of reading development. Her classroom was a print-rich environment with posters, word wall, and a classroom library. She also had a play area that she designated as a necessary developmental appropriate practice. Helen noted that her play office included a laptop and cellphone. Helen pointed out that she is interested in using iPads for assessment purposes.

Carly. Carly was an instructional coach, but had experience as an elementary teacher and as a technology teacher leader. I met Carly at her home to accommodate her schedule. Carly was a self-professed *digital native* who stated that she was eight years old when she began using computers. She became visually frustrated when asked about her experiences attending workshops. Carly stated she was beyond most professional development workshops on technology. She no longer attended technology workshops as she was usually a technology troubleshooter for the presenters and attendees. As a result of her experiences, Carly was passionate about improving professional development.

Lauren. The initial interview with Lauren was conducted via teleconference. After a brief introduction, Lauren easily engaged in conversation about her use of mobile devices in her classroom. During our prior communication, Lauren felt that she might not use technology enough to participate in this case study, but she was willing to try. At one

point in the conversation, she stated she was pleasantly surprised by the various ways she had integrated technology into her instruction During the focus group interview, Lauren took on the role of connector. She easily engaged the other participants in conversation.

Grace. The initial interview was conducted at Grace's home. At first Grace was nervous stating that she was not confident in her technology skills. As the interview progressed, Grace became more relaxed, which allowed her to openly discuss the various ways she used mobile devices in the library. Grace noted that as the school librarian she has had the opportunity to extend literacy development. She had worked with classroom teachers to reinforce specific reading skills such as leveling the library books for easier selections and creating genre study displays. She also connected parents and teachers with library resources through the development of the library website. Grace admitted that she needed to build her confidence in using technology.

Celeste. I first met Celeste in her third grade classroom. We met at her reading conference table that was flanked by a row of floor to ceiling bookshelves filled with baskets of labeled books. During her description of the online program, Raz-Kids, Celeste opened her laptop and led me through the program. She navigated the website, talking about the benefits of the program, and how she determined the activities her students would use during reading instruction. At the conclusion of the interview we spoke about some of the changes she was making in her instruction.

Maddie. The initial interview with Maddie was conducted via teleconference. During the first 10 minutes of the interview, the phone connection dropped. Even with predetermined questions, her responses moved seamlessly from one question to the next.

As a reading interventionist and technology teacher leader, Maddie had a variety of teaching experiences to share. The details she provided concerning her decision-making process fascinated me as she went beyond typical considerations. For instance, checking for hearing and sight test results were a routine procedure.

Data Collection

The data collection was comprised of initial, follow-up, and focus group interviews. All 10 teachers participated in the initial and follow-up interviews. The initial interviews were approximately 45-60 minutes in length and were one-time only events. Participants were asked the same set of predetermined questions and probes following an interview protocol (see Appendix D). Further probes were asked on an individual basis as needed. Six participants were interviewed in their schools. Two interviews were conducted at Elementary School Z, and four interviews were held at Elementary School X. Two participants were interviewed via phone, and two were interviewed at their homes. Phone interviewing excluded visual aspects such as facial and body expressions; however, both participants were able to express their thinking. The interviews held in the respective schools provided a familiar setting associated with the topic of this study. While responding to questions, several participants pointed to a portion of their classrooms as a reference. For example, one teacher stated, "We use Daily 5 so read to self, the red one, read to self or listen to reading depends on either that they are using." She was referring to the red posterboard at the front of her classroom. The initial interviews were audio-recorded using an iPad. The digital recordings and associated transcripts were coded by name and school to match the survey responses. A member-

checking system was sent to each participant for verification of the data. Accordingly, participants were able to clarify and add information concerning the initial interview.

A follow-up interview was conducted via email correspondence. The participants had the option of responding by email or phone. All 10 teachers responded by email to the predetermined questions and probes. No audio-recording was necessary; however, the participant responses were copied into a question chart for analysis (see Appendix A). Follow-up interviews were held once during the study with several participants responding to further questions for clarification. Their responses were also added to the question charts.

The focus group interview was held towards the end of the data collection period when most participants had completed both initial and follow-up interviews. Five out of the 10 teachers participated in the focus group, which was a one-time event. Originally, I had proposed that all 10 teachers would participate. A smaller number of participants was selected instead to ensure a conversational atmosphere (Merriam, 2009). All three site schools were represented with two participants from both Elementary X and Z and one from Elementary Y. Since most of the participants were from the same town, the local public library was selected as a central location and easily accessible to the traveling participant. A focus group protocol was used to facilitate the experience, which lasted approximately 45-minutes (see Appendix E). A Surface Pro tablet was used to audio-record the session for later transcription. The audio-recording and transcription was name-coded to provide confidentiality for the participants. As participants arrived, they had the opportunity to socialize with one another over light refreshments. The meet-and-

greet was important as one of the site schools was from a neighboring community. An

executive summary letter was sent to the five focus group participants for verification of

the overall summary of the interview. Upon review, participants had the opportunity to

email clarification or additional information. No additional information or clarification

was received.

Data Analysis

The data analysis process for this case study began with constructing a case study

database (Yin, 2014). Case studies rely on information-rich data to explore the multiple

aspects of a phenomenon. Case studies can generate a vast amount of data making a case

study database necessary to organize evidence for the analysis process. The case study

database was organized in a typological manner (Hatch, 2002). A typological analysis

(Hatch, 2002) was used for the data analysis of this study.

The case study database began prior to the study with the identification of initial

codes for each of the interview and focus group questions. These codes were based on the

conceptual framework and literature review themes. After each initial interview, the

audio recordings were transcribed verbatim with the exception of non-essential words

such as umm, you know. Several of the recordings had disruptions, which included low

volume to interruptions from the school intercom or technology technicians measuring

the classroom for new WiFi system. Once the transcriptions were completed, I used

Microsoft Office Word 2007 to organize and store data. A question chart was created for

each interview (see Appendix G). The chart included interview questions and probes, the

participant's responses, the initial codes based on the conceptual framework and literature review themes, keywords, and comments/quotes.

I read the transcripts and copied responses that corresponded with the interview questions and probes. I then highlighted keywords and phrases that matched the initial codes. During a second read, additional words and phrases were highlighted as new themes emerging from the data. Additionally, I highlighted quotes and pasted them into the comment/quote column. Lastly, I wrote comments related to the data. I repeated this process for all ten initial interviews and the focus group interview. A similar chart was used for the follow-up interviews minus the transcribing process as these interviews were conducted through email. Responses were copy and pasted from the email to a question chart with all of the coding process done in the same manner as the initial and focus group interviews.

A researcher's journal was used to track personal connections, bias, dispositions, and assumptions concerning the data. Additions were made in this journal throughout the data analysis process across all three data collection tools. As the primary instrument for the data collection, it was important that I recognized and addressed my bias and experience I had related to classroom teaching. The researcher's journal is a strategy associated with reflexivity where the researcher addresses personal experiences, bias, and assumptions (Merriam, 2009). By using this tool, I openly discussed my bias and assumptions, but also established aspects that could influence my conclusions (Merriam, 2009).

A list of non-examples was created after a third read through. This list was used to explore their meaning with those participants who provided the outlier responses. By further probing into these outliers, the participants shared their experiences. The additional information stimulated more details used in the meaning-making process. Afterward, new comments were placed on the question charts to expound upon the outliers and their potential impact on the study.

After the question charts had been completed for each of the three data collection tools, four charts were created representing each related research questions. The corresponding questions and probes from each tool, initial codes, keywords, and comments/quotes were included. Data was copied and pasted from the original question charts into the new charts. I then began to look for patterns across data among the keywords column. Repeated or related words were color coded and then organized into content clouds. Content clouds were a visual organizer that aided in identifying relationships among similar words. Then I looked through the transcripts and charts for participant quotes as supporting data. Once the quotes were added to the charts, larger themes were formed. Summaries were written about each typological set, which were brief statements defining the main idea of each typology. A table was created to summarize each of the typological sets (see Table 5). The table consists of the listing and defining the typological codes. Additionally, a participant quote was matched to each code. This phase of the study started the formation of categories (see Table 6). The categories were justified, and ample data was evident to support the larger themes that had emerged from crosschecking the data collection (see Table 7). There were no

outstanding discrepant cases, though one outlier was ascertained during the focus group

interview. I assumed there was formal professional development in the area of reflective

practices. This assumption will be addressed later in the chapter.

Table 5.

List of Codes, Definitions, and Examples

Codes	Definitions	Examples
Collegial Sharing (CS)	Informal and formal peer engagement to share practice and experiences.	"Team and grade level meetings have built confidence, skills, and tools to utilize with students. We shared and compared different ways of teaching and learning and made instructional decisions based on those discussions." (Carly)
Content Knowledge (CK)	Teacher knowledge about subject matter.	"I wanted to make sure that the activity we were doing on the iPad was practicing a skill we were already learned. That was heavily supported with pictures and graphics because kindergarteners, for the most, part are pre-readers."(Helen)
Knowing-Doing Gap (KDG)	An organizational management theory that refers to a gap between knowledge and action.	"I struggle because I do not have that instinctual ability to use this technology as the children do. As much as I am willing it is difficult. But I am getting over that."(Grace)
Pedagogical Knowledge (PK)	Teacher knowledge about instructional practices, strategies, methods for teaching and learning.	"My first thing I do is look to see if they are visual learners or auditory learners. What are they missing? Are they missing the fluency? Do they have phonemic awareness issues? I look at all those things.(Maddie)
Perceived Ease of Use (PEU)	The perception of how easy the technology can be used	"One of the primary criteria is the simplicity of the program for 5 and 6 year-olds to use by themselves." (Mary)
Perceived Usability (PU)	The perception of how useful the technology can be for instruction	"With an iPad every student can record every day. So it is about efficiency; that is a big part of it for me."(Carly)
Reflection in Action (RiA)	The 'in the moment' examination of the learning experience that brings about an immediate change in practice.	"The more I use iPads, the more in tune I am about the reactions of my students. Simply eye contact with the screen; their attention to the screen."(Taylor)
Reflection on Action (RoA)	The post-event examination about the effectiveness of the learning experience that signals further teacher knowledge development or modifications to the next lesson.	"Scaffold is what we do where we layer as we go. We realize that what we did the first time didn't go as planned. We have to think about what we need to do to get to them a second time." (Grace)
Reflective Practice (RP)	The examination and evaluation of the learning experience to gain insight of effective implementation of instruction.	"I have audio- recorded student conferences. I probably should do that more because then I will not be relying on my memory as much."(Taylor)
Self-Directed Learning (SDL)	An adult learning theory that fosters independent learning of a personal interest through a systematic process of plan, implement, evaluate, and drawing conclusions.	"I also realized how much I didn't know. I requested to attend a kindergarten workshop."(Helen)
Technological Knowledge (TK)	Teacher knowledge about technology.	"I use an app called Decoding Reading, and another called Reading Record. I use those to see where the kids are at their reading level and then after one-on-one instruction give them time on their iPads to follow-up what we did in the group." (Maddie)
Technology Support Staff (TSS)	A staff member who supports classroom use of technology and trouble-shooting hardware issues.	"He [library/media/technology coordinator] is always giving us opportunities for webinars."(Grace)
Trial and Error (TE)	A process of learning through experiencing both success and failure.	"It is trial and error, where teachers will explore a free app and see what the application might be for reading instruction. We review it to see whether or not it meets the objectives for this young age group." (Mary)

Table 6.

List of Categories, Definitions, and Examples

Categories	Definitions	Examples
Collegial Interactions (CI)	Informal and formal settings where peers share information and support implementation of new practices.	"One of the other teachers that was very technology savvy was talking about using iPads not only for documenting learning but also for assessment."(Helen)
Job-Embedded Professional Development (JEPD)	A situated learning model of professional development that involves both autonomous and collaborative learning.	"If a colleague has shared an application or a way to use mobile devices in the classroom I often use this immediately; especially if I can apply it our curriculum and classroom learning." (Lauren)
Learning by Doing (LbD)	A process of learning in action followed by reflective practice.	"That's the biggest part of technology; give me time to play with the devices; give me time to try out apps." (Emma)
Mobile Device Use (MDU)	The purpose of selecting mobile devices for instruction.	"It depends on the goal of the instruction." (Helen)
Technology Integrator (TI)	A specialist whose job is to guide teachers with technology integration in curriculum, instruction, and assessment.	"Having those people in our building available to us as needed is helpful. It is not a 'put in a help ticket' and wait until Tuesday. They are there to run your ideas by or help you write a lesson." (Carly)
Technological, Pedagogical, and Content Knowledge (TPACK) Teacher Perception of Technology Integration (TPTI)	A framework to support technology integration. The perception of needed change in attitude held by the school culture that technology is an 'add-on' rather than commonplace.	"Sometimes if I am introducing something new I pick an app that targets that skill. Sometimes it might be listening to a story and then having them response to the story." (Helen) "I feel like it's more of an add-on than what we do on a daily basis." (Taylor)
Teacher Reflection for Metacognition (TRM)	Reflective practice used by teachers to examine instructional choices, implementation, and adaptations from experiential learning	"Whenever we are using iPads in the classroom, in the back of my mind I am always thinking are they using them in a way that allows them to develop cognitive and social skills." (Abby)
Traditional Form of Professional Development (TFPD)	Professional development models such as one-day workshops and conferences designed to disseminate information and strategies for classroom use.	"Professional development workshops often are K-12 and not grade specific. So I am going to key in on the way it is applicable for kindergarten, and I am going to lose a lot of what else is going on." (Abby)

Table 7.

List of Emerging Themes, Definitions, and Examples

Emerging Themes	Definitions	Examples
Overarching Theme: Being a self-directed learner assists in transferring 'knowing to doing'.	Closing the KDG by being a learner who is self-motivated to address a concern through the process of planning, implementing, and evaluation system.	"While at a staff meeting I heard that a teacher used something in her classroom. I am going to seek out that teacher to learn how to do the same thing. It is all self-directed." (Carly)
Theme 1: Teachers need school environments that encourage experimenting with mobile device use.	School environments that support experiential learning, shared-decision making of technology use and accessibility to mobile devices.	"We all see the need to make sure that we are current in the use of technology and to try and stay updated with the current trends." (Grace)
Theme 2: Teachers need to purposely plan for mobile device use in their instruction that supports student-centered learning.	Teachers have knowledge in technology, pedagogy, and content then apply technology as a developmentally appropriate practice for student learning.	"There's a lot of planning around it. I am looking for the ease that the child can use the program or app. The ability to stay on attention with the program and the procedures for managing it."(Taylor)
Theme 3: Teachers need formal reflective practice to inform their decision to use mobile devices.	Teachers learn from an intentional process of self-reflection and reflection with colleagues.	"It would be nice to be given time to sit down with your team and say what did you take from that. We need that time to reach metacognition." (Emma)
Theme 4: Teachers need collegial interactions that build collective knowledge by sharing information, mentoring peers, and engaging in reflective discourse.	Teachers learn from one another in a variety of situations that are formal such as team and grade level meetings to informal conversations.	"We do not have the time during professional development to reflect. I think it is done very undercurrent after the fact."(Lauren)
Theme 5: Teachers need to learn by doing and by teaching their peers.	Teachers learn through both a 'trial and error' approach and then a peer-mentoring system.	"Teachers need direct instruction, time to play and explore, and a forum for discussing and sharing learning."(Carly)
Theme 6: Teachers need technology integration specialist to support mobile device use.	A specialist who provides teacher support for integrating technology into curriculum, instruction, and assessment.	"Someone who can say 'What is your idea and how would you like to use technology in the classroom?' Then come up with some apps or project." (Maddie)
Theme 7: Teachers need differentiated professional development that has a flexible structure and addresses adult learning styles.	Differentiated professional development is a form of peer mentoring that involves knowing teacher abilities, developmental readiness, and adult learning styles.	"I would like professional develop to be differentiated to meet the learning styles of teachers and their teaching styles." (Taylor)
Theme 8: Teachers need a coherent plan to attain the vision and goals of the school for integrating technology into curriculum, instruction, and assessment.	A systemic plan that identifies school vision and goals for improving student learning with clearly defined technology use within curriculum, instruction, and assessment.	"I would like to see a strategic five-year plan that identifies this is what we want teachers and students to be able to do and then back that up with a yearly plan that includes technology."(Carly)

Evidence of Trustworthiness

It is the responsibility of the researcher to ensure that the study has been

conducted in a trustworthy manner (Merriam, 2009). Qualitative studies depend upon

evidence of trustworthiness through credibility, transferability, dependability, and

confirmability. Credibility relates to how the findings of the study represent the reality of

the phenomenon studied (Merriam, 2009). Issues with researcher bias and experience

were addressed in this study in four ways. The first was the use of reflexivity, where I

bracketed notes that were identifiable with my own personal connections. I kept a

research journal to track comments and notes that related to my personal experiences and

bias. Additionally, I did the same process in the data collection question charts. The

question charts included the interview questions and probes, the participant's responses,

the initial codes based on the conceptual framework and literature review themes,

keywords, and comments/quotes. Secondly, triangulation was conducted across the data

collection. A research question chart, similar to the question charts was created for each

research question. Keywords were color coded across the data collection to crosscheck

and compare the data. Next, a member check was completed after the initial interview

with the ten participants. The participants had the opportunity to clarify or make additions

to the initial interview transcripts. Lastly, an executive summary letter was written after

the conclusion of the focus group interview. The five focus group members reviewed the

letter.

For transferability to occur, future researchers need enough details to determine

how to apply the findings to their work (Merriam, 2009). Transferability was addressed

by providing details about the setting and participants. To ensure that researchers had

pertinent details, I established the setting within a regional location and details about the

student population. An introduction survey collected demographic information about the

10 participants. A table was created to assign a pseudonym for each participant, age range, gender, teaching position, numbers of years of experience, and educational degree (see Table 3). Additionally, rich description described the findings of this case study.

According to Merriam (2009), dependability is a concern in qualitative studies. Since the human experience is "never static" (p. 220), replication is questionable. For this case study, dependability was addressed during the study with an audit trail (see Appendix H). The audit trail established a record of interview dates, procedures with the data collection process, interpretation and validation of data. After the study, dependability was established through the triangulation process.

At the beginning of the study, a peer reviewer was asked to verify the content validity of each data collection tool. The peer reviewer for this case study was a current first grade-teacher, who used mobile devices during reading instruction. The peer reviewer had 16 years of teaching experience and has a Master's degree in literacy. Appropriate revisions were made to the data collection tools according to the peer-reviewed feedback.

During the study, confirmability was addressed with the audit trail, which provided a detailed roadmap of the procedures, methods, and decision made. After the study, triangulation and reflexivity were applied. Triangulation was applied by crosschecking the data across the data collection tools. Reflexivity clarified researcher bias and experiences compared to the participants' experiences. Additionally, an experienced qualitative researcher conducted an external crosscheck by reviewing and coding a portion of the interview responses (see Appendix I). The external crosscheck

was compared to my coding system. My interpretations were aligned with those of the expert qualitative researcher's results.

Results

In this section, the results of the study are presented by addressing each of the four research questions and the overarching research question. Themes were organized by their relationship to the research question. The themes were generated by crosschecking the data collection. Transcripts from the initial, follow-up, and focus group interviews were reviewed and coded. Discrepant responses were added throughout this section. Excerpts from the transcripts were selected to support the emerging themes. The excerpts were verbatim responses from selected participants to represent their perceptions and experiences related to transferring their understanding of how to use mobile devices to the application of that knowledge in their K-4 reading instruction. The findings are organized in alphabetic order, and where applicable, participant quotes are presented in order starting with teachers, then specialists and librarian. A technology and reading terms chart is located in the appendix (see Appendix J).

Research Question 1

RQ 1: How do teachers describe their decision-making process in order to implement what they know about using mobile devices during K-4 reading instruction?

Theme 1: Teachers need school environments that encourage experimenting with mobile device use.

Theme 2: Teachers need to purposely plan for mobile device use in their instruction that supports student-centered learning.

Figure 3. Diagram of Themes for Research Question 1

Themes 1 and 2 focus on what influences the decision to use mobile devices.

Theme 1: Teachers need school environments that encourage experimenting with mobile device use. The findings for Theme 1 included accessibility of mobile devices, experiential learning, and shared decision-making.

Accessibility to mobile devices. A common finding among the participants was having access to mobile devices. Each of the three participating site schools provided the teachers with mobile devices. However, at this time the three schools are not 1:1 technology schools. Mobile device availability at Elementary School X included a set of six to eight iPads for each grade level and a set of MacBook Air laptops for the third grade classrooms. Elementary School Y had a designated set of iPads for each K-2 grade

level with approximately five to six devices per class. Elementary School Z also had six

iPads per class and a class set of Chromebooks for grades 3 and 4. Emma stated,

> We have a full class set of the MacBook Airs but we only have eight iPads per
>
> grade level. Two of those are designated for the specialist so those have different
>
> apps on them. That can get a little tricky, but we are working with our
>
> administrator right now to get more iPads. We find that for our reading
>
> instruction, the iPads are the easiest to use. They boot up quicker…they are just
>
> easier for the kids.

Abby added,

> We have a set of iPads for each grade level with five iPads designated specifically
>
> for each classroom. Most of the kindergarten teachers use them for small group
>
> work. If we had to use them with the whole class we can schedule for that.

Lauren added,

> That is a natural way to integrate the technology into our classroom because we
>
> have the technology available for our classroom right then and there. When we
>
> are in our planning process, I can say I will be using these today. I feel that
>
> because they are accessible it is easier to have them in my reading instruction.

Experiential learning. All 10 participants stated that their school cultures made a

difference in their decision to use mobile devices during reading instruction. Each of the

three site schools had encouraging environments for inclusion of mobile devices use. The

participants were given time to explore the tools and then experiment with them during

their instruction. Emma, a third grade teacher, stated:

I am very lucky to work in a building with a principal that supports the integration

of technology. We piloted the use of interactive white boards in our district. We

were the first building to have iPads and now many teachers have Apple TVs in

their classrooms. If it were not for the support of our administrator, many teachers

would still be using their laptops for word processing and not for much else.

Carly, an instructional coach, had the same sentiment, "We have an openness to try

things and allowed to experiment and take a risk with implementation." The experimental

learning dimension was echoed in other responses with the terms *trial and error* or

playing with the devices. Abby, a kindergarten teacher, stated,

It is a trial and error process. The first time I use it with a teacher eye and the

second time I will use it with a kindergartner mind. I put myself into the mind-set

of a kindergartener. I will make wrong and random guesses and tap too many

times to see what kind of support the app has built in.

Shared decision-making. For some of the participants, shared decision-making

was a factor of a supportive school environment. Shared decision-making occurs when

administrators and teachers work together to determine how to address curriculum,

instruction, and assessment. The overall finding was that teachers were given latitude in

when and how to use the mobile devices. For instance, a third grade teacher named

Celeste stated, "The expectation is that we will incorporate mobile devices based on our

comfort level." Mary added, "Although there are no specific expectations for a given

grade level, all teachers are encouraged to use iPads periodically to deliver instruction."

Lauren, a third grade teacher, articulated, "I also believe that the decision of how best to

incorporate the technology has been left up to teachers." Taylor, a special educator, shared the same point stating,

> I believe that we are encouraged to use technology where we see fit in the curriculum and what is best for students. There is no expectation that we should be doing it one way or a specific way that is standard.

The overall finding was that teachers had the opportunity to use their professional judgment when integrating mobile devices into their curriculum, instruction, and assessment.

Theme 2: Teachers need to purposely plan for technology use in their instruction that supports student-centered learning. The findings for Theme 2 relate to TPACK. To make instructional decisions, teachers need to transfer their knowledge about TPACK. The first finding focused on CK anchored in DAP. The second and third findings included PK and TK.

Content knowledge anchored in DAP. In this study, CK referred to the professional knowledge teachers have in the area of reading instruction. The findings for this area focused on teacher understanding of what they know about student needs and ensuring DAP were considered when making instructional decisions to use mobile devices. According to Taylor,

> It is important that I get to know my students first to see where they are; to get a baseline on skills. Being a special education teacher, I have aims and goals that I have to achieve. So anything I use needs to be a way to that ultimate goal.

She continued,

> There are different ways to get the students to where you want them to go.
> Whether it is you that interacts with them or mobile devices. For me if a child
> already has a handle on things I am not going to bore them with repetition just to
> use an iPad. I will look for apps that are appropriate for them and will be
> challenging for them but that they are still learning.

> The apps needed to be selected to meet the reading goals that had been

established. Abby continued in a similar area noting that the apps she uses with her

kindergarten students need to be developmentally appropriate. She stated,

> I look to make sure that the app was easy to use. That it did not require any
> reading because kindergarteners, for the most part, are pre-readers. That the
> instructions could be repeated is probably most important way to scaffold. This
> would prevent the children from randomly push buttons and move on. That they
> would get a prompt to try again or given more information in order for them to
> learn something.

Mary also concurred with the importance of appropriate use,

> I think the simplicity of the programming is important. I knew there was a high
> level of success for children to work independently. I would say that was probably
> one of the primary criteria. Also, the program itself was simple for 5- and 6-year-
> olds to use by themselves and would not get confused with multiple steps.

> *Librarian support.* An unexpected finding was reading support by the librarian.

Grace labeled the library books by reading level using the same process as her classroom colleagues. At the beginning of the school year, the third and fourth grade teachers provided Grace with student reading levels. She organized this information by class in a notebook. When the particular class attended their assigned library time, she had access to what reading level would be appropriate for the child. She also emphasized the need to have books that were below and above the student's reading level. Grace had a mobile phone app called Level It that provided a database of a variety of children's books. Grace added, "We scan the ISBN of a book, and we can find its level." Though Grace was not a classroom teacher, she recognized that she played a vital role in reinforcing reading skills.

Pedagogical knowledge. For PK, the participants pointed out the use of assessments to inform instructional planning. Celeste stated, "They [students] are assessed based on a level through DRA [Developmental Reading Assessment]." She then related that based on the individual reading level scores, she could appropriately match the reading materials found in an online program entitled Raz-Kids. Celeste shared that Raz-Kids provides independent reading practice for her third grade students. Her colleague Emma shared similar information,

> I set a reading basket that is a range of reading levels within their [student] DRA range. The developmental reading assessment is what we use as an assessment. It will identify a couple levels below for fluency purposes. It will also identify a couple of levels above so they can challenge themselves or have the book read to them if it is something they are very interested in.

Daily 5. Celeste and Emma used Raz-Kids to augment their Daily 5 literacy

instruction. Daily 5 is a rotating activity system or what is referred to as *literacy stations*

that reinforce five key components of literacy instruction. During literacy stations,

students used their iPads to access Raz-Kids. Raz-Kids provides student access to reading

materials at various proficiency levels. The program mainly focuses on comprehension.

Celeste added that Learning A to Z, a paid component of Raz-Kids, provides her students

with activities that supported reading skills.

Reader's workshop. For kindergarten teachers Mary, Abby, and Helen, iPads

were also used as a form of independent work within a Reader's Workshop format.

Reader's Workshop is an adaptable instructional format that includes teaching mini-

lessons, independent practice, and sharing time. Abby shared that for her to consider the

use of mobile devices during independent practice, she needed to know the following,

> I wanted to make sure that the activity we were doing on the iPad was practicing a
>
> skill we had already learned. That was heavily supported with pictures. Those
>
> graphics were not over the top; like too many bells and whistles or too much
>
> background noise. I look for those things that would be distracting.

Lauren also used a Reader's Workshop approach, but her focus at the third grade level is

individual conferencing and independent work. She reported, "I do more one-on-one

conference type reading evaluation." Some of her students used the class iPads for Raz-

Kids while others brought their own mobile devices, such as Kindles and Nooks.

Specialists. Maddie, Carly, and Taylor had unique positions as Maddie was a

reading interventionist, Carly was an instructional coach, and Taylor was a K-2 special

educator. Both Maddie and Taylor applied small group instruction rather than working one-on-one with students. Taylor stated, "The iPads are more for small group instruction because of my setting. It all depends on the needs of the students I am working with." As a reading interventionist, Maddie's pedagogical considerations were to individualize instruction but in a small group setting. She shared, "To individualize instruction is the key to getting any struggling learner reading." For Carly, she found both small and whole group structures worked to integrate mobile devices for different purposes. She advocated for a 1:1 technology for her students so that "They are not just watching a lesson but engaged in the lesson."

School librarian. The inclusion of Grace, a school librarian, provided a different perspective on mobile device use and her role in supporting literacy throughout the school. As a former classroom teacher, Grace had experiences with reading instruction. Now as a librarian in a grades 2-4 school, Grace supports literacy with not only the students, but also teachers and parents. For instance, she supported reading development with activities that were "more geared to library lessons such as Smart Searching and use of internet." She went on to share that a Smartboard was used in a whole group instructional format. The smart search related to the generation of keywords and other online search skills. She shared the smart search lessons with teachers stating, "There are a lot of teachers who are using the online Minerva system. That is one of the major areas for our librarian staff to help teachers understanding the use and benefits of that tool."

Grace also shared,

>We have used the iPads and iPhones for recording books that are Chickadee
>
>Award recipients. That is an optional service from the library as well. We opened
>
>it up to teachers and they can record one of their favorite books.
>
>***Technological knowledge.*** In the area of TK, teachers stated that the mobile

devices and associated applications (apps) needed to be both easy to use and useful. For

instance, a kindergarten teacher named Helen stated,

>I knew there was an incredible amount of possibilities for using iPads. That
>
>appealed to me because it is so intuitive for young children because it doesn't
>
>have a keyboard in the traditional sense like a desktop. You can just access it by
>
>touch.

Reading interventionist, Maddie, stated,

>Is this a quick, cover a skill that they lack in a very short period? In the reading
>
>intervention program, we only have them [students] for 45 minutes. I am looking
>
>for things [applications] that I can cover a skill quickly and is meaningful. That is
>
>one thing I always think about is if this technology is going to fit in the timeframe
>
>that I have.

For Celeste's third graders, she also looked for apps that are age appropriate and of

interest. She stated, "There are many apps out there, and I want to make sure it is content

ready for third-grade students not necessarily academically but interest wise."

The teachers also shared that several of the apps had built-in tracking systems to

monitor student progress. For instance, Emma stated, "Raz-Kids has a reporting system

where I can log in and see what the kids have read. It also gives the rate the kids have read because as the kids turn the pages it calculates their rate." She expanded upon how the tracking tool then informed her instruction. Celeste also used Raz-Kids and found the tracking system useful stating, "They [students] will not move up another level until they have mastered a certain percentage at that particular level. I get the reports, and I can review their progress." Mary also looked at the tracking options for apps as well, stating she could go back and check on the iPads. Though she further explained she would need assistance to set those options on the apps, "I am not familiar with how to set it up. I would need a workshop or a colleague who could train me set it up for a whole class."

Research Question 2

RQ 2: What reflective practices are used to support the decision-making process to use mobile devices during K-4 reading instruction?

Theme 3: Teachers need formal reflective practice to inform their decisions to use mobile devices

Theme 4: Teachers need to build collective knowledge from collegial interactions that share information, mentor peers, and engage in reflective discourse.
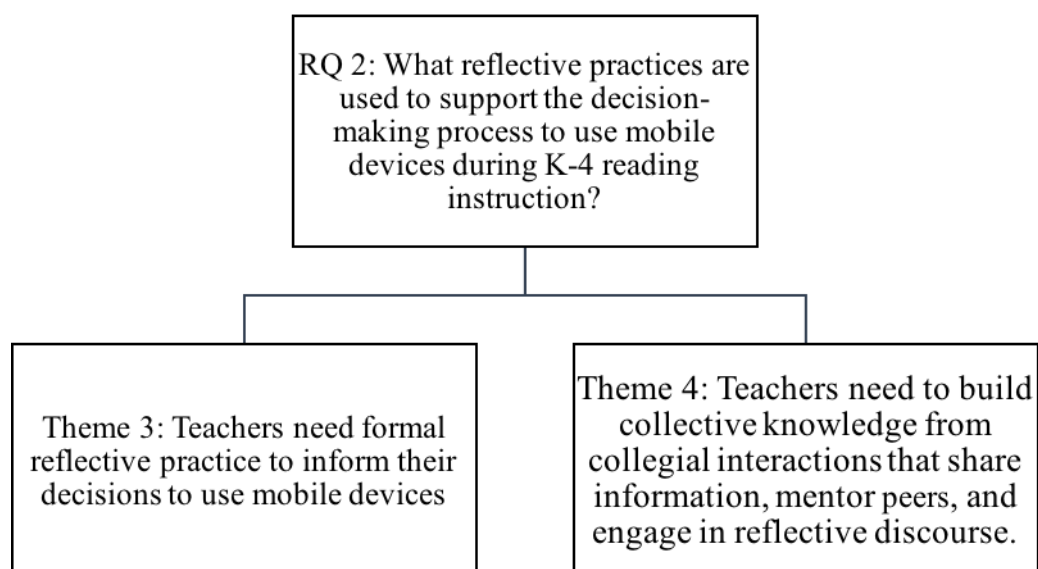
Figure 4. Diagram of Themes for Research Question 2

Themes 3 and 4 focus on using reflective practice to inform decisions to use mobile devices.

 Theme 3: Teachers need formal reflective practice to inform the decision-making process to use mobile devices. The findings for Theme 3 included application tracking systems, less formal reflective practice, and student engagement.

 Application tracking systems. Several teachers reported using the tracking systems from the apps that were used. For example, Helen stated, "Several of them [apps] collect data on the user, and the kids can log in as themselves." Emma shared that "The reports that I get from Raz-Kids comes instantly when the students log out. It shows up in my account. I keep it open on a tab in the background all through my reading time." She continued, "I can set up links right in my plan book on Excel. I can open up to a specific assignment on a specific student website. It makes it so much easier to follow-up with students."

 Emma shared that BrainPOP and Raz-Kids both had recommendations for new movies or books based on what has been viewed or read. Emma continued, "It gives you other suggestions for reading or videos that kids can go to view. I will be able to see what they have been reading or watching as well as see the recommendations."

 Maddie acknowledged that some apps provide data; however, without 1:1 technology application, tracking systems can be difficult to manage. She shared,

  In the paid version yes, you can track the kids. It is limited in the tracking amount.

  You would have to do more tracking. They will give you a read out of how many

they missed that day. It will not track more than one day at a time. If you could set them up so that one device per child, then the tracking systems could work.

Several of other teachers reported the limitation with application tracking systems. One stated, "That is probably the area that I need the most help with because I am in the dark. A lot of the apps do not have the capability to track students, for student managing."

Less formal reflective practice. The initial interview questions focused on a reflective practice pattern, which included RiA, RoA, and RfA (see Figure 1). All the teachers reported they reflected upon their practice. However, several reported a less formal process that was used. One teacher noted, "I try to remember it and write it down as a note." A second teacher reflected, "I will be honest, reflective practices is something that I should do more of." A third teacher stated, "As I prepare for the next activity with the iPads, I rely mainly on what I remember of my students' experience during the previous activity." A fourth teacher shared with a chuckle,

> Usually, they are seared into my brain. 'Okay, that was a massive fail. I have got to fix that.' Or sometimes it is something that occurs over time. The same issue keeps coming up whether it is kids making the same mistake or bumping into the same wall. Then I think, 'There's got to be a different way to do this.'

Several teachers shared that they conference with their students. Taylor reported, "When I touch base with them and have a conversation with them about what they are doing, the feedback I get back from them will tell me if it was successful or not."

Maddie used a more formal reflection pattern,

I have my computer beside me, and I have a code for when I see something that triggers that's wrong or this shouldn't be that way. I already have my lesson planned out, and I am looking for target skills that I am teaching. Are they getting it at that time? And if they are not getting it at that time I do my +/- system, and write what I noticed. I make my following day based on that.

Student engagement. All the participants distinguished student engagement as a key factor in determining the success of instruction with mobile device use. Student engagement was reported mainly from teacher observation. Abby kept a running inner dialogue sharing,

Whenever we are using iPads in the classroom, in the back of my mind I am always thinking are they using them in a way that allows them to develop cognitive and social skills. Are they chatting with their peers about what they are doing on the iPads and if they are then that is good? Are they getting help with their peers when they are getting stuck? Then good. If they are off task, then I am thinking about why they are off task. Are they off task because the app design is not engaging? Did they not understand it? Did it not work the way I thought it would work?

Attention to task is further supported when Celeste shared, "Third-graders enjoy the game component. They certainly seem to enjoy apps that help them progress and have a reward like an avatar. That appeals to them."

Taylor reported the importance of observation,

I am working with a population of students whose communication skills are not

very strong, so I need to get in there to see if what they are saying reflects what

they were doing. The view of a teacher is time on task and how long can they

attend to it before it becomes frustrating.

Theme 4: Teachers need to build collective knowledge from collegial

interactions that share information, mentor peers, and engage in reflective

discourse. The findings for Theme 4 included teachers meeting in both informal and

formal settings to share information, peer mentoring to support change in practice, and

time to engage in reflective discourse.

Informal and formal settings to share information. Across the data collection,

the participants indicated the need for them to interact with their colleagues.

Informal settings. For several of the participants, this interaction occurred

informally, such as at lunch or while speaking with a colleague after school. At the

beginning of the study, Mary stated a strategy she uses to explore mobile device use in

her practice was her peers. She shared, "Most times it happens at lunch time. Where

someone will share a program, an application they have used that morning perhaps if we

are talking about reading instruction." Later she expressed that her trial and error process

included sharing with her peers, "Then you share it with your colleagues, and it becomes

one that everybody will use." For Emma, she used her colleagues to select her ideas

stating, "I have found getting other teachers' take on what they have tried has helped a lot

to narrow down the ideas." Abby concurred stating, "Hearing other kindergarten teachers

talking about the apps they are using in their classrooms is motivational."

Formal settings. Formal settings included team and grade-level meetings, and PLCs. Celeste shared, "We are very fortunate to have time allotted each week that we do meet at each grade level. We also meet another time to go over our goals in our curriculum." Taylor stated, "Typically, I share by discussing it with them [colleagues] in grade level meetings. We sometimes have the opportunity to share school-wide during monthly staff meetings by demonstrating the use of the iPad or application." Taylor also shared about professional learning community opportunities stating,

> Our team meets weekly in our PLC, and that is the forum I use to share such things. Sometimes there is an opportunity at staff meetings to share as well. Our sharing and discussions can lead to new ways of using the device, or I get exposure to apps I was not aware of.

Abby also stated that staff meetings have been useful in sharing information sharing, "Even doing a share at a staff meeting and having people speaking up that this is something I have used. But I'd like to see this happen on a more regular basis."

Peer mentoring to support change in practice. The participants indicated the role of peer mentoring contributed to their use of mobile devices. Lauren shared,

> I always learn a lot when I am teaching with someone else. Not only about their expertise but I also learn about myself as a teacher. It might be beneficial if we could co-teach with another teacher regarding technology. They might do something very different in their classroom then what I might do. If they have an idea, it is just like sharing that knowledge base. I am also open to co-teaching and

team teaching with special educators because I think they have knowledge. Sometimes they can use technology in different ways to reach different kids.

Specialists. For instance, as an instructional coach Taylor had opportunities to mentor her peers. She described this relationship in the following,

I would say it is sharing what I am doing with my colleagues and them wanting to see it. Then me modeling it for them. It is important to keep up with what type of technology is available for their students' needs. Technology is always changing and always getting better. You might have an app that works well this year but if you look next year, there might be something even better.

In addition to being a reading interventionist, Maddie was a technology teacher leader. She described this position in the following way,

I am in several classrooms for their support. I am often the person who goes in to get a classroom started with something new related to technology. One of my jobs lately has been approaching the teachers with 'what is your idea and how would you like to use technology in the classroom.' Then I come up with some apps, or a project of this is how we can incorporate the technology. Then we brainstorm back and forth how do you want to implement this, and then I end up going in one or two times to be the second set of hands and eyes.

Librarian. Grace had also led her peers in a practice referred to as *Chew and Review*. She describes this practice in the following,

We feed them [teachers] and we show them a smart search tool or strategy. It is

difficult to get teacher participation because they are busy. We want them to see

this is a benefit for them especially if they are at home and want to find a book.

Time to engage in reflective discourse. A repeated finding was the importance of

time with colleagues to reflect together, which cultivates the building of collective

knowledge. Reflective discourse engages self-examination of practices and beliefs in

relation with their peers. During the focus group, participants were asked about the type

of follow-up professional development being used to foster teacher reflective practices.

There was a six-second silent pause until Taylor began by saying, "I cannot ever recall

formal follow-up conversations after professional development." Emma responded, "Or

being given time after professional development to get together as a team and process

what you've learned." She continued by adding,

Sometimes at a whole day workshop you hit saturation, and it would be nice to be

given time to sit down with your team and say 'what did you take from that.' To

have that type of metacognition would be great.

Emma followed up with, "That's where reflection occurs. It is back when you are

decompressing after the professional development. Figuring out what exactly works for

you in your classroom, in your building, with your students." Lauren extended the

conversation by stating,

Or even share what other people's ideas to use the pieces of technology we've

learned. A lot of the times we don't even have that opportunity to do that during

the presentation to then sit down with others about what their ideas are. I feel like

we are a collaborative profession anyway I think that is so powerful to share with

your colleagues. A lot of people have great ideas. But I don't think we have the

time right then. I think it is done very undercurrent, after the fact.

Abby expounded upon the fact that most of her professional development workshops

have been general K-12 presentations. She stated,

I will focus on the way that it is used for kindergarten, and I am going to lose a lot

of what is going on. So even the way professional development is designed in the

area of technology, it doesn't allow for much reflection.

Abby also discussed the value of collegial discussion with the following,

Even if I am the one that has found that great app I think every kindergarten

teacher could use because it could benefit all kindergartners, I still want to know

if one of my colleagues have tried it and what she thinks and how it worked. I

think that collegial piece is key.
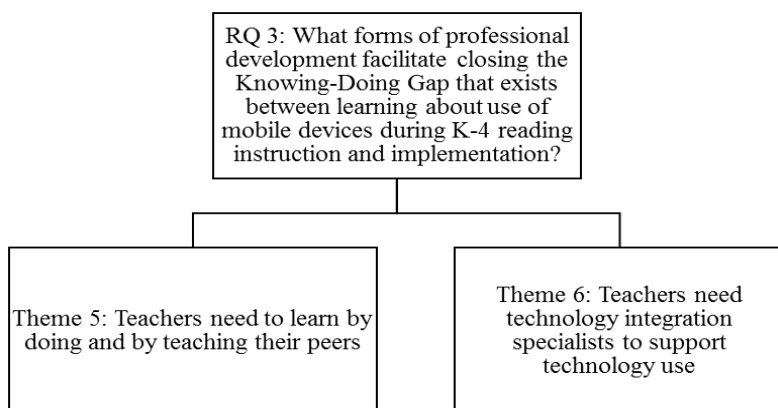
Research Question 3

Figure 5. Diagram of Themes for Research Question 3

Themes 5 and 6 focus on professional development that facilitates closing the KDG (Pfeffer & Sutton, 2000).

Theme 5: Teachers need to learn by doing and by teaching their peers. The findings for Theme 5 included deprivatization of practice and job-embedded learning.

Deprivatization of practice. Teachers learn by teaching their peers. The act of teaching peers provides opportunities for teachers to de-privatize practice. Teachers are no longer learning in isolation. Lauren stated,

> I have used the technology over a week and tried it a couple of different times. Then I share it with someone else who is at my grade level or someone else that I feel is going to use it. I have to teach them so that is going to solidify it for me. It says to me I really know how to do this.

As a technology teacher leader, Maddie advocates collegial learning. She shared,

> The ability to work with other teachers with what they are doing with the other devices. To structure iPad use and how they enhance the classroom. How are they using this device? What are they using for apps?

In comparison, one teacher felt that because of her teaching position she was isolated from those who were using technology. She relayed being the only one from her department using iPads so there was limited collegial experiences to exchange ideas about iPad use. She described, "I am like an island in regards to technology use."

A second teacher also felt she was more of a recipient of assistance than a peer mentor of technology. She stated,

I don't know if I have. I feel like I have been the recipient of help more so than a

catalyst of help. I have used iPads more this year than in the past. I believe that is

due to my colleagues attending the iPad workshop. So I am more of a sponge than

I am a leader in exploration and use of the iPads.

This participant felt that she has had limited time to investigate iPad use. She also

shared that she would be taking a graduate-level course this year. Her hope is that she

will learn more about reading and technology use from the course that she can share with

her peers.

Job-embedded learning. The finding of job-embedded learning addresses the

closing of the KDG. Change in practice is limited when teachers mistake talk as action.

Learning by doing is a form of job-embedded learning. The participants were asked to

share an activity they had learned about through professional development that used

mobile devices that they then implemented into their classroom instruction.

Helen stated that the use of the iPads for recording story structure,

One thing that I am exploring this year is how to use the for instance the camera

function of the iPad to record kids learning about books. They can have an actual

book in their hands, and they can talk about setting, they can take a picture of a

book page that has a great example of the setting. That would be their evidence.

Additionally, Helen stated that a contributing factor for implementing the activity was

"One of the other teachers that was very technology savvy was talking about using iPads

not only for documenting learning but also for assessment. That has been in the back of

my mind."

Celeste described the use of QR Codes,

> I was introduced to the QR codes by an activity another teacher did to review
> some math skills she would tell students which skills they had to work on and that
> would start with scanning a QR code and they would watch a mini-lesson on. It is
> definitely an area I would like to do more of.

When asked what a contributing factor for using this activity was, she responded, "It was highly engaging, and interactive within their small groups and the larger community with other staff members and students."

Maddie's activity was the creation of a graphic novel using an app called Explain Everything. Maddie shared,

> I had gone to a conference that they used that and a couple of really cool cartoon
> apps where the kids can make themselves into a cartoon and then they created a
> graphic novel. It was a great for the kids because they were engaged and part of
> the story. They were able to write a story and understand the beginning, middle,
> and end.

After completing the activity she explained,

> Everyone's graphic novel was made into a movie and I put them up on the
> website. I also sent the link to the parents so that they could see the kids' books. I
> got this idea from Ep Camp. Third-graders love graphic novels and third-graders
> love having their picture in everything.

Carly described her experience,

> We were preparing students for test preparation in how to write an answer in a
> paragraph form. The children needed to learn to repeat the question, giving some
> details and writing a conclusion statement. I had heard from a colleague there was
> a website called ReadWriteThink that has a generator that you can put in
> questions, the facts and it writes the paragraph. I used that with my students for
> the beginning set up as a gradual release for that writing.

She later explained that she expanded the lesson a few days later to incorporate
developing word choice.

> For me the paragraphs that came out were very cookie-cutter. They weren't very
> exciting or anything. So what came out of that lesson was that I hadn't anticipated
> was a lesson later on in that unit that I added about how to make your sentences
> more interesting. The writing generator was very general such as 'There are four
> legs on a cheetah.' Instead of something like, 'The fast cheetah has four legs that
> help it propel itself forward.'

> Both Mary and Abby shared the same experience adding recommended apps to
> their Reader's Workshop. Several of their kindergarten colleagues attended an all-day
> workshop that was grade specific ideas for using iPads. These colleagues then returned
> and shared the recommendations to the rest of the kindergarten staff. Abby described an
> app called Pocket Chart. She said a determining factor for inclusion was,

> The kids were familiar with the basic format of pocket charts. There were built in
> scaffolds in the app as well. It would not let them go on until they had made three

choices. They had to complete each set. They could tap on the picture and hear

the word again. There was a scaffold platform built into the program.

Theme 6: Teachers need technology integration specialists to support

technology use. The findings for Theme 6 included defining the role and expectations of

technology integration specialists.

The role of technology integration specialists. The participants referred to the

technology integration specialist with a variety of titles. Regardless of the job title, all 10

participants agreed that a specialist was needed to provide teachers support for integrating

technology into curriculum, instruction, and assessment. For instance, Carly stated, "The

goal of the integrator is to plan lessons together with the classroom teacher. Not to solve

technology problems." Similarly, Emma shared that she and Carly used to be technology

teacher leaders. Emma described, "We would work with teachers, and talk about the

lessons. Then help them to plug the technology into what they were already doing."

Abby concurred with these descriptors by adding,

> The integrator is a teacher who can speak to all of those things that I have spoken
>
> about that are important to an app and then give me three apps. Here are some
>
> apps you can try in your class. Try them out and I will tell you why I like them
>
> while you are playing around with it. Someone who shows you some of the
>
> features and then answers any questions you have.

Expectations of a technology integration specialist. The participants indicated

that the technology integration specialist needed to have pedagogy and content

knowledge. They stated that the job of the technology integrator should focus on infusing technology into the curriculum. Taylor stated,

> When I think of technology in our building and even how I use it I feel like it is compartmentalized for a certain part of the day. It is not meshed in with our instruction so it is not streamlined. I think people see it as another thing they have to approach; another thing they are having to address.

Mary shared concerns about the technology specialists should have understanding of grade-level needs. For instance,

> I do not know if we have someone who is familiar with kindergarten software. I guess they could make themselves familiar because that might be their job but our current technology person does a lot of trouble shooting and if you have a need, a very specific need he will come and tutor or walk you through. He might not understand the development needs of kindergarten children and literacy development.

Lauren's experience included support with both hardware and curriculum. For example,

> He can do both. He is very versed in technology. I could say to him 'I am looking for this type of thing in reading instruction what do you think? I am thinking about doing this with this technology. What do you think?' He would help me create something that would work very well with the curriculum.

Research Question 4

Themes 7 and 8 focus on participant recommendation to improve professional
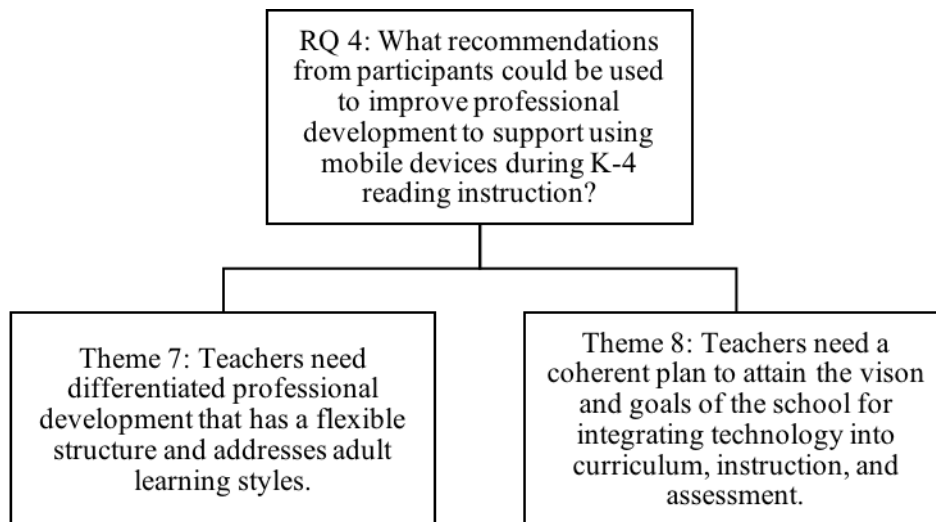
development.

Figure 4. Diagram of Themes for Research Question 4

        Theme 7: Teachers need differentiated professional development that has a

flexible structure and addresses adult learning styles. The findings in Theme 7

included addressing adult learning styles and flexible professional development options.

        Adult learning styles. Adult learning styles were acknowledged in connection

with improving professional development. As an instructional coach, Carly addressed

adult learning theory considerations that should be made to professional development.

For instance,

        As with any professional development, the structure of it has to be cognizant

        about teachers as learners. Teachers need direct instruction, time to play and

explore, and instruction that is more direct. They need time and a forum for

discussing and sharing learning. Time to reflect on their learning.

She added, "There has to be room for professional development to meet their [teachers]

needs. Because you might not have professional development that works for everybody."

During the focus group interview, Taylor and Abby addressed an adult learning

opportunity that offered both learning styles and different levels of technology

knowledge.

Taylor: I would like professional development to be differentiated to meet the

learning styles and different teaching styles of teachers in the building.

Abby: They did try to do that when we switched over to Google. It was not about

using it in the classroom, but having to use technology to do attendance and

email.

Taylor: Right, right.

Abby: They had to have sessions for people who were uncomfortable with

computers and then they would have sessions for people who were comfortable.

Taylor: A Google 101. I think if they were to do that with actual applications and

learn how to manage it in a classroom that could work. Where is the assessment

piece? And when do we have time to reflect on it?

Flexible professional development options. All the participants discussed having

various options for professional development. Differentiated professional development

offers a flexible structure for engaging teachers in the learning process.

The differentiated professional development combines not only job-embedded learning opportunities but the attendance to traditional workshops and seminars.

Grade-level specific. Participants recommended that professional development should be grade-level specific. Abby described,

> I think that kindergarten teachers are going to know what works for kindergarten students. I would like a teacher who can speak to all of those things that I have spoken about that are important to an app and then give me three apps. 'Here are some apps you can try in your class. Try them out and I will tell you why I like them. While you are playing around, I will tell you why I like them. Show you some of the features and then answer any questions you have.' That would be the most efficient most effective professional development have somebody else says give this a try.

Mary added,

> Three or four of the kindergarten teachers attended a conference specifically for iPads. They came back with a list of 25-30 recommended applications for reading and math for kindergarten students. They were able to use them at the workshop. Then they presented those apps at the kindergarten grade-level meeting.

Teacher-led. Two teachers established that their participation in Ed Camps was an effective professional development option due to being topic specific and teacher-led.

> Helen explained,

> I attended a Seacoast Ed Camp, which is a Saturday gathering of technology educators and regular educators who share their knowledge. Ed Camps are held

all over the country. I was able to attend one in Portsmouth. I attended a session on iPads. It was eye opening and very exciting. I could return to an Ed Camp if I wanted, but I would have to search it out and travel.

Maddie added that Ed Camps are teacher-led professional development. She explained,

They are teacher-led. You spend a day taking classes. There is a bulletin board, and you sign up for a class. I wanted to learn more about iPads in the classroom for math. You can also sign up to lead a group. Then you go into a classroom and brainstorm what worked for you. I have done e-libraries for people. How can you make an e-library? When we began using mobile devices, I went to one about how to effectively use mobile devices in the classroom. You come out of there with so many ideas. You are working with other educators who are using the same type of technology. You are getting that kind of input of what worked and what did not.

An unexpected finding came from Carly. She indicated that she was beyond most of the workshops on classroom use of technology. Carly expressed,

I do not usually attend workshops on technology. I would rather somebody tell me there is something out there. I would say 90% of the technology workshops I have attended have been a major waste of my time. It is something I could have learned in a few minutes compared to a whole day. When I usually attend these things I tend to solve tech issues most of the day. Since I feel confident about whatever the teacher is teaching, I am just helping everyone else to keep-up.

Theme 8: Teachers need a coherent plan to attain the vision and goals of the school for integrating technology into curriculum, instruction, and assessment. The finding for Theme 8 is a description of a strategic plan to support technology integration.

5-year strategic plan. The participants indicated that a strategic plan would be necessary to continue to develop their teaching skills as well as integrate technology into their curriculum, instruction, and assessment. Helen stated,

> I would like to see more iPad professional development or technology professional development as part of our regular on-going professional development. We do have some technology professional development tends that to be K-12, and that is not always very useful. More grade specific. Even learn how to use iPads for assessment, or how to score reporting for kids. All those types of questions that would otherwise take me hours and hours on my own to learn. I need somebody that has more expertise than I.

Carly stated, "The expectation of schools is that teachers use mobile devices to increase learning opportunities and achievement for students." She then shared her vision,

> I would like to see a strategic plan. I want to see a five-year plan that shows this is what we want teachers and students to be able to know and do at the end of five years. Then back that up every year and identify this is the one thing, one goal per year for each grade level. Here is the one technology goal for the year. We are going to give you the time to work at the beginning of the year. Then in the middle of the year, we give more exploratory time and time to share with your colleagues. How have you used it? What has worked? What hasn't? Then time

at the end of the year to reflect on that practice and make your goals for the next

year. I want an actual plan. I want somebody to think about what I might need

five years from now, back up, and give me the tools instead of making me make

up those tools as I go along.

A change in teacher's beliefs about technology is necessary. The change in beliefs can be

one area developed in a strategic plan. Taylor articulated,

I feel like it is more of an add-on than what we do on a daily basis. I wish the

professional development would be how we integrate it into the curriculum we

already have rather than making it an add-on to what we do. So that it can support

our instruction and reach those kids who need to be expanded upon. It would help

those kids that need remediation. Professional development can guide teachers

that it does not have to be an add-on that it can be part of the everyday instruction

how to build that into the day and not make it separate. Technology is just another

piece of what we do. It would be stronger if it was built into our curriculum.

Overarching Research Question
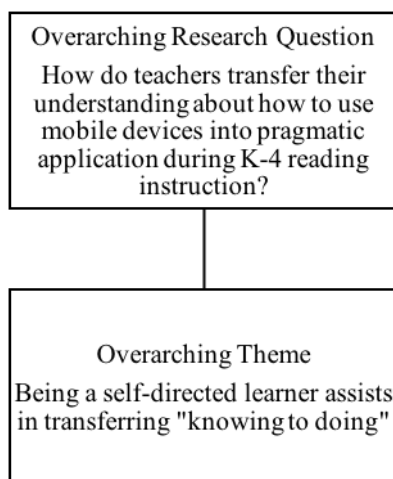
Figure 7. Diagram of Theme for Overarching Research Question

The overarching themes focus on transfer of 'knowing to doing.'

According to the teachers in this study, being a self-directed learner assisted them in transferring what they know about technology use to application of this knowledge in K-4 reading instruction. The key findings included autonomous learning, collaboration, planning, implementation, and reflection, varying levels of use, and challenges in using mobile devices.

Autonomous learners. Self-directed learners are self-motivated and proactive learners who engage in independent learning. For instance, Carly stated,

My experience has been professional development is self-directed based on interest. While at a staff meeting, I heard that so-and-so used something in her classroom. I am going to seek her out during the day on how to do that. So it is all self-directed.

Taylor replied to Carly with affirmation stating,

We have had two or three workshops specific to technology use. These were not

grade-level specific. I think it is that I know somebody that is using it, and I liked

it. I saw it, and I am going to seek out that teacher. I will give it a whirl.

Both Abby and Carly expressed how they used on-line sources to support their use of

mobile devices. Abby shared,

If I had an idea of how I wanted to use technology in my reading instruction, I

would Google it and do research that way. I would find a technology blog. I hope

that a teacher who is using technology and I would read about what she had to say

about how it worked in her classroom.

Carly searched Facebook,

I have found a fair number of things people are sharing on Facebook have a fair

number of things to try in the classroom. But I look for something that is going to

be worth my time to learn because I have to learn it first. I look for something that

is educational that is not too gamey. There are some things you will play that are

80% game and 20% learning. That is not what the ideal activity.

Collaboration. Self-directed learners recognize when they need to seek assistance

from others. Grace relied more on her colleagues, especially her supervisor who was the

library, media, and technology coordinator for the school district. She described,

He [supervisor] came in and sat with us to show us how to use the iPads. He has

been very instrumental in doing that since I have trouble with the use of them. He

makes sure that I can use the tools.

Emma found that she sought out assistance when a new program, Raz-Kids, was

introduced by a colleague. "I told her I want full access into this since I used iPads in our

room all the time. We spent two full days playing around it." She was also self-directed

when evaluating her experiences as she recalled,

> The more I played with the devices, the more confident I became. Now, I can
>
> troubleshoot almost any problem that comes up on any of the devices we use in
>
> the classroom. I also ask the kids to troubleshoot many problems themselves.
>
> They are usually excited to have the reins passed to them. I always pick up a new
>
> trick or two by watching them.

Planning, implementation, and reflection. Self-directed learners plan for

implementation and execute the plan. All the participants were using mobile devices in

their classroom instruction. They planned instruction that used mobile devices. Factors of

perceived ease of use and usefulness influenced how and when mobile devices were

included in the lesson. For example, Abby described the Pocket Chart app. She selected

this app due to the familiarity her students had with the physical pocket chart used during

reading instruction. She planned the use of the app based on what she knew about her

students.

The participants acknowledged trial and error was essential to implement and

evaluate how the devices supported individual learning needs. The participants had

supportive school cultures that encouraged the teachers to experiment with integrating the

mobile devices within best practices. Emma noted several times her need for time with

her colleagues to play around with the devices. Additionally, teachers need time for

reflective discourse. As they reach deeper into their metacognition, the teachers build collective knowledge. Collective knowledge then prepares the teachers for reflection for action as they prepare their next lessons.

Varying levels of use. A key finding was that all 10 participants were proactively exploring the use of mobile devices. However, they were using the mobile devices in a variety of ways.

Management. Several of the participants were using mobile devices for management aspects such as Lauren when she described,

> I keep a conference notebook, but it is not digital. I do know some of my
> colleagues do have a digital notebook on their laptops. I could see that moving to
> an iPad. And I haven't moved there because I am a kinetic learning myself. I tend
> to remember things when I write them down versus typing. It would be very easy
> to bring something back up to look at it again.

Communication with parents. Abby, Grace, and Maddie used their iPads to communicate with parents and students. Abby shared first iPad explorations with parents. She described,

> I think the very first time I introduced the iPads, we did a whole group activity,
> and the children's job was to take a picture of something in the classroom. I had
> them take a picture of themselves or took a picture of something in the classroom.
> The activity that followed I had them write their names in letter tiles. They had to
> take a picture of all the different times they wrote their names. And that was

shared with parents on the web page. The parents were able to see the activity in

the classroom using iPads.

Both Grace and Maddie established websites as a resource for parent, teacher, and

student. Grace stated,

We have lots of resources for students as well as parents. We have a listing of

books. Another way that we share information with the faculty is through our

website. There are links to websites to aid in their instruction as well as websites

for their students to use in the classroom and at home as well.

Maddie added, "I made a whole website for our reading intervention group. In the

website, I list certain apps and how they are used. Whether they are apps for

comprehension fluency or working on phonemic awareness and phonics."

Independent work and producing a product. Mary, Abby, Taylor, and Celeste

replaced paper and pencil activities with iPads. They were using the iPads at one of the

reading stations for independent work. While Helen and Emma also used iPads in a

similar manner, they both moved towards creating a product. For instance, Emma had the

children video record a student-led mini-lesson. The students then uploaded the video to

iMovie, and then Emma assigned a QR code. The children gained access to the video by

using iPads to scan the QR codes. Helen had her students use the iPads to video their

identification of story structure. Maddie, Lauren, and Carly had their students create a

writing product. Lauren used Google apps, such as Google Docs, where she could leave

feedback on student papers. Maddie had her students generate graphic novels with the

app known as Explain Everything. Carly shared,

Students create a slideshow of important events, characters, vocabulary and include a quiz that could be answered using details from the chapter. I would give them suggestions of questions to make sure they were asking high level thinking questions as well. They would then share this with their class and a buddy class. I would upload their slideshows to our class website for them to share with their families.

Challenges in using mobile devices. Though all 10 participants were users of mobile devices, they each faced challenges. Hardware and infrastructure concerns were expressed as a deterrent for technology integration. Emma was a confident user of technology. However, when asked about a challenge she faced when determining to use technology, she responded,

In the beginning, my biggest fear when integrating any technology into my lessons was the possibility that the technology would not work. I learned early that it is always best to have a high-interest contingency plan that the kids can work on while I troubleshoot a problem, or if I need to dump the lesson entirely.

Carly reported, "Bandwidth, Wi-Fi connectivity, and developmental appropriateness of the tools and apps" were concerns for her. Helen had similar concerns stating, "The biggest challenge has been hooking everything up correctly, so it works seamlessly." Lastly, Taylor explained, "If I hit a challenge that I cannot resolve quickly I am less confident to use the device again. I do not always have the time to seek out help." They had varying levels of technology confidence; yet were pursuing the use of mobile devices.

Conceptual Framework

The conceptual framework was built on the tenets of the Knowing-Doing Gap (KDG) (Pfeffer & Sutton, 2000) and reflective practice (Killion & Tondem, 1991; Schon, 1983). In Figure 1 (p.26), *knowing* and *doing* were placed outside of the reflective practice cycle aligned with a particular phase of the cycle.

Knowing. A significant aspect of this case study was that all 10 participants had moved beyond the common technology barriers. The development of collective knowledge was a contributing factor towards technology acceptance. Collective knowledge was created during collegial discourse that fostered reflective practice. The participants indicated that the informal, incidental collegial interaction often aided change in practice. However, the participants specified that formal professional development that focused on technology was necessary to continue to guide technology acceptance. For instance, Emma reinforced the use of team and grade-level meetings when she stated,

> It would probably be my team mates. Because we are always bouncing ideas off
> of each other. We are always working together. We don't necessarily plan lessons
> together but often times because we all use Raz-Kids, we all use BrainPOP, we all
> use DRA, we'll say 'Oh, I tried this and it worked out really well.' We will share
> back and forth.

She continued by stating,

> It always comes down to in any area and any school having time to collaborate.
> Given common planning time, and given release time to go to conferences or any

kind of outside professional development that can expand what I am doing in the classroom in order to try to do things differently.

In Figure 1 (p.26), *knowing* is placed in relation to reflection on action and reflection for action. The participants introduced the possibility of including *knowing* within the cycle of reflective practice. For instance, teacher metacognition was discussed several times. Lauren discussed how reflection with her team would engage metacognition. Carly also discussed the ability to reflect deeply upon their decisions to use technology. At each phase of the reflective practice cycle, Carly drew out specific examples of linking knowledge to her actions in the classroom. For example, she would ask a series of questions,

> I chose this activity so there is some critical thinking component that I want my students to get out of the lesson. I am looking at them to see are they interacting with it the way I imagined they would. Is the app engaging them? Is it really asking them difficult questions or is it too easy? Do I need them to change a level on an app they might be using. Are they totally lost and do I need to partner them up with someone. The learning part is most important. If there is some sort of barrier to accessing the learning goal then I want to remove that.

Doing. The *doing* dimension of the conceptual framework was originally placed outside of the RiA portion of the reflective practice cycle (see Figure 1). The participants described integrating technology through a process of trial and error. Mary stated, "It has been on the fly experimentation because there is not a lot of time during the school day or even after school to sit down with the technology specialist." Maddie also found that she

used a trial and error approach at professional development. For instance she stated, "There is a time we are testing things out and say, 'Look at this. Check out how I am using that app.' You get to see and try new ideas."

The trial and error process is a form of learning by doing. The participants were given opportunities to experiment with the mobile devices to determine the ease of use and usability of the mobile devices during reading instruction. Learning by doing and trial and error are components of the KDG and reflective practice cycle of the conceptual framework for this case study. Though *doing* was linked outside of the reflective practice cycle, the teachers articulated that *doing* was the catalyst for closing the KDG. More specifically, teachers needed to be self-directed learners. Helen captured the process of self-directed learning when she stated,

I have gone up some wild goose chases along the way. I am sure we all have so finding the right tool to use with my kindergarteners given my skills. Then taking that next step. I try to set up goals for myself and stick to those goals. Even though there are so many tangents that you could go off on. For instance, this year it's all about going beyond the app and finding things I can use that are more clearly tools that show learning.

During the focus group, Carly and Taylor stated the lack of specific professional development that focused on technology integration has led teachers to be self-directed learners. They recognized that the key to technology adoption was their decision to seek advice and recommendations for integrating technology from colleagues. For instance, Emma stated,

If you come away from a workshop with one thing that you will use in your classroom, then the workshop was successful. If a team of teachers attended the same workshop and they come back with their one thing, we will have a variety of recommendations to give one another. Then you have a bit of a tool belt that you can use with the device or program.

Reflective Practice (Killion & Todnem, 1991; Schon, 1983) and the KDG (Pfeffer & Sutton, 2000) formed the conceptual framework. The participants instinctively reflected upon their practice without the assistance of formal professional development. During the focus group, it became apparent that the teachers wanted those opportunities to reflect with their peers, especially after attending professional development workshops. This finding reinforces the necessity of deprivatizing practices in order to foster collegial discourse. The participants stated they looked towards their peers' experiences to help them determine effective ways to integrate technology. In more formal settings, the teachers could work in a strategic manner focused around a shared-vision of technology use in curriculum, instruction, and assessment.

Furthermore, the results of this study contradict the KDG principle of confusing talk for action. The 10 participants were action-oriented, and learned by doing through a trial and error process. They all reported experimenting with integrating technology within their reading instruction. The participants also knew when to work with their colleagues to assist them in making a change in practice. However, they did not confuse talking about technology integration with actually applying that knowledge; they put their plans into action.

Summary

In this chapter, the setting and demographics were depicted along with a
description of the data collection, data analysis, and evidence of trustworthiness. Lastly,
in the results section, information-rich data was reported. Research Question 1 focused on
how teachers describe their decision-making process to implement mobile devices in K-4
reading instruction. Key findings included encourage school environments that promote
teachers to learn by doing, by giving them accessibility to the devices, and a choice when
and how to apply the mobile devices. Additionally, teachers expressed a level of
technological, pedagogical, and content knowledge when deciding to use mobile devices.
They were student-centered and concerned about mobile devices being used in a
developmentally appropriate practice.

Research Question 2 focused on reflective practices teachers applied to support
the decision-making process. Key findings included the use of informal reflection, the use
of the iPad applications' tracking systems, and teacher observations to determine student
engagement. Additionally, teachers stated the need to have reflective discourse with their
peers in a variety of informal and formal settings. They also had time to reflect during
peer mentoring sessions.

Research Question 3 focused on professional development that facilitates the
closing of the KDG. Key findings included that job-embedded professional development
was essential to closing the KDG. Also, working with colleagues assisted in developing
collective knowledge used to close the KDG. Lastly, the teachers articulated the need for

a technology integration specialist whose job would focus on supporting technology use within the curriculum.

Research Question 4 focused on participant recommendations for improving professional development. Key findings included the need for differentiated professional development that is flexible in structure and considers adult learning styles. The teachers also confirmed the need for a strategic plan that would guide technology integration.

Lastly, the overarching research question focused on how teachers transfer their knowledge about mobile device use to a pragmatic application in K-4 reading instruction. The key finding was that teachers needed to be self-directed learners. All 10 participants acknowledged that the decision to use mobile devices was a combination of working with their colleagues and being proactive to try the devices. Chapter 5 includes interpretation of the findings and limitations of the study. Then a discussion presents recommendations and implications for the study in the area of positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this qualitative case study was to explore how reflective practices within professional development aided teachers in transferring what they know about how to use technology into practical application. Technology integration continues to be a professional development issue in elementary schools (Hutchinson & Woodward, 2014). Teachers are not necessarily transferring what they know into pragmatic application of that knowledge. The goal of this case study was to determine which professional development options supported a shift from theory to practice; from talk to action. The 10 participants for this case study were elementary school teachers who had adopted mobile devices during reading instruction. They averaged four years of experience using such devices.

The overarching finding of this study was that being a self-directed learner assists in transferring knowing to doing. Self-directed learners are proactive in addressing a concern. They recognize the need for both autonomous and collegial learning. School environments that encourage differentiated professional development support self-directed learning. Differentiated professional development offers teachers the opportunities for experiential learning where they learn by doing. Through self-reflection and reflective discourse with their peers, teachers evaluate and inform their practice. Collective knowledge is formed that strengthens TPACK that is needed when deciding when and how to use mobile devices during reading instruction.

Self-directed learners also recognize the necessity of learning by teaching their peers. Differentiated professional development promotes peer mentoring and coaching. The participants stated that a reciprocal relationship is formed where they share information and experiences as well as teach others how to use mobile devices. Differentiated professional development reinforces a cycle of autonomous learning that is job-embedded, collegial-supported, and action-oriented. To guide differentiated professional development, teachers need a coherent plan to attain the vision and goals for integrating technology into curriculum, instruction, and assessment. A strategic plan can incorporate continuous professional development that has a flexible structure, and addresses adult learning styles. An integral component of this strategic plan should be the inclusion of a technology integration specialist. The technology integration specialist acts as a peer coach, who assists teachers to integrate technology into curriculum, instruction, and assessment.

The following chapter begins with a discussion of the interpretation of the findings. Next, limitations of the study are presented followed by recommendations for action and recommendations for future research. Then implications for positive social change are offered. Lastly, a conclusion to this case study is presented.

Interpretations of the Findings

The following section discusses the four overall findings in relation to the literature review conducted for this study. The overall findings were formed based on the themes that emerged during the data analysis process. This section ends with a discussion of the connections between the overarching theme and conceptual framework.

Purpose for Using Mobile Devices

To study the phenomenon of transferring understanding about how to use mobile devices to application of that knowledge, I first investigated the teacher decision-making process. The first research question focused on the teachers' descriptions of their decision-making process to implement mobile devices. A theme that emerged was their ability to determine when and how to use the mobile devices. To inform the participants' decisions, the teachers drew from their knowledge of technology, pedagogy, and content. Harris et al. (2009) confirmed that teachers need to develop TPACK to aid technology integration. The interrelationship of TPACK domains emerged when teachers discussed their selection of apps and programs.

During the selection process, the participants were student-centered to ensure that the mobile devices were used in a developmentally appropriate manner (NAEYC, 2015b). The teachers then examined the potential use of the mobile device based on their perceptions of ease of use and usability of the technology. Through the discernment process, they developed an understanding of how the mobile devices could enhance student learning. According to Holden and Rada (2011), mobile devices need to be used in a student-centered approach. Additionally, the mobile devices must have the capabilities to increase student learning. For instance, the app or program had to have an engaging interface. The graphic design needed to be appealing, hold children's attention, and scaffold the learning process. Built-in safeguards were an essential component, as these helped prompt the children to make self-corrections. Safeguards were important due to the limited reading ability of emerging readers. Visual, audio, and tactical capabilities

were examined to support emergent readers. Children could use their fingers to navigate the devices, rather than manipulate a mouse or keyboard (Hutchinson et al., 2012). Additionally, children can easily read the device through graphic representations such as pictures, symbols, sounds, and color. These options support student engagement and provide motivation for learning.

Perceived usability was another factor that influenced the selection process. Built-in tracking systems appealed to the teachers as a useful way to monitor student progress. Tracking systems assist teachers to individualize learning, which provide children with additional reading time. Additionally, mobile devices should augment print-based literacy instruction by enhancing independent practice (Northrop & Killeen, 2013). The programs should be efficient to enable children to work with little assistance from the teacher. Lastly, an additional benefit of mobile device use should be the accessibility of the app or program on multiple devices. Five of the participants looked specifically for accessibility on multiple devices to extend learning beyond the classroom. None of these teachers mandated at-home assignments but they did provide families with additional information that the parents could use to supplement classroom learning.

Collegial Interactions

Collegial interaction was a theme woven throughout this case study. The participants relied on their colleagues throughout the decision-making process. For instance, during informal meetings, the participants sought recommendations from their peers about mobile device use. Lunchroom conversations and grade-level meetings were platforms for teachers to present recommendations and share information. The finding

from my study concerning informal settings differs from the studies by Hutchinson and Woodward (2014) and Masuda et al. (2013), who determined systematic professional development was more likely to assist in promoting mobile device use. The formation of professional learning communities and communities of practice are designed to draw teachers from learning in the isolation of their classrooms (Leclerc et al., 2012; Prytula & Weiman, 2012). The collegial dimension of professional development builds cohesiveness to the learning organization. In my study, all 10 participants said that they were members in a variety of professional learning communities, but none of these were technology focused. The consensus was they sought a peer when there was a need for information or support using the mobile device. However, the participants recognized they must work formally with peers, especially in the area of reflective discourse.

Through reflective discourse, collective knowledge can be built. The participants expressed the need to reflect with their peers to reach metacognition. By critically reflecting, teachers use their understanding to determine implementation for future practice (Prytula, 2012). Thus, creating content knowledge based on their experiences and practices. Burke et al. (2011) reinforced that critical reflection is not conducted only by individual teachers, but also in collaboration with peers. In my case study, the participants wanted to be given designated time to reflective with their peers as they found there was a lack of reflective discourse about mobile device use. In fact, the participants reported not having any specific form of reflective practice. Rather, they had internalized reflective practices. Collegial interactions designed to support reflective discourse reinforces the necessity of deprivatizing classroom practices (Schrum &

Levine, 2013). As teachers discussed their experiences with mobile device use, collective knowledge was developed. Collective knowledge continues to increase as peers mentor one another.

Peer mentoring emerged as a form of collegial interaction. As peer mentors, teachers provide feedback for one another that can assist with adjusting instructional practices (Burke, 2013; McArdle & Coutts, 2010). In my case study, three of the 10 participants had a peer coaching position in their school. As technology teacher leaders, these participants had experiences mentoring their peers. As a mentor, they collaborated with their peers to design instruction that integrated technology. Peer mentors assist their peers in developing teacher knowledge, and applying theory into practice in order to adapt teaching practices (Bates & Martin, 2012; Grierson & Woloshyn, 2013). As teachers receive guidance to apply knowledge about mobile device use, a change in practice will be achieved.

Learning by Doing

Learning by doing emerged as a theme from the data. The participants described that a job-embedded approach to professional development, such as learning by doing, supported their ability to implement mobile devices. A benefit of learning by doing is the application of practices within the daily classroom routine (Burke, 2013). The participants from my case study recognized the potential of mobile devices as a means to individualize instruction. They held the belief that mobile devices could increase student engagement. Mobile devices should not be an add-on to the instruction, but a means for supporting student learning (Prestridge, 2011; Walker & Shephard, 2011). They were

confident in their knowledge of pedagogy and reading instruction, which fostered their

motivation to apply the mobile devices. Therefore, the participants were proactive in

searching for resources that would inform their decision-making process.

The participants discussed that their learning by doing was a process of trial and

error. As a form of job-embedded professional development, trial and error can promote

the daily use of the mobile devices to improve student learning (Burke, 2013). For my

case study, the participants designed and implemented instructional plans that included

mobile devices. Then the teachers reflected upon their experiences to determine future

considerations. For this case study, trial and error occurred autonomously; however, the

participants conferred with their colleagues about their experiences. The addition of

reflective practice informed their decision to continue with the mobile device or modify

the instruction.

Continuous Professional Development

Continuous professional development emerged as a theme from the data.

According to Charteris and Smardon (2013) continuous professional development (CPD),

is a systematic approach to increase teacher knowledge and skills. The participants

acknowledged two specific areas of CPD for future improvements to professional

development. The first was the development of a strategic plan for technology

integration. The second was the employment of differentiated professional development.

Strategic plan for technology integration. The focus group substantiated the

need for a strategic plan that had specific goals for technology integration. The strategic

plan would include on-going professional development to attain the technology goals.

Continuous professional development promotes engaging teachers in a yearlong

reflective practice to improve upon their skills (Tidwell et al., 2011). Traditional

professional development, such as one-day workshops, have had limited influence on the

inclusion of technology (Masuda et al., 2013). Teachers often return from these sessions

to the isolation of their classrooms without receiving further instruction or feedback

(Leclerc et al., 2012). CPD offers various collaborative learning opportunities that

deprivatize teaching practices and foster job-embedded professional development

(Dickerson, Jarvis, & Levy, 2014). The collegial dimension of CPD encourages teachers

to expand their teaching skills. This, in turn, promotes changes in practice, especially in

regards to integrating technology (Cifuentes et al., 2011). In my case study, the focus

group members discussed the necessity of working with their colleagues after attending

professional development. They noted how collegial discourse was an essential

component of the reflective process to make sense of what was learned and how to

integrate the mobile devices into instructional strategies. They were more apt to test iPad

use in their instruction because they had the support of their colleagues. This corresponds

with studies by Schrum and Levine (2013) and Howard (2013), who advocate a trial and

error system when integrating technology. A contributing factor in each was peer

involvement. Continuous professional development involves collegial interactions that

influence technology acceptance.

Though the participants had flexibility in applying mobile devices, they also

recognized the necessity of a shared vision for integrating technology. A strategic plan

would provide the school with a clear structure of the goals for integration technology

(Dufour & Fullan, 2013). A school culture of teaching and learning endorses the use of mobile devices to improve student learning. Cifuentes et al. (2011) concurred by reinforcing the necessity to form a common goal by fostering teacher relationships during CPD. The authors found those teachers who had established learning communities were more apt to adopt technology. According to Cifuentes et al. (2011), technology adoption was a common occurrence due to a shared vision for integrating technology. Additionally, Schrum and Levine (2013) reported that the focus on technology integration fostered teacher knowledge. Schrum and Levine discussed that the advancements on technology integration were directly related to collegial learning through job-embedded professional development. Furthermore, they found that the administrators valued collegial learning; thereby, providing occasions for technology planning. The opportunity to plan for integrating technology into instruction nurtures a shared vision. The shared vision provides a clear direction for attaining the schools' missions for improving student learning with technology.

Differentiated professional development. The participants stated that professional development needed to be flexible with differentiated formats. Differentiated professional development is a new topic in the body of knowledge in teacher development (Grierson & Woloshyn, 2013). Grierson and Woloshyn (2013) explored building teacher learning capacity through both small group and individual mentoring sessions to differentiate the learning experiences for teachers. As a form of CPD, small group sessions were designed for the specific needs of the teachers. Then classroom-based coaching was applied to individualize mentoring sessions. The instructional

coaches generated target learning experiences that were discussed during small group

sessions and followed by classroom-based modeling. Next, the coaches performed

classroom observations that included feedback sessions. Lastly, the teachers returned to

their small groups for collaborative reflection. This time together offered a collegial

discourse that challenged peers to reflect critically upon their teacher knowledge and

skills. The Grierson and Woloshyn (2013) study fits the flexible structure description that

the participants of my case study suggested. However, adult learning styles were absent

from the Grierson and Woloshyn study.

Adult learning styles should be considered for planning ongoing professional

development. The focus group members discussed that a lecture format did not address

adult learning styles. Participants stated they felt disconnected from the learning

experience; therefore, they wanted professional development that was engaging,

supportive, and relevant to their teaching needs. Adult learning styles has several

connotations. For instance, adult learning styles can refer to andragogy with

characteristics such as autonomy, situated learning, and motivation (Merriam, Caffarella,

& Baumgartner, 2007). A second meaning is cognitive styles, which is defined as how

adults take in and process information (Merriam et al., 2007). Furthermore, learning

styles can be thought of how people strategize learning tasks. Evans (2014) referred to

cognitive processes as the "mental internalization in individuals" (p. 185) that encompass

behavioral, attitudinal, and intellectual dimensions. These three dimensions are linked to

a person's ability to engage in the learning process. Patton, Parker, and Tannehill (2015)

concurred, stating that developing human capital is a means to build learning capacity

that actively involves learning at a personal level. Similarly, Loughran (2014) stated that professional development should come from the "perspective of the learner" (p. 277). By understanding how adults learn, teacher knowledge and skills can increase, thereby fortifying technology adoption.

Conceptual Framework

The conceptual framework for this study included the KDG (Pfeffer & Sutton, 2000) and reflective practices (Killion & Todnem, 1991; Schon, 1983). The combination establishes the relationship of using reflective practices to close the KDG. Figure 1 (p.25) presented the basic conceptual framework. I have added to this conceptual framework based on the results of this case study (see Figure 8).
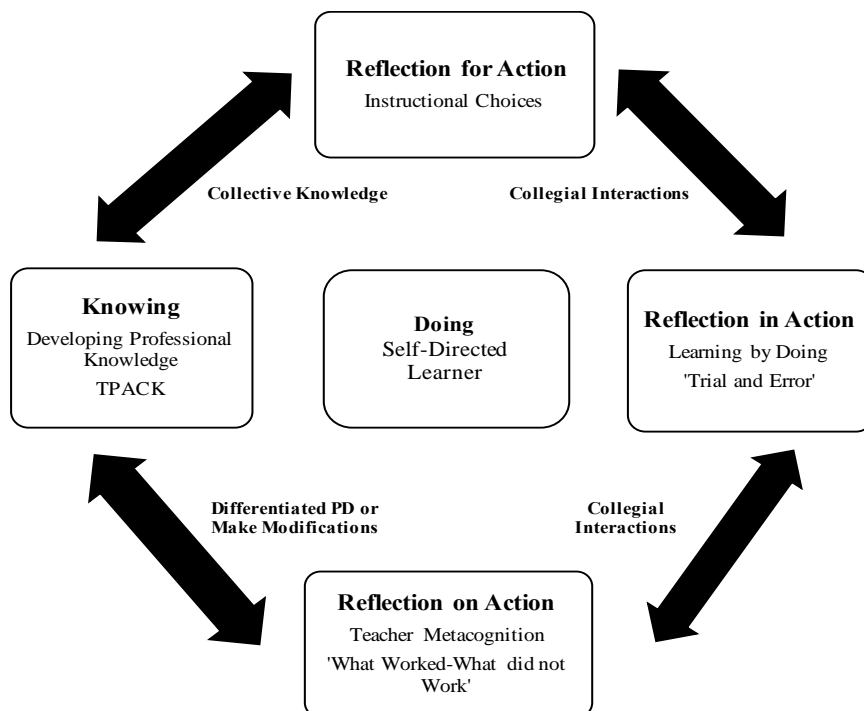

Figure 5. Closing the Knowing-Doing Gap: Self-Directed Learners

To address the KDG (Pfeffer & Sutton, 2000), teachers need to be self-directed learners. Within continuous professional development, teachers work autonomously and collegially to develop professional knowledge. Reflective practices (Killion & Tondem, 1991; Schon, 1983) provide a cycle of examination that moves teachers from talk to action.

Knowing. Initially, the conceptual framework displayed *knowing* and *doing* outside of the reflective cycle (see Figure 1). The position of *knowing* and *doing* shifted to demonstrate a change in relationship within the conceptual framework structure. *Knowing* became part of the reflective practice cycle. *Knowing* implies both knowledge gained from reflective practice and knowledge that needs to be attained. Pfeffer and Sutton (2000) stated that organizations often will apply a new approach to address a concern. They advocated that learning organizations already possess the knowledge to address change in practice. The participating teachers from my case study obtained knowledge through reflective practice. They used their experiences to decide what new knowledge was required to enable the use of mobile devices during reading instruction. According to Cornish and Jenkins (2012) these participants would be categorized as autonomous teachers. The participants were able to reflect critically upon their experiences, and identify where their skills were lacking. They had reached metacognition, where personal understanding was acknowledged (Prytula, 2012). The next course of action was for the teachers to either modify their existing instructional plans or further advance their professional knowledge.

By situating *knowing* into the reflective cycle, professional knowledge was highlighted as an important dimension of professional learning. For this case study, professional knowledge in technology, pedagogy, and content influenced when and how teachers used mobile devices. The interrelationship of TPACK informed the teachers as they entered the reflection in action phase of the reflective practice cycle. The participants shared that they instinctively knew when to look for more information about TPACK domains. Their responses focused on seeking assistance from their peers in the areas of technology and pedagogy. Content knowledge was discussed during the interviews concerning reading skills and characteristics. The teachers did not report having to participate in professional development for reading instruction. This could mark a level of confidence in content knowledge, which enabled the teachers to focus on technology integration (Rohaan et al., 2012). By developing pedagogical knowledge, teachers can effectively integrate technology (Shinas et al., 2013). Most of the participants in my case study attended professional development workshops to increase their technological knowledge. However, all of the participants stated their pedagogical knowledge was increased through collegial interactions.

Collegial interactions foster pedagogical knowledge. The teachers shared that they had daily opportunities to meet informally with their colleagues. Most of these meetings were during lunch breaks, where casual conversations offered time for teachers to discuss their experiences. Some of the participants referred to these meetings as 'learning-on-the-fly' opportunities. These casual meetings are a form of PLCs that have forged an atmosphere of trust and respect for their colleagues (Dufour & Fullan, 2013; Huffman,

2011). They recognized that these colleagues valued integrating technology to improve

student learning. Therefore, they trusted the recommendations made by their colleagues

and immediately made changes to their practices. Teacher adaptation is driven by teacher

metacognition in combination with working as a collective to generate knowledge about

mobile device use (Parson & Vaughn, 2013). As pedagogical knowledge is developed,

the teacher's ability to make instructional adaptations will affect the transfer of knowing

to doing (Pfeffer & Sutton, 2000). As teachers share experiences with their colleagues, a

collective knowledge can be formed; thereby, motivating a change in practice

(Hargreaves & Fullan, 2012). The teachers in my case study were able to work with their

colleagues in both formal and informal professional development. Their shared

experiences and mentoring established a belief system about the importance of using

technology for instruction.

Doing. Based on the results of this study, *doing* became the central point of the

conceptual framework. Originally, the *doing* component of the conceptual framework

was placed outside of the reflective cycle next to reflection in action. During

implementation, the participants engaged reflection in action. A learning-by-doing

approach was used to integrate mobile devices during reading instruction. Learning by

doing is a form of job-embedded professional development that provided teachers time to

experiment with the mobile devices (Dufour & Fullan, 2012; Pfeffer & Sutton, 2000).

The participants from my case study were encouraged to use a trial and error method to

learn from their experiences. Pfeffer and Sutton (2000) stated that learning organizations

should cultivate environments where members can learn from their mistakes. Without a

"culture of forgiveness" (Pfeffer & Sutton, 2000, p.253) risk management becomes a concern. Risk-aversion forms due to the consequences of failure, which creates teacher resistance to technology integration (Howard, 2013). The participants for this case study were encouraged by administrators and their peers to use technology. Their schools applied a trial and error approach to motivate teacher use of mobile devices.

Self-directed learners were added to the *doing* dimension of the framework. As the central theme of this case study, being a self-directed learner is directly related to closing the KDG. Self-directed learning entails independent learning based on personal interests or needs (Knowles, 1975). The participants for this case study were proactive in addressing the need for improving student learning. They recognized the potential of mobile device use during their reading instruction. While they were all autonomous learners, the participants knew when they needed to consult with their peers. Their perceptions of both ease of use and alignment with learning goals, combined with colleague recommendations promoted technology integration. During reflection for action, the teachers created plans for implementation. This was a decisive point in the KDG. The teachers could have continued to talk about action with their colleagues. However, they moved from talk to action by implementing their instructional plans. Then they monitored the transfer of knowledge to application during reflection in action. The 'in-the-moment' learning was crucial for teachers to determine the effectiveness of mobile device use during reading instruction (Schon, 1983). Based on their reflection on action and collegial discourse, the teachers either modified their instruction or participated in professional development. Thus, they contributed to building collective

knowledge that would inform reflection for action. This cycle of reflective practice and the KDG established a framework for transferring knowledge about mobile device use to a pragmatic application.

Limitations of the Study

This case study used a small sample size to ensure information-rich data (Patton, 2002). The anticipated participant pool was 10-15 teachers from three elementary schools. Initially, only six classroom teachers volunteered. During a second round of recruitment, the participant pool was expanded to include special education teachers and specialists, who met the purposeful sampling criteria. The second recruitment yielded four additional participants for 10 volunteers. This case study was enhanced by including special education teachers and specialists. Nevertheless, the small sample is a limitation.

My experience as an elementary school teacher might have been a limitation of this case study. I worked to avoid this by applying reflexivity. During the data analysis, I scrutinized the transcripts for any personal connections and assumptions. I bracketed these to ensure that my experiences did not mar those of the participants. On the other hand, my experience added to the study. My familiarity with classroom teaching fostered congenial conversations, which generated information-rich data (Patton, 2002).

During the analysis process, career stages emerged as an additional limitation to this case study. The aim of this study was to explore how teachers transferred their knowledge of mobile device use into a pragmatic application. Career stages were not considered as part of the purposeful sampling criteria. The participants had to be users of mobile devices. At the beginning of the data collection process, demographic information

was collected concerning participate age and numbers of years of teaching experience (see Appendix C). The participants were between the ages of 30 and 60. Seven of the participants had 11 and 20 years of teaching experiences. Two had more than 30 years of experience, and one participant had less than five years of experience. The participants for this case study were established in-service teachers. According to Hargreaves and Fullan (2012), there are six distinct career stages with four levels of teacher commitment, which include negative focuser, disenchanted, positive focuser, and renewal. The positive focusers in the more than 30 years of experience stage "care about students and their achievement and have learned to avoid the distractions of repetitive reform efforts" (Hargreaves & Fullan, 2012, p. 66). The renewal group becomes advocates for change. The two participants with over 30 years of experience in my case study were positive focusers and fell within the renewal group. Teachers with eight to 23 years of experience tended to be pragmatic about their teaching. There was a confidence to their teaching; however, they were not satisfied with the status quo (Hargreaves & Fullan, 2012). They were more willing to experiment with new approaches, especially if they had time to plan the implementation of the new approach. The majority of participants for this case study fell in the middle phase of career stages. They were all willing to experiment with mobile device use to support student achievement. Without enough participants in each of the career stages, it was difficult to definitively state if the length of teaching experience contributed to the willingness of the participants to apply mobile devices during reading instruction.

Recommendations for Action

The participants for this study expressed the need for a strategic plan to integrate technology into curriculum, instruction, and assessment. While all of the participants were users of technology, they recognized the importance of a systemic plan based on shared visions and goals to support future technology use. The strategic plan should promote continuous professional development that differentiates learning opportunities and fosters each teacher's adult learning styles. Additionally, the participants wanted more time to engage in reflective discourse with their peers. The participants reported that the informal learning occasions yielded more technology inclusion. However, they discussed the importance of engaging in reflective discourse, especially after having attended formal professional development workshops. Lastly, peer guidance holds possibilities for technology integration. All 10 participants stated that they would benefit from the assistance of a technology integration specialist. The technology integration specialist would assist teachers with integrating mobile device use into curriculum, instruction, and assessment. Teachers would have the advantage of the technology integration specialist's previous classroom experience, and expertise with technology. I recommend that the technology integration specialist would be a full-time position, which would allow the specialist to work with individual teachers during classroom instruction. The technology integration specialist could be considered an instructional coach, providing one-on-one assistance to individualize professional development. Additionally, the technology integration specialist can design specific professional development that addresses how mobile devices can support assessment. Use of mobile devices in

assessments was meagerly discussed in this study compared to the emphasis placed on curriculum and instruction. I will send an executive summary of my findings and recommendations to the participants, principals, and superintendents.

Recommendations for Future Research

This study included teachers who willingly incorporated technology into their instruction. Teacher resistance to technology integration was not a factor for the participants. Even though confidence levels varied, the participants were self-motivated to include mobile devices in their classrooms. Additionally, most of the participants were in the middle phases of career stages with eight to 23 years of experience (Hargreaves & Fullan, 2012). They were committed to their students and capable of navigating new instructional approaches. Even the two teachers with over 30 years of experience were compelled to integrate technology into their teaching. A similar study could be conducted with a broader spectrum of teachers at various career stages. While this study had one teacher with less than five years of experience, her age might have made a difference. She entered teaching later in life, as a second career. The inclusion of teachers from early career stages would inform further professional development considerations. According to Masuda et al. (2013), the various career stages have specific concentrations for professional development. Additionally, including teachers who resist technology integration would further expand how to address individual teaching needs. The current body of knowledge has established technology integration barriers. The participants for this case study had moved beyond technology barriers to integrating mobile devices into their instruction. The addition of technology resistant teachers, who participate in the

recommended strategic plan, could inform administrators how to support technology adoption.

A second focus for future research could be the exploration of feedback among peers. The participants for this case study articulated the importance that their peers had in influencing technology adoption. Collegial feedback can be a contributing factor in overcoming technology barriers (Kopcha, 2012). Since peer feedback can influence technology adoption, it is important to train teachers in applying effective feedback. One addition to this research could be in conjunction with adult learning styles. Peer mentors and technology integration specialists would benefit from training that supports adult learning (Hudson, 2013). The role of the peer mentor is to advance professional knowledge through collegial discourse and modeling. To engage in meaningful conversations, peer mentors need to develop their communication and leadership skills (Hudson, 2013).

A third consideration for future research is the possibility of teachers using mobile devices to examine their practices. As self-directed learners, teachers can use mobile devices to gain further understanding of how they integrate technology into their daily instruction (Tondeur et al., 2013). Tondeur et al. (2013) studied how teachers used video recordings to examine their instruction. Upon watching the recordings, the teachers used a system referred to as stimulated recall. This system prompted individual and group reflective discourse to inspect pedagogical proficiency. From the reflective discourse, peer coaches determined the type of professional development necessary to support teacher development. In relation to my case study, stimulated recall would enhance

teacher reflective practice. The participants in my study specifically stated that there was a need for training teachers how to reflect upon their practices. Stimulated recall can be used by individual teachers, with a peer mentor or technology integration specialist, and in PLCs.

Lastly, future research can be conducted on how teachers use mobile devices specifically for assisting critical thinking, problem solving, communication, and collaboration skills of elementary students. Basic reading skills are the foundation for critical thinking, problem solving, communication, and collaboration skills. In the current literature, mobile devices have been used for the acquisition of print-based skills. Future research could look at how children use mobile devices to construct knowledge and use this knowledge to express their thinking. Mobile devices should be used intentionally and appropriately to support creativity, collaboration, and communication skills of young children (NAEYC, 2015a). The exploration of using mobile devices to generate a product would expand curriculum, instruction, and assessment options.

Implications

Positive social change occurs when teachers leverage mobile devices to improve the quality of instruction for the acquisition of reading skills of young children. Currently, reading achievement scores of American high school students indicate limited proficiency of basic reading skills (PISA, 2013). To actualize positive social change, teachers need to improve reading instruction to prepare students for the rigors of a competitive global market. Reading skills are the foundation of critical thinking, problem solving, communication, and collaboration skills needed in the 21st century workforce.

The integration of mobile devices in reading instruction has begun to demonstrate improvements in reading acquisition (Hutchinson & Woodward, 2014). However, teachers continue to struggle to incorporate mobile devices into their curriculum, instruction, and assessment. Conceptually, teachers recognize the potential of mobile device use. The gap is taking that knowledge and effectively applying it to reading instruction.

To close the KDG, teachers must take responsibility to improve their practices. Professional development should not be imposed upon teachers, but rather formed to engage adult learning that is situated within their daily classroom instruction. By working with their colleagues, teachers create collective knowledge that is used to inform their decisions to use mobile devices. A unique aspect of my case study was the willingness of the participants to integrate technology into instruction. They took the responsibility of becoming self-directed learners to improve their practices. They not only engaged in learning by doing, but learning in relationship with their peers.

Furthermore, positive social change can develop changes in school culture as more teachers work together to adopt technology to their practices. Unlike current literature, the participants for my study had moved past technology barriers. They saw the potential that mobile device use had to improve reading instruction. Their student-centered approach for evaluating mobile device use demonstrated their confidence in their knowledge of pedagogy and reading instruction. However, they still work with colleagues who are resistant to technology adoption. The participants can act as peer mentors to support a shared vision for the use of mobile devices. By developing a

strategic plan, changes in school culture will increase teacher knowledge, and thereby, encourage changes in practices that will result in improving reading achievement.

Conclusion

The inclusion of mobile devices during reading instruction has begun to change how children are acquiring reading skills. While some teachers have integrated mobile devices into their instruction, others continue to struggle to make the transition from theory to practice. As teachers participate in continuous professional development that is specific to their learning needs and responsive to their learning styles, change in practice will occur. However, teachers need to be attentive to the KDG where talk can be mistaken for action. By engaging in collegial discourse, teachers reflect upon their experiences, thereby building collective knowledge that will inform future instruction. To ensure transfer of knowledge into pragmatic application, teachers must become self-directed learners. Teachers who are self-directed learners are driven to improve their skills to benefit student achievement. They learn by doing, recognizing that trial and error are necessary aspects of the learning process. Self-directed learners work independently; yet, they know when to seek the counsel of their colleagues. Teachers thrive when they have the self-confidence to move back and forth between learning in community and learning autonomously. Most importantly, quality professional development brings forth better teachers, who in return have better students prepared for a better future.

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Appendix A: Introduction Letter to Principals

May XX, 2015,

Dear _____,

     My name is Lisa-Marie Bald and I am a doctoral student at Walden University. I am conducting a study with K-4 teachers about how they make decisions on how to use mobile devices in reading instruction. My interest in this topic is to provide information to in-service teachers to support intentional planning for the use of integrated technology. I am interested in exploring the transfer of knowledge to action in the area of mobile device use and reading instruction. Children will benefit from this study by having teachers who are better prepared to teach reading based on targeted in-service training.

     I am looking for volunteer elementary teachers in grades K-4 that would like to participate in my dissertation study. These teachers should be using mobile devices already in their teaching and have accessibility to mobile devices during reading instruction.

     This study has been designed to be as non-intrusive on teachers' time as possible. I know the value of their time needed in the classroom. Participation includes the following commitment:

- Complete a one-time 5-10 minute on-line survey

- Take part in one 45-60 minute interview that is audio-recorded either in person or by phone

- Take part in a brief follow-up interview by either phone or email

- Take part in one 45 minute focus group observation that is audio-recorded

     I would like to meet with you to answer any further questions you might have concerning my dissertation. It is my hope that you might introduce my dissertation study to potential teachers that meet the prerequisites for my study. You can reach me at XX.XXX@XXXX or XXX-XXX-XXXX

     I look forward to hearing back from you. Thank you in advance for your consideration to participate in my dissertation study.

Sincerely,
Lisa-Marie Bald

Appendix B: Introduction Letter to Participants

May XX, 2015,
Dear _____,
My name is Lisa-Marie Bald and I am a doctoral student at Walden University. I am conducting a study with K-4 teachers about how they make decisions on how to use mobile devices in reading instruction. My interest in this topic is to support developmentally appropriate use of mobile devices in K-4 reading instruction.

Your participation is voluntary and you can decide to leave the study at any given time. Your identity and any information you provide will be confidential. I will not use your personal information for any reason other than to publish the results in my dissertation.

 Your participation includes the following commitment:

Complete a one-time 5-10 minute on-line survey

Take part in one 45-60 minute interview that is audio-recorded with interview either in person or by phone

Take part in a follow-up interview by either phone or email

Take part in one 45 minute focus group with participating teachers from neighboring school district that is audio-recorded
You can reach me at XX.XXX@XXXX or phone XXX-XXX-XXXX I look forward to hearing back from you. Thank you in advance for your consideration to participate in my dissertation study. I am excited to see how your experiences can encourage other teachers to select mobile devices as a teaching and learning tool.

Sincerely,
Lisa-Marie Bald
XXX.XXX@XXXXX
XXX.XXX.XXXX

Appendix C: Introduction Survey

1. Your Age Group: 20-29 30-39 40-49 50-59 60+

2. Gender: Male Female

3. Highest Education Level: Bachelors Masters, Master's+ Doctorates

4. Do you hold any endorsements?

    Yes: Name of endorsement_____No

5. Years of Teaching Experience 0-5 6-10 11-15 16-20 20-25 26+

6. Which grade do you currently teach? K 1 2 3 4

7. Have you taught in any other grade?

    Yes: Write grade level on the line_____ No

8. How many teachers are in your grade level?

9. How many teachers are in your school?

10. What is the student population at your school?

11. Circle as many of the devices you personally own:

    Smartphone Android iPad iTouch Kindle Nook Surface Pro

    Other(s):_____

12. How many years have you used mobile devices?

13. Circle which areas apply to your instruction with mobile devices:

    Reading Writing Mathematics Social Studies Science Other(s)_____

14. How many years have you used mobile devices during your instruction?

15. How many years have you used mobile devices during reading instruction?

Appendix D: Interview Protocol

Date:

Time:

Place:

Participant:

Opening:
1. Welcome the participant and thank the participant for coming.
2. State the purpose of the interview.
3. Remind the participant that this is a voluntary interview.
5. Inform the participant that you will be note taking and digitally voice recording for transcription.
6. Remind the participant that the interview data will be used strictly for the study.
7. The interview will be no longer than 45-60-minutes.
8. Make sure that the recorder is turned on.

IQ 1: What tools or strategies helped you to explore how to use mobile devices in your practice? (For instance, peer-observations, workshops, collegial discourse, independent research)

IQ 2: What developmental reading aspects influence when and how you determine to use mobile devices in your instruction?
Probe: What made you decide if the technology would be easy to use during instruction?
Probe: What made you decide if your instruction would be enhanced by using mobile devices?

IQ 3: What self –monitoring strategies did you apply while using mobile devices during your reading instruction?

IQ 4: After teaching your reading lesson, how do you track what worked or did not work in the lesson that would help you to modify future instruction.

IQ 5: As you prepare for your next lessons, how do you access your previous self-reflections?
Probe: What types of support systems assist you with accessing your previous self-reflections?

IQ 6: What have you used as a resource to support the use of mobile devices in your teaching?

IQ 7: How do the resource people in your school specifically help you with integrating technology during reading instruction?

IQ 8: Tell me about an activity you learned about during professional development about the use of mobile devices that you then implemented into your classroom instruction.
Probe: What factors contributed to your decision to use this activity?

IQ 9: What recommendations do you have that would improve professional development options for mobile device use during reading instruction?
Probe: What conditions need to be in place to foster implementation of mobile devices during reading instruction?
Probe: What would aid you in transferring your understanding about mobile device use to application?

Appendix E: Focus Group Protocol

Date:

Time:

Place:

Participants:

Opening:
1. Welcome the participants and thank them for coming.
2. State the purpose of the interview.
3. Remind the participants that this is a voluntary interview.
5. Inform the participants that I will be taking notes and digitally voice recording for transcription.
6. Remind the participants that the interview data will be used strictly for the study.
7. The interview will be no longer than 45-60-minutes.
8. Make sure that the recorder is turned on.

FGQ1: How does your school support mobile devices as a natural part of your planning for reading instruction?

FGQ2: What types of follow-up professional development have been used to foster teacher reflective-practices concerning mobile devices during reading instruction?
Probe: How have these sessions encouraged future use of mobile devices in your reading instruction?
Probe: How have you used these sessions with other colleagues to promote mobile device use?

FGQ 3: What forms of professional development have been used at your school to aid in using mobile devices in your reading instruction?
Probe: How have these forms of professional development fostered continued use of mobile devices in your reading instruction?

FGQ4: What changes would you like to see in professional development that would support your continued use of mobile devices during your reading instruction?

Appendix F: Sample Follow-up Interview Chart

Symbols: {}=grey highlighted for keywords; [ ]= direct quote *=researcher comment

Questions	Responses	Initial Codes	Keywords	Key Quotes/Comments
FI 1: What types of challenges have you faced when deciding to use mobile devices?	In the beginning, my biggest fear when integrating any kind of technology into my lessons was the{ possibility that the technology would not work} I learned early that it's always best to have a high-interest contingency plan that the kids can work on while I troubleshoot a problem, or if I need to dump the lesson entirely.	PEU	Hardware	*Confident that she can integrate mobile devices. *She is prepared to change instructional format
Probe: What has affected your confidence level in using mobile devices in your teaching?	[The more I used (played with) the devices, the more confident I became. Now, I can troubleshoot almost any problem that comes up on any of the devices we use in the classroom. I also ask the kids to troubleshoot a lot of problems themselves, they are usually excited to have the reins passed to them, and I always pick up a new trick or two by watching them.]		Trial and Error Problem Solving-Trouble Shooting	*Confidence in using the mobile devices; can troubleshoot when necessary

Appendix G: Sample Initial Interview Chart

Symbols: {}=grey highlighted for keywords; [ ]= direct quote *=researcher comment

Questions	Responses	Initial Codes	Keywords	Key Quotes/Comments
What tools or strategies helped you to explore how to use mobile devices in your practice?	I visit a lot of {blogs} and use the information that {other teachers} have recommended you know, to initially look at apps and other tools on our iPads or on our tablets. [That is how I narrow it down because the pool is big with potential apps and most of them aren't very good.] So I have found getting other teachers' take on what they have tried has helped a lot that is how I do the initial narrow down.	RP	Blogs Colleague	"that is how I narrow it down because the pool is big with potential apps and most of them aren't very good" *Blogs: I need to look at type of blogs and who generates these; are there other professional teachers. If so this could be considered an extension to a wider PLC
What developmental reading aspects influence when and how you determine to use mobile devices in your instruction?	I would say we don't use mobile devices initially until I have a really good feel for {where the child is at developmentally}. [It is not a teaching tool as much as it is a support tool for me in my classroom.] I like to do a lot of one on one instruction and {use iPads to support what we have done in our reading groups}	DAP	Assessments Support tool Extension Reinforcement	"It is not a teaching tool as much as it is a support tool for me in my classroom." *iPad is not direct instructional tool but used as a support tool to extend the learning opportunities from the reading group focus. Ability to use for differentiation

Appendix H: Audit Trail

The following audit trail outlines the process taken to collect and analyze the data for this case study.

Collection of Data

Participants

A.   An introduction email was sent to each of the principals at the three elementary schools to share information about the case study and establish an appointment either by phone or in person.

B.   I met with each principal at their respective schools. I shared an outline of the case study proposal. Additionally I inquired if there were any classrooms using mobile devices during reading instruction. I then shared information concerning participant time commitment and expectations.

C.   Upon school principal approval, I prepared a packet for every K-4 teacher for each site school. The packet included an introduction letter that briefly described the study and participant commitment and expectations. At the time of participant recruitment teachers were on summer break. Therefore, a designated school representative sent the introduction letter via the school email system. Potential participants were provided a contact email.

D.   After hearing from potential participants, I sent an email to share further details about the study and description of their participation. A consent form was attached to the email providing further details concerning the participation expectations. The email also contained a link to the introduction survey. Once the consent forms were returned, participants were directed to complete the introduction survey. Initial interview appointments were scheduled.

Interviews

A. Each of the 10 teachers participated in initial and follow-up interviews. Below is a list of the teachers with associated interview dates and locations of the interviews.

Initial Interviews:

Participant (Pseudonym)	Date of Interview	Location of Interview
Teacher 1-Mary	07/20/2015	At teacher's school
Teacher 2-Emma	07/20/2015	At teacher's school
Teacher 3-Abby	07/24/2015	At teacher's school
Teacher 4-Taylor	07/28/2015	At teacher's school
Teacher 5-Helen	07/28/2015	At teacher's school
Teacher 6-Carly	07/30/2015	At teacher's home
Teacher 7-Lauren	07/31/2015	Phone Interview
Teacher 8-Grace	08/06/2015	At teacher's home
Teacher 9-Celeste	08/11/2015	At teacher's school
Teacher 10- Maddie	08/11/2015	Phone Interview

Follow-Up Interviews:

Participant (Pseudonym)	Date of Interview	Location of Interview
Teacher 1-Mary	07/23/2015	Email
Teacher 2-Emma	07/22/2015	Email
Teacher 3-Abby	07/29/2015	Email
Teacher 4-Taylor	08/05/2015	Email
Teacher 5-Helen	08/13/2015	Email
Teacher 6-Carly	08/13/2015	Email
Teacher 7-Lauren	08/09/2015	Email
Teacher 8-Grace	08/11/2015	Email
Teacher 9-Celeste	08/18/2015	Email
Teacher 10- Maddie	09/10/2015	Email

Focus Group:

Participant (Pseudonym)	Date of Interview	Location of Interview
Teacher 2-Emma	08/26/2015	At Public Library
Teacher 3-Abby	08/26/2015	At Public Library
Teacher 4-Taylor	08/26/2015	At Public Library
Teacher 6-Carly	08/26/2015	At Public Library
Teacher 7-Lauren	08/26/2015	At Public Library

B. An interview protocol was used for each of the interviews and the focus group.
    Participants were asked the same set of predetermined questions and probes,

though further prompts and questions were asked on an individual basis as needed.

C. The initial interviews were audio-taped and then later transcribed. A member check was conducted with each participant to verify the transcription.

D. The follow-up interviews were conducted through email. The same questions and probes were used with each participant, but further questions and clarifications were emailed to the individual participants.

E. The focus group was audio-taped and then later transcribed. An executive summary letter was sent to the five focus group participants for verification of the overall summary of the interview.

Data Analysis
Interview and Focus Group Transcripts

A. A case study database was constructed with the initial interview transcripts. I used the program Microsoft Office Word 2007 to organize and store data for this study. A question chart was created for each participant's initial interview transcript. The chart included the interview questions and probes, the participant's responses, the initial codes based from the conceptual framework and literature review themes, keywords, and comments/quotes.

B. I read through the transcripts and copied responses that corresponded with the interview questions/probes. I then highlighted keywords and phrases that matched the initial codes. During a second read, I highlighted additional words and phrases that were possible new themes emerging from the data. In addition, I highlighted quotes and copy/pasted them into the comment/quote column. Lastly, I wrote comments related to the data.

C. A researcher's journal was used to track personal connections, bias, dispositions, and assumptions concerning the data. Additions were made in this journal throughout the data analysis process across all three data collection tools.

D. After a third read, a list was created of non-examples. The list was later used to ask participants for further clarification.

E. A similar process was conducted for the follow-up interviews minus the transcribing process. Participant responses were placed into a question chart with all of the coding process done in the same manner as the initial interviews.

F. The same process was conducted for the focus group including the transcription of the audio-recordings.

G. Once all data had been entered into question charts for each of the three data collection tools, I generated a chart for each of the four related research questions and their corresponding questions/probes. The chart included the corresponding questions/probes from each tool, initial codes, keywords, and comments/quotes. Data was copy and pasted from the original question charts into the new charts.

H. I then looked for patterns across the data among the keywords column. Repeated or related words were color coded. These words were then organized by relationship.

I. I then looked for participant quotes as supporting data from the interviews. A chart was created to summarize each of the typological sets. The chart listed and defined the codes and matched these with participant quotes.

Interpretation of Data

A. Emerging themes were constructed based by first coding the transcripts from the initial, follow-up, and focus group interviews. Then after a coding chart was developed, categories were formed.

B. Five participants needed to be contacted to clarify initial interview data. Each provided the additional information via email.

C.

Validation of Data

A. After the initial interviews, the participants received a copy of their transcripts. They were invited to make clarifications and provide additional information.

B. Reflexivity was practiced by keeping a researcher journal and bracketing comments on the question charts that might be considered researcher bias.

C. A peer reviewer evaluated the research questions and data collection tools to ensure the questions were pertinent to elementary teachers.

D. An experienced qualitative researcher conducted an external crosscheck.

E. An executive summary letter was sent to the five participant focus group members. They were invited to make clarifications and provide additional information.

Appendix I: Sample External Cross Check Question Chart

This chart was sent to an experienced qualitative researcher, who coded the data for keywords and general emerging themes. The external cross check was conducted after I had coded the question charts.

Symbols: {} = grey highlighted data   * = Themes generated by the reviewer

Question	Participant	Response	Keywords	General emerging themes *
What developmental reading aspects influence when and how you determine to use mobile devices in your instruction? Probe: What made you decide if the technology would be easy to use during instruction? Probe: What made you decide if your instruction would be enhanced by using mobile devices?	1	In independent practice. I did {not have a lot of parent volunteers} this year so I would use {small group instruction} for new applications. One group might have been working on letter sound associations; another group might be working on listening to a story and comprehension and another group might have been working on phonemic awareness skills like rhyming. Then they would use them independently during our reading workshop The Reader's workshop is {more about reading strategies}	App simplicity for child and teacher Child able to work independently Content important Target needed skills Choose app based on own try out or recommendation from someone who used it App provides feedback	Assessment key – both pre-, formative, and summative Align app with child's needs and interests Technology = student engagement iPad seen as another resource beyond classroom instruction Variety of good apps available

Appendix J: Technology and Reading Instruction Terms

Term	Definition
Apple TV	A digital media adapter produced by the company, Apple. The adapter networks between Apple products and televisions.
BrainPOP	An on line program that provides access to educational movies, learning games and concept mapping to support reading and writing skills in content areas.
DRA Reading Level	The Developmental Reading Assessment book level system that identifies the degree of text complexity.
Daily Five	A structured literacy instruction format that includes five dimensions of instruction: read to self, work on writing, read to someone, listen to reading, and word work.
Developmental Reading Assessment (DRA)	A standardized assessment use for identifying a child's accuracy, fluency, and reading comprehension.
Level It Books	An application used to identify the reading level of books by scanning the book's ISBN numbers.
QR Codes	A bar code that can be scanned by a mobile device to retrieve information about a product or used as a link to a website.
Raz-Kids	Raz-Kids is an online program that contains eBooks at various comprehension levels.
Reader's Workshop	A framework for reading instruction that includes teaching mini-lessons, independent practice, and sharing time.
Smart Search Instruction	Lessons and activities led by school librarian to support digital literacy skills.