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EFFECTS OF READING APP USAGE

The Effects of Reading App Usage
On Reading Comprehension

By

Ashley Yang

A Graduate Field Experience
Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts
Urban Education
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2015

EFFECTS OF READING APP USAGE

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December 1, 2015
Date

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Abstract

This research study was carried out to explore the relationship between reading app use and the reading comprehension of kindergarteners. There were three participants in this study who were all kindergarteners in my classroom. Their ages ranged from five to six years old and all were high-level learners. Compared to the other students in the classroom, these three students were among the most advanced readers. A five-week long reading enrichment plan using a reading app for the iPad was conducted to examine how it would affect the three students' reading comprehension. The reading app, called Booksy, was used in addition to the core literacy instruction provided in my classroom. While the results from this study do not support the importance of using a reading app for improving kindergarten reading comprehension, it does not discount the usefulness of reading apps completely.

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Chapter One: Introduction

The following thesis is an investigation of the relationship between kindergarten reading comprehension development and the use of technology for reading instruction. It aims to shed light on how reading on tablets and using reading applications, also referred to as apps, impacts comprehension for young readers. As the technology for mobile devices become more sophisticated and cost continues to drop, these devices become more available to schools across the United States. With an increasing number of learners of all ages now using mobile devices in some way, it is important to explore how the integration of technology can affect, and even shape, reading for young learners.

This study presents five chapters. The first chapter is an introduction to the case study. The second chapter provides a summary of the related literature. The third chapter outlines the procedures for this study in my classroom. The fourth chapter details the results of this action research. The fifth chapter is a discussion about conclusions that can be drawn from this study and implications for future research.

This first chapter includes two sections. The first section briefly introduces the three student participants of this study and explains related academic information. The second section describes the current context of mobile devices used for learning in classrooms. To protect students' privacy and confidentiality, I refer to the participants as Student 1, Student 2, and Student 3 throughout and no identifying characteristics are mentioned.

Introduction of the Students and Context for Learning

The students chosen for this study, Student 1, Student 2, and Student 3, were all kindergarteners from the same classroom at an urban, public charter school in the

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Midwestern United States. As of September 2015, Student 1 was six years and seven months old, Student 2 was six years and six months old, and Student 3 was six years and five months old. All three students attended prekindergarten at the same school the previous year and have not repeated kindergarten before. At the time of this study, none of the students received special education services and had not previously had an Individualized Education Plan. None of the students had any identified medical conditions, information processing delays or difficulties, or emotional/behavioral disorders and did not receive accommodations for learning.

These three students all demonstrated above grade level performance in reading and math. During literacy centers, they were grouped by their ability level and worked together in a small group. They also read together in the same group during guided reading. Once a week for 30 minutes, they received reading enrichment from an educational assistant outside of the classroom. Additionally, they worked on Compass Learning—a software that prescribes individualized learning plans for student—twice a week for 45 minutes in the computer lab. The students worked on reading and math during this time. Finally, twice a week for 45 minutes, students engaged with reading and math applications on iPads.

In kindergarten, all three students took the Measures of Academic Progress (MAP) assessment in the fall, winter, and spring for reading and math performances. Here, I present each student scores for reading from the fall to the spring along with the kindergarten national averages for each testing period. A comparison of each student's scores to the national averages is also given. Student 1 scored 142, 149, and 161. Student 2 scored 161, 163 and 182. Student 3 scored 156, 183 and 174. With a national average

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of 142.5 for kindergarten reading in the fall, Student 1 was on grade level and Student 2 and Student 3 were above grade level. The national average in the winter was 151, which means Student 1 was below grade level and Student 2 and Student 3 were above grade level. Compared to the national average of 157.7 for kindergarten reading in the spring, all three students were well above grade level.

The Phonological Awareness Literacy Screening (PALS) assessment, designed to identify students in need of additional reading intervention and to inform instruction, was administered in the fall and spring. The summed score benchmark is 28 for the fall and 81 for the spring. All three students scored well above the fall and spring benchmarks, which indicate mastery of kindergarten phonological awareness and phonics skills. Since these three students had developed the necessary skills they needed to decode words and read fluently at the kindergarten level, my primary focus with them was on reading comprehension. During guided reading, I noticed that they were able to ask and answer questions and provide retellings of the texts that they read on a very basic level. All three of them needed additional instruction and practice with making inferences and providing more detailed responses.

Student 1, Student 2, and Student 3 were hardworking students that enjoy learning and being at school. All three were very sociable students who care about their classmates and their teachers. These students worked well independently and were usually on-task during work time. In terms of social-emotional development, these students were among the most mature in their class. The students interact well with their peers in the classroom and during playtime at recess. The implications for instruction were that Student 1, Student 2, and Student 3 would do well during whole group instruction and in small

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groups with a variety of students. They also worked well with different adults in the building. From my observations in the classroom, I can conclude that their socio-emotional development positively impacted their learning in kindergarten.

Mobile Devices for Learning

It is nearly impossible to ignore the changing landscape of learning as the adoption of technology in classrooms continues to grow. Edutopia, a nonprofit organization that advocates for the use of innovative strategies to positively impact student achievement, published a guide about mobile devices in the classroom. The guide states, “The Common Core State Standards call for students to develop digital media and technology skills. One way to help them reach that goal: incorporate gadgets they’re already familiar with—cell phones, tablets, and smartphones—into their learning environment” (Robledo, 2012, p. 1). As an increasing number of schools work to develop digital learning skills in their students, classrooms of all types—from urban to rural, general education to special education, early learning to secondary education—have seen a dramatic growth in the use of mobile devices for learning.

While leveraging technology to drive the needle on student achievement seems like a natural next-step in education, educators have had to consider how technology will affect the process of learning. Concerns that devices are distracting to students have certainly come up, but many have actually found that students are very engaged by learning with technology and enjoy using the devices in the classroom. Currently, students are engaging with many different mobile devices in school, including cell phones, e-book readers, mp3 and portable media players, tablets, smartphones, and laptop computers.

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With so many types of devices to choose from, decision-makers have to determine which ones will best support student learning. Different devices fulfill different purposes and are not generally designed to replace others, but to compliment them. For example, tablets are most often chosen for hands-on learning experiences because they feature tactile elements like using fingers to zoom or navigate through highly interactive apps (Daccord, 2012). The laptop, on the other hand, provides a platform for collaboration that can be more suitable for older students. Another attractive feature is the keyboard on laptops that allows students to develop their keyboarding skills that are essential to productivity both in and out of school (Murphy, 2014). Second-generation Apple iPads were used for this study.

Conclusion

Student 1, Student 2, and Student 3 are high-performing students who receive reading enrichment in kindergarten. At the time of the study, they had demonstrated mastery of kindergarten level phonemic awareness and phonics skills and sight words. While continuing to develop those skills, my main focus for reading instruction for these students was on reading comprehension. Understanding what is read and making meaning from texts are crucial to a student's academic successes and are also skills we rely on every day to navigate through the world. In a comprehensive review on the research surrounding reading comprehension instruction, Butler, Urrutia, Buenger, and Hunt (2010) affirmed this fact stating that:

Comprehension becomes especially important to students in the later elementary grades because it provides the foundation for further learning in secondary school. A student's academic progress is profoundly shaped by the ability to understand what is read. Students who cannot understand what they read are not likely to acquire the skills necessary to participate in the 21st century workforce (pg. 1).

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While the landscape of learning continues to change with the steady growth of technology in classrooms, students are still required to learn how to read. As more and more schools adopt digital learning initiatives, new questions about how these different digital devices can impact the reading process and the process of learning to read are raised.

The following literature review begins with a brief overview of the role of technology in teaching foundational reading skills. It focuses on how some have chosen to integrate technology with reading instruction and the lessons that were learned from those experiences. This review will also look at how these technologies specifically influence reading comprehension. It explores how reading on tablets and using reading applications affect comprehension for readers, ranging from kindergarten to high school. The topics examined in the second chapter guide the research design and procedures that follow in this case study.

Chapter Two: A Review of the Literature

In an interview with NPR Daniel Willingham—a professor of psychology at the University of Virginia whose research focuses on the application of cognitive psychology to K-16 education—said, “I think I gain experiences I wouldn’t gain any other way by virtue of being a reader” (Turner, 2015). The experiences that young, fluent readers share with books are not only times of joy and exploration, but are also important to their future successes in school and adulthood. Yet *The Nation’s Report Card* revealed that in 2011, 67% of fourth grade students scored Basic or Below Basic compared to the 34% of students who scored Proficient or Advanced on the reading assessment (National Center for Education Statistics, 2013). In 2013, 65% of fourth grade students scored Basic or Below Basic compared to the 35% of students who scored Proficient or Advanced on the reading assessment. The numbers, while alarmingly low, are a part of a decades-long trend of underachievement in one of the most developed countries in the world.

The perturbing lack of quality reading education in our country has spurred federal-level efforts to support school districts in the form of grants to fund reading initiatives. When the No Child Left Behind Act of 2001 was signed into law it also created Reading First and Early Reading First—programs that were devised to support effective reading instruction in classrooms. The mission of Early Reading First is to “ensure that all children enter kindergarten with the necessary language, cognitive, and early reading skills for continued success in school” (U.S. Department of Education, Office of Early Learning, 2014). The funds from these grant programs require grantees to integrate scientifically based reading research into all aspects of their reading instruction

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programs including instruction materials, teaching strategies, curricula, parent engagement, and professional development.

The push to improve reading instruction has brought about new and innovative strategies for teaching reading, including the integration of technology. Different kinds of computer software and apps for tablets have been developed for use as a part of classroom reading instruction. This chapter is a survey of the literature relating to how technology has been used to teach reading and how reading on digital devices affects reading comprehension. It begins with a look at how integrating technology with reading instruction impacts the development of an early reader's foundational reading skills. Next, the chapter explores different ways that technology has been used in the classroom for reading instruction. It also focuses on whether or not reading on digital devices affects reading achievement and engagement when compared to reading print-based texts. Finally, the chapter seeks to understand how the instructional use of reading apps can affect reading comprehension.

Foundational Reading Skills and Technology

This section of the literature review concerns itself with the use of technology and the role it plays in the development of foundational reading skills in emergent readers. The first study deals with the instruction on phonemic awareness and the alphabetic principle, both prerequisite skills that young readers need to develop before they can learn to read fluently. The second study is about the language and literacy of young readers as they relate to vocabulary, story comprehension and word reading.

In a quasi-experimental study about the impact of iPad technology on emergent literacy skills, Cubelic and Larwin (2014) examine the acquisition of phonemic

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awareness and the alphabetic principle when students interacted with literacy-based apps. The researchers caution readers that, “Technology, while an appealing addition to the classroom experience is not the panacea for education, but simply a tool that can or cannot be used effectively in support of instruction” (Cubelic & Larwin, 2014, pg. 48). Ultimately, the purpose of this study was to learn whether or not there is value to committing instructional time and resources to the use iPad 2 applications in kindergarten classrooms.

The researchers assert that, “The charge for schools is to provide an atmosphere in which the curiosity of 21st Century learners, accustomed to stimulating environments and immediate gratification, often at the hands of technology, can be embraced and fostered” (pg. 50). It is this current educational context that prompted Cubelic and Larwin to investigate the impact of iPad technology integration on early literacy skills, as measured by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment.

The independent variable for this study was the integration of iPad technology with existing kindergarten literacy instruction. The dependent variable was the development of phonological awareness skills. The researchers focused on the four specific phonological awareness skills that DIBELS measures: Letter Naming Fluency, First Sound Fluency, Phoneme segmentation Fluency, and Nonsense Word Fluency. To minimize the effect of extraneous variables Cubelic and Larwin controlled for class size, the type of kindergarten program (full day), teacher technology proficiency, time and frequency of DIBELS administration and the person administering the DIBELS assessment.

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The researchers used nonrandom sample selection to select 16 kindergarten classrooms for this study. They invited 27 districts to complete a questionnaire to obtain information about kindergarten education in their respective districts. Cubelic and Larwin were looking for schools with multiple kindergarten classrooms, a full day program, heterogeneous grouping, and the use of learning centers as a part of the literacy instruction. The classrooms—two from each district to serve as a control and an experimental group—were chosen from eight school districts across a three county region in northwestern Pennsylvania. The eight control classrooms had a total of 164 students and the eight experimental classrooms had a total of 169 students. The researchers state that the students were from racially and economically diverse populations, but did not indicate that they controlled for race or socio-economic status for this study.

This study began in the fall “immediately upon establishing the classroom structure and procedures” and concluded in the spring (pg. 52). Each district that participated in this study received five iPad 2 tablets. All teachers in the intervention classrooms group attended training for three days to learn how to use iPads for literacy instruction. During this time, these teachers selected five apps to support the four skills measured by DIBELS. Students in the intervention group were taught how to use the apps, one by one, and received sixty minutes per week of iPad instruction during literacy centers. It should be noted that both the control and experimental group received the same amount of early literacy instruction time, however, the latter received part of that instruction time through the use of iPad apps. Therefore, time on the iPads was considered instruction, not supplemental intervention.

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To get baseline data, the DIBELS assessment was administered in the beginning of the school year. It was administered again in January and for a third time in the spring. The data indicated that students in the control group made greater gains in Letter Naming Fluency than the experimental group. Results for First Sound Fluency were not statistically different between the two groups. Finally, the results showed that the experimental group made greater gains than the control did for Phoneme Segmentation Fluency and Nonsense Word Fluency—both of which are high-order, challenging skills for kindergarteners to master.

Cubelic and Larwin state that, “The quality of instruction is heavily influenced by the instructional tools and materials available to teachers... This factor alone substantiates the need to explore instructional tools, such as iPads, to impact student achievement” (pg. 57). From there, they concluded that the outcomes of integrating iPad instruction into literacy instruction were promising. The results showed that the integration of iPad apps into literacy centers had a positive impact on the development of high-order phonological awareness skills. Finally, they posit an inverse relationship between teachers’ experience levels and levels of student growth. Cubelic and Larwin noticed that the least experienced teachers in the experimental group saw the greatest gains in phonological awareness skills. Ultimately, the results and implications from this research suggest that investing time and resources into iPad integration can be beneficial to the development of early literacy skills for kindergarteners.

This second study explores how reading an electronic storybook affects the language and literacy of Israeli children in kindergarten and first grade. Korat (2010)

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developed an educational e-book¹ for this study and asked the following research statements: “(1) Whether our educational e-book can support young children’s vocabulary, story comprehension and early word reading, and (2) whether this support differs for kindergarten children compared to first graders” (pg. 25). He made three hypotheses. First, both kindergarteners and first graders would benefit from reading the e-book compared to the control group. Second, the older students would make greater gains in vocabulary learning and word reading when compared to the younger students. Finally, first graders would have higher story comprehension.

Korat was interested in seeing how the use of an interactive e-book at school would affect kindergarten and first grade students’ language and literacy. To analyze any effects on language and literacy, the researcher used an assessment for measuring word meaning and one for word reading. Since the participants came from schools located in middle socioeconomic status (SES) neighborhoods, they shared several common factors: SES status, age, grade in school, and previous exposure to using computers individually and in small groups (as a part of their school’s curriculum).

The participants were from ten classes from several different schools. Five were kindergarten classes ($n = 40$; 19 girls and 21 boys) and five were first grade classes ($n = 50$; 27 girls and 23 boys). The participants were randomly assigned to a control group and an experimental group with 20 students in each group for kindergarten and 25 students in each group for first grade. The e-book chosen for this study is an electronic version of the printed book *Yuval Hamebulbal (Confused Yuval)* by M. Roth (2000). Korat justified his choice for using his e-book saying that, “The story’s structure and simple narrative

¹ “Which was aimed at supporting the early literacy development of preschoolers who have not yet formally learned reading and writing as well as of school beginners who have already begun this process of learning at school” (pg. 25).

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elements—setting, characters, goal/initiating event, problem and solution/ending—appear eminently suitable for the participants’ age” (pg. 27). Although the title of the book was in Hebrew, the text itself was presented in the English language.

The students in the intervention group participated in five e-book reading sessions lasting 20-25 minutes while the students in the control group received normal kindergarten/first grade instruction. Students were given instruction on how to use the software and different functions of the e-book. They were pulled from their classes, three at a time, to read the e-book on a computer on the “read story with dictionary” mode, which included an oral reading of the printed text. Children’s vocabulary and word reading of the e-book’s target words were measured both before and after the intervention. Story comprehension and story production were only measured after the intervention. All four measures were administered on an individual basis.

The results confirmed Korat’s assumption that both kindergarteners and first graders would benefit from the e-book intervention when compared to the control group who received the school’s reading program. Korat also assumed that first graders would demonstrate higher comprehension when asked to retell a story when compared to kindergarteners. However, test results indicated no significant differences between the comprehension levels of these two grade levels. While these results are promising, the middle SES background of all the participants means that Korat’s sample was not representative of the broader population of students. Thus, the results cannot be used to make conclusions about the possible effects of e-books on the language and literacy of students from lower SES backgrounds.

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Korat concluded that kindergarteners and first graders both benefit from using interactive e-book software to read, even only with limited exposure to the intervention. He proposed that, “Providing children with the written text together with synchronized narration accompanied by animated pictures and sound effects that relate directly to the storyline, providing a living dictionary with multimedia meaning of rare words, all seem to comprise good support for children’s literacy development” (pg. 30). Therefore, teachers looking to integrate reading software and e-books into their reading instruction need to carefully consider all the different features in order to best meet their students’ needs. We can conclude that it would be beneficial for teachers to first identify students’ strengths and weaknesses before selecting a reading software or app to use as a part of the class reading instruction.

While Cubelic and Lawrence used centers-based implementation model for technology and Korat used a small-group pull out model, both studies come to the conclusion that incorporating technology with literacy instruction can have a positive impact on the development of foundational reading skills in emergent readers. Cubelic and Lawrence’s study went from the fall to the spring and Korat’s study was based on five reading sessions. Despite the differences in amount of time that students were exposed to technology-based reading interventions, both studies find that technology can improve learning outcomes for students.

Integrating Tablets with Reading Instruction

While the previous study was concerned with how iPad use influenced the development of foundational literacy skills, this section reviews three research studies that focus on the effects of reading on an e-reader or digital device (such as the iPad,

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Google Chromebook, Kindle Fire) on reading achievement and engagement. There is not much debate that reading printed text is different from reading texts on digital devices. Much research has been devoted to understanding how these two different modalities of reading can impact the process of reading, especially as it relates to classroom learning.

In the first study, Hutchinson, Beschorner, and Schmidt-Crawford (2012) studied how the integration of digital learning into literacy instruction would affect reading, writing, and communicating skills. The authors used a case study research design to investigate how a fourth grade teacher could most effectively integrate iPads into her literacy instruction to teach print-based and digital literacy based goals.

The integration of iPad apps into Mrs. Dill's literacy instruction was the independent variable. Student reading comprehension—in the following areas: independent reading, sequencing, visualization, retelling, cause and effect, and main idea and details—was the dependent variable. The researchers and Mrs. Dill's observations anecdotal notes were used as data and evidence for the discussion section. Since this research was a case study of one classroom and one teacher's practices, Hutchinson, Beschorner, and Schmidt-Crawford did not control for extraneous variables.

The participants of this research included Mrs. Dill and her 23 fourth grade students. The researchers selected Mrs. Dills and her classroom as the participants of this study because of her experience with technology integration and her desire to increase the level of technology integration in her classroom. While the researchers did not provide much information regarding the background and demographics of the students, they did reveal that the students worked in pairs or small groups while using iPads to develop reading comprehension skills.

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Mrs. Dill's goal for this study was to enhance her student's learning opportunities by providing them with the chance to practice new literacy skills on the iPad while also continuing to teach the print-based literacy goals in her reading curriculum. The researchers and Mrs. Dill designed the instructional activities for each lesson according to Harris and Hofer's (2009) recommendations for technology integration and then selected iPad apps that would best meet the students' learning goals. Separate apps were selected for each of the reading comprehension skills mentioned above. For the reading lessons during the three-week research period, the students read an assigned text and then used the accompanying iPad app to practice the reading comprehension skill being addressed.

The researchers found that Mrs. Dill successfully achieved curricular integration according to the Harris and Hofer's recommendations. They refer back to observation notes from lessons to provide evidence of curricular integration, "During the lesson on sequencing ideas, the students learned how the size and placement of the boxes on the screen helped convey meaning. Similarly, students learned to digitally communicate with other readers in class by leaving a sticky note, in the digital books they read using the iBooks app, for future readers" (Hutchinson, Beschorner & Schmidt-Crawford, 2012, pg. 15). The researchers also discovered that in addition to iPads supporting student learning, the students were highly engaged during lessons and found creative ways to respond to the texts they read.

While the researchers drew broad conclusions about the effects of iPad integration on literacy instruction three-week study, this research provided detailed explanations of how to develop reading lessons that use iPads in a meaningful way. Hutchinson, Beschorner, and Schmidt-Crawford noted that when students encountered issues while

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using the iPads, they were able to work together to resolve the problems. They also noticed that students unintentionally engaged functions on the iPads because of the sensitive touch screen. This kind of information can be valuable to educators that are integrating iPads with literacy instruction and also provides school leaders with insight about the payoffs of investing in iPads for the classroom.

The second study is a report commissioned by the North Central Regional Educational Laboratory Center for Technology to examine interventions using digital literacy tools to develop and improve the reading performance of middle school students. Pearson, Moran, Ferdig, and Blomeyer Jr. (2008) conducted a research synthesis of experimental and quasi-experimental studies within the last 15 years. The five specific areas of reading performance examined were: strategy use, metacognition, reading motivation, reading engagement and reading comprehension.

The studies in this report were subjected to a peer review process, included students in the middle school levels, reported outcomes assessing the impact of a treatment on reading performance, used an experimental or quasi-experimental design, and were published between 1988-2005. The participants of the studies were middle school students in sixth, seventh, and eighth grade. It is important to note that the authors included studies from many countries, languages, and cultural ranges in order for this report to be inclusive.

To find the studies that would be included in their meta-analysis, the authors performed a comprehensive search of databases, journals, websites, and bibliographic resources. The goal was to find the maximum number of studies and articles that met the

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inclusion criteria described above. Only 20 articles met the stringent inclusion criteria and were used for this report.

Through the course of this study, the researchers found that they were only able to locate sufficient data to adequately address one of the five areas of reading. Based on the empirical evidence they collected, the researchers stated that comprehension was the most common measure of reading performance outcomes. They concluded that, “The overall positive impact of technology environments, especially on comprehension outcomes, should prompt us to feel comfortable in recommending broader implementation of programs that have undergone careful evaluations of their effects on student learning” (Pearson, Moran, Ferdig & Blomeyer Jr., 2008, pg. 20). Their findings suggest that digital technologies did enhance the reading comprehension of middle school students.

This report provided insight about the effectiveness of integrating technology with literacy instruction. The authors made several recommendations for implementing digital literacy tools in schools and also put forth considerations for policy makers. According to this meta-analysis, the authors found that commercial programs for reading interventions have a modest impact on the reading performance of students. This means that schools considering the adoption of digital literacy tools need to carefully evaluate the efficacy of those tools before investing in them. Their data also suggested that positive outcomes for struggling readers are harder to come by with the use of digital literacy tools when compared to students without reading difficulties. We can conclude that schools also need to consider the population of students who will be using the digital technologies when making decisions about integrating technology with literacy instruction.

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In the third study, McKenna (2012) explored how two elementary classrooms implemented an iPad initiative to drive student achievement. The researcher was primarily interested in defining the different kinds of technologies being used in elementary classrooms in California and sought to identify possible disadvantages of using iPads in the classroom too. The following research questions guided McKenna's research: "How does the use of an iPad enhance student learning in two elementary classrooms? How does student achievement increase through the use of an iPad in two elementary classrooms?" (2012, pg. 137)?

The use of iPads during whole group math and language arts instruction was the independent variable for this study.² Student learning and achievement as measured by student engagement in minutes and student reading fluency was the dependent variable. McKenna states that control groups were not used because of the age level of the students. Therefore, the entire class either used iPads or did not use iPads during observed lessons during the three-month study.

The participants of this study were students from a one-school school district in a small community in the Central Valley of California. The school was a K-8 public school with approximately 100 students. 56% of the students at the school received free and reduced lunch and 7% of the students were English Language Learners. This study focused on two classrooms. One classroom was a first grade class with 18 students and the other classroom was a second and third grade combination class with 20 students. The

² McKenna's research includes findings about student achievement in English Language Arts and mathematics with the use of iPads. For the purpose of this literature review, I report McKenna's results as they pertain to reading achievement.

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teachers of both of these classrooms were first year teachers who used iPads everyday during instruction.

McKenna used an experimental research design for this study. Data collection began in January 2011 and lasted for three months. To investigate the effects of iPads on student learning in these two classrooms, McKenna observed both iPad and non-iPad lessons. The observed lessons were approximately 45 to 60 minutes long and included instruction and activities in math and reading/language arts. Each classroom had its own set of iPads. Each student was assigned a specific iPad for the duration of the study so that he or she could annotate and save his or her work during each lesson or activity. The data was collected through researcher and teacher observations, student interviews and student work. Anecdotal information was collected from the teachers before data collection in December 2011 to qualify quantitative results and determine teacher attitudes toward using iPads in the classroom.

During the study, both teachers recorded observations about student engagement in a log. The two teachers noticed that students were engaged more often during lessons that used iPads than they were during lessons that did not use iPads. According to the teachers' and researcher's observation logs, the average number of minutes of student engagement increased when students used iPads during math and reading lessons in both classrooms when compared to traditional lessons. McKenna also found that the average reading fluency, the accuracy and speed of reading, of first graders and second graders increased at "a rate considered normal for that same period of time" (pg. 140). These findings support the claim that iPads have a positive effect on student learning and achievement.

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McKenna notes that despite the overall gains in learning and student achievement with the use of iPads, there were times when the iPads became a distraction to whole group instruction. He proposes that iPads might have been a distraction to the students because of their grade level and age. However, McKenna also points out that the lack of both teacher professional development for incorporating iPads with instruction and powerful wireless infrastructure may have played a role in the complicated implementation of digital learning at the school. As a result of technical difficulties, students worked collaboratively to resolve issues throughout the learning process.

McKenna concluded that the benefits and gains in student achievement outweighed the initial setbacks that occurred during the implementation of iPads in the two classrooms. It is important to consider that as schools continue to invest in wireless infrastructure and provide targeted professional development for teachers, the payoffs of using iPads will continue to increase as well.

All three of these research studies explored how integrating digital devices with classroom language arts instruction can influence student reading achievement and engagement. While the grades included in the research studies ranged from first through eighth, the researchers come to the similar conclusion that technology-rich learning environments have the potential to positively impact reading outcomes. Hutchinson, Beschorner, and Schmidt-Crawford (2012) state, “We believe that this study provides literacy teachers with a portrait of the viability of the iPad as a response tool” (pg. 18). In a similar vein, Pearson, Moran, Ferdig, and Blomeyer Jr. (2008) argue that despite some technical difficulties that students experienced, they feel comfortable recommending the broader implementation of technology programs in schools. Finally, McKenna found that

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teachers noticed student higher engagement during lessons that utilized iPads. An important consideration that all the researchers raised is that, regardless of the type of digital device being used in the classroom, proper technology integration is a key factor to maximizing reading gains.

The Effects of Technology on Reading Comprehension

The previous section examined how integrating technology with language arts instruction can impact reading outcomes for students at both the elementary level and the middle school level. The following section is a review of seven research studies that investigate how comprehension—both listening and reading—is affected by the use of technology. Since the ultimate goal of reading instruction is to develop strong reading comprehension skills so that students can create meaning from texts they read, it is important to take a closer look at this specific area of reading performance as it is shaped by technology.

The first study by Ciampa (2012) explores the effects of online electronic storybooks (also referred to as e-books) on the reading motivation and listening comprehension of first grade students from Ontario, Canada. The author asked the following research questions: What are the effects of the online reading program on first grade children's attitudes toward online reading? What are the effects of the online reading program on first grade children's listening comprehension? What are the effects of the e-book question/answering tasks on first grade children's listening comprehension and reading engagement?

This investigation was designed as six single-case studies to serve as an “explanatory tool” for studying the impacts of an online reading program on

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comprehension and reading attitudes (Ciampa, 2012, pg. 33). The independent variable is the use of the ICANREAD online reading program as a supplemental reading intervention. The dependent variables are listening comprehension, cognitive strategy use among primary grade children, and attitudes toward online reading. Since this study consisted of six case studies Ciampa only controlled for age, grade level, and geographic region.

She recruited six first grade participants through convenience sampling, meaning that the participants selected for inclusion in the research were the easiest to access. All of the students were seven years old at the time of the study and came from the same suburban school district and geographic region of Southern Ontario Canada. Five students were Caucasian and one was African-American, and all were English-speaking. None of the students received special education services or additional reading interventions in school.

Ciampa organized a pretest session, 12 e-book reading sessions, and a posttest session over a period of three months for each participant during after-school hours in an Internet-equipped room. The ICANREAD e-book materials used as interventions for this study were specifically designed by Ciampa to supplement classroom literacy instruction. To gather baseline data, the researcher had each student individually complete a listening comprehension test and a questionnaire to assess each student's reading motivation toward print-based and electronic texts. Each participant worked individually next to Ciampa. In the final session, each student participated in a different version of the listening comprehension test and the same motivation questionnaire.

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According to the “My Motivation to Read Questionnaires” pretest results indicated that picture books and e-books were the most preferred type of reading material for the majority of participants. The posttest results indicated that e-books became the most preferred reading choice. This demonstrates that over the course of the study, the students developed a preference for reading e-books over print-based books. According to the Gray Oral Reading Test (GORT-4) all participants made gains in listening comprehension. The total pretest mean score of 49.2% and posttest mean score of 71.7% are evidence of a dramatic increase in the average listening comprehension of all six participants. Finally, the observation data revealed all participants were highly engaged and on task during each of the reading sessions.

The author makes the claim that creating technology-rich classrooms for literacy learning are important for maximizing gains in reading achievement. The results indicated that providing students with a large variety of reading choices might have an impact on reading engagement, which in turn, affects listening comprehension. If students are given choice about the format of the texts they read and the types of text they read, then they are more likely to enjoy reading. A high level enjoyment leads to a higher level of engagement in learning to read. Ciampa also states that the interactive features of e-books (read aloud, moving words, and highlighted text) were particularly interesting to the participants. Despite the benefits of an electronic reading instructional program, school leaders and teachers need to consider the quality, quantity, and the purpose of the e-books they incorporate into their classroom literacy instruction.

The second study is a special report commissioned by Renaissance Learning, Milone (2011) that investigated how electronic reading devices (such as e-readers and

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tablets) affect a reader's comprehension. As more and more schools adopt electronic reading devices, researchers are searching for definitive answers surrounding question about reading comprehension and e-readers. Milone asked the following research questions: "Was there a difference in students' comprehension of books read in Kindle versus traditional print formats? Did students' reading proficiency relate to their differential understanding of the books in the two formats?" (pg. 3). The answers to these questions are crucial to better understanding reading comprehension as it is influenced by different modalities of reading.

The independent variable for this study was student reading comprehension as measured by the computer-based Accelerated Reader assessments. The dependent variable was the format of a text, either electronic or print-based. The research design for this study does not involve an experimental and control group. Therefore, a participant's reading comprehension results from reading on an e-reader are compared to that same participant's reading comprehension results from reading a traditional print text.

The study involved the majority of students from two fourth grade classrooms from a school in the Upper-Midwest. A few students were excluded from the study because their reading proficiency did not qualify for inclusion in the study. There were a total of 31 students in the study. The participants read up to six books, alternating between the Amazon Kindle e-reader and traditional print-based formats. The books selected for this research were fiction titles that matched students' reading proficiency as measured by the STAR Reading assessment. The participants read a total of 135 books, 69 of the books were on the Kindle and 66 of the books were in print.

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Milone noted several features unique to this research. He explained that most students read several books in both Kindle and traditional text formats. The study also took a “naturalistic approach to student participation” (pg. 4), meaning that the students were allowed to read the kind of books they would typically read during times and in a setting they would normally read in. Books for the study were chosen based on students’ reading proficiency, length, popularity among boys and girls, and availability in Kindle and print formats. The study began in early April after spring break vacation and ended during finals week in May. When students finished reading each book they took an Accelerated Reader Reading Practice Quiz on the computer to check their understanding of the text. At the end of the school year, students completed a survey about their experiences reading on e-readers, which included questions about their book and text format preferences.

The researcher calls attention to the varied levels of participation as a result of choosing to use a naturalistic approach for this study. Therefore, twelve of the 31 students read six books, 4 students read five books, and the remaining students read four books or fewer throughout the course of this research. Milone states that there was no statistical or practical difference in comprehension between reading on Kindles and reading traditional print-based texts. Based on the Accelerated Reader comprehension assessments, the average percent correct for books read on the Kindle was 88% and the average for print books was 88.5%. The mean difference between the two types of texts was just 0.5%. The students were also asked to respond to a survey of several questions to capture their attitudes about the format of books because “the user experience is so important to comprehension and motivation” (pg. 6). Milone argued that the student responses

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reflected the presence of a “novelty effect” related with using technology rather than traditional print-based texts.

The results of Milone’s research on the effect of text formats on a student’s reading comprehension are consistent with previous research on the same relationship. Besides concluding that there is no statistical difference in students’ comprehension of texts read on a Kindle versus in print, the results also suggested that students reading at different levels were able to comprehend texts in both formats at an equivalent level. From the student survey responses, Milone hypothesized that the novelty effect of e-readers might play an important role in motivating students to read more and explore a larger variety of topics and genres that they might not have previously considered.

Finally, Milone pointed out two limitations to this study. The first limitation is that the results of this study cannot be generalized to reading on all digital devices (like smartphones or online reading). The second limitation is that students read narrative texts, not informational texts. Since the Common Core State Standards places a heavy emphasis on information texts, a separate study specifically about reading comprehension of informational texts on e-readers needs to be conducted.

The purpose of this third research study included in this section was to find out if readily available technology features on e-book readers—such as animation, highlighting, dictionary, thesaurus, etc.—would support students’ reading comprehension. As more and more individuals make the shift to reading digital texts, the body of research surrounding electronic reading systems suggests that there are similarities and differences in reading performance and comprehension in digital formats compared to print-based texts. Wright, Fugett, and Caputa (2013) stated that the intent of their study was not to

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endorse the opinion that e-books should replace print-based texts for children, but rather to investigate whether or not e-books are a more effective alternative option to reading.

The participants of this study engaged in reading, using both iPads and traditional print-based texts. This type of research design does not identify independent and dependent variables. However, the researchers stated that, “variables that were considered to be influential in affecting outcomes were the alertness level of participants, interaction of participants, and amount of time allotted for reading” (Wright, Fugett, and Caputa, 2013, pg. 371). While these were not the variables being studied, it is important to consider their effects when analyzing the data. The researchers also identified constant variables between the participants. None of the participants had a history of special education services, were from middle socioeconomic status families, spoke English as the primary language at home, and had access to computers at home. Additionally, none of the participants had previous exposure to the texts used in this study or had a history of using e-reading systems.

The participants for this study were recruited through word-of-mouth at the Mary K. Chapman Center for Communicative Disorders on the University of Tulsa college campus. To determine eligibility for participation in the study, parents completed a questionnaire and children completed hearing screening, language assessment, and reading assessment. The participants were the first three students who met all of the eligibility criteria and volunteered to participate in the study. These individuals were three female students enrolled in the second grade between 7 years and 0 months to eight years and 11 months old. The participants scored within normal limits for their age in language skills and reading skills.

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Wright, Fugett, Caputa used an AB experimental design between reading on iPads and reading print-based texts, which meant that each participant served as their own control in both conditions. Each of the students participated in four reading sessions over a three-week period for one and a half to two hours per session. During the first two sessions, the participants used print-based text to read a story. During the last two sessions, the participants used an iPad to read a story. Before the first and third sessions, the students were instructed on how to use available resources (dictionary, thesaurus, word pronunciation) for each reading method. The participants read in the same room at the same time in individually chosen reading spots. They were not allowed to interact with each other while they were independently reading and completing comprehension quizzes. In order to limit general fatigue, the participants attended reading sessions on days that they did not have school.

The researchers collected two sets of data for analysis. The first data set was the number of times literacy resources were used by type of reading method and the second data set was reading comprehension by reading method. Wright, Fugett, and Caputa discovered that the three participants utilized more literacy resources when they were reading in an electronic format. Additionally, they found that the participants scored higher on reading comprehension quizzes when reading print-based texts. However, statistical analysis indicated that the results were not significant. The results supported the authors' hypothesis that children would use reading support resources more often while using an e-reader. The results did not support the hypothesis that e-readers would increase children's reading comprehension.

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According to the researchers' observation notes, the participants consistently spent a longer amount of time reading on iPads in comparison to print-based texts. This leads them to suggest that this observation could "challenge the understanding that children born in the new generation are able to automatically adapt to electronic use" (pg. 374). They also noted that all three participants reported that their reading experiences were more enjoyable when reading on iPads. This leads the researchers to conclude that the results from the research support the use of e-readers in the classroom. Using e-readers in the classroom could engage students who do not enjoy reading traditional print-based texts and also encourage students to access a greater amount of reading support resources.

This fourth study set out to investigate the effects of using an iPad as an e-reader on reading comprehension and engagement for Year Six students (11-12 year olds) in Australia. Sheppard (2011) identified two questions that guided his research: How do the features of an electronic book make a difference to the level of student engagement and would this improve their understanding of the text? Was there a significant change in the way students processed content when reading an electronic book? (pg. 13). Sheppard's intent was to provide researched-backed information about iPads and reading instruction for teachers who are considering using iPads their classrooms.

The independent variable for this study was using iPads to read texts. The dependent variables were student engagement during reading instruction and student understanding of texts, which I take to mean student reading comprehension. The constant variables that emerged as a result of the group of students selected for this study were gender, age, and grade level. Additionally, the duration of the reading sessions and

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the number of times the sessions met per week were the same for both the experimental and the control group.

This research project had a total of 43 participants who were all Year Six students, all boys between the ages of 11 and 13 years old. These participants came from two different classrooms from the same school. The first class had a total of 21 students and the second class had a total of 22 students.

This study collected data from the two Year Six classes before and after they read two prescribed texts. Class 1 read the first text using print-based books and Class 2 read the same text using iPads. Then Class 1 read a second text using the iPads and Class 2 read the same book in the traditional print-based format. Throughout the course of this study, the students participated in three reading sessions each week that included instruction, reading, and activities. Each session was between 45 to 60 minutes long. Students were assigned to a specific iPad for the duration of the study so that they were able to annotate their e-book texts. Pretests were administered to collect baseline reading achievement data, which was later compared to posttest results. Additionally, Sheppard collected qualitative data from formal and informal interviews and attitudinal surveys during the course of this study to measure attitudes towards reading and student engagement during reading instruction.

The results from this study suggest that the group of participants, from the outset, had a positive attitude towards reading while just 16% of students reported that they did not spend anytime reading for enjoyment. From the interviews and surveys, Sheppard discovered that there was a strong correlation between higher levels of reading achievement and a more positive attitude regarding reading. According to the 15-item

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reading achievement test administered at the end of the study, almost two-thirds of the students showed negative or no growth when using iPads to read texts. Sheppard separated students into three groups depending on ability level—Low, Medium, and High. The Low group was the only group that showed a majority positive growth.

Despite the fact that the quantitative tests did not yield statistically significant changes with the introduction of iPads as e-readers, the study has implications for the adoptions iPads in middle school classrooms. Sheppard noted that the iPads had the potential to become a distraction during reading lessons. Students used the iPads to explore other features instead of reading and changed the settings on the iPads. He attributes this as a possible reason for the large percentage of negative change in comprehension scores for the participants. Sheppard reported that during the course of this study, there were difficulties with wireless connectivity since the school's wireless infrastructure was not powerful enough to handle all the iPads. He also stated, "One of the most challenging aspects of the project was finding appropriate content, and this will continue to be a challenge for schools using iPads for reading" (pg. 15). Teachers integrating iPads into classroom instruction need to take these three points into consideration when planning lessons in order to ensure that students are truly learning and achieving when using these devices.

The fifth study in this section focuses on the impact of using a web-based intelligent tutoring system (ITSS) on fourth grade students' nonfiction reading comprehension. Wijekumar, Meyer, and Lei (2012) asked: "Do 4th grade classrooms using the ITSS system as a partial substitute for the standard language arts curriculum outperform control classrooms on standardized and researcher-designed measures of

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reading comprehension?” (pg. 995). The researchers used ITSS to teach students how to use the strategy, which involves the use of knowledge of text structures to improve reading comprehension of expository texts. Readers using the structure strategy learn how to identify signaling words, use the text structure to organize the main ideas in the passage, and create a mental representation and recall of the text using structure.

The researchers selected 131 fourth grade classrooms to study the efficacy of ITSS on nonfiction reading comprehension, justifying their decision to study fourth graders based on the fact that this grade level is a critical time when students are transitioning from story-based reading to more expository text comprehension. They state, “Failing to make the transition from narrative to expository text comprehension can result in serious negative effects on subsequent school learning” (pg. 988). Participation in the study was completely voluntary and did not involve random sampling. The classrooms then were randomly assigned to either the experimental or control group.

Pretests using the Gray Silent Reading Test (GSRT) and researcher-designed measures were administered to students in the beginning of the 2009-2010 academic year during a large group testing session. Teachers of the experimental group were instructed to use ITSS for 30-45 minutes each week as a partial substitution for the regular language arts curriculum. The total amount of daily and weekly time devoted to language arts instruction in the control and experimental classrooms were the same. The students of the experimental group used the ITSS software for 6-7 months and then completed GSRT and researcher-designed measures for the posttest.

According to pretest data, the ITSS and control groups did not have any statistically significant differences meaning the two groups were comparable in their

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reading levels. The research shows that the use of the ITSS system as a partial substitute for regular classroom reading instruction did result in higher nonfiction reading comprehension. With reading pretest scores, gender, and school locale held constant, the students in the experimental group scored on average 1.07 points higher on the GSRT than the students in the control group. The researchers also found that there was a positive, but weak correlation between the average minutes used per week and the total number of question answered by students with GSRT posttest scores. This suggests that students who used the ITSS system more performed better on the posttest than students who used it less.

Wijekumar, Meyer, and Lei conclude that the results from this study “support the efficacy of delivering the reading comprehension strategy to a large audience using web-based ITSSs” (pg. 1011). These findings are important to the design of instruction at schools where teachers may not be able to provide individual attention to each student in a large group setting. The researchers assert that schools investing in technology infrastructure and multi-media learning tools like ITSS have the potential to make a real impact on the learning outcomes of the students they serve.

In this sixth study Grace (2011) argues, “If electronic reading devices are to be adopted, they should lead to better comprehension than the previous paper-based text materials used” (pg. 1). The central research question of this doctoral dissertation asked, “Does reading electronic text on an iPad impact third grade students’ silent reading comprehension (pg. 3)?” This body of research also explores which specific features of the iPad the students took advantage of while reading.

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Grace employed a switching replications research design that has a control group, which included participants who read the text from a paper-based book, and a treatment group, which included participants who read the text on an iPad. After the experiment was run for the first time, the groups switched roles. Grace explains, “The goal here is that all students have an opportunity to be in the treatment group” (pg. 28). The researcher used convenience sampling and therefore did not control for extraneous variables.

The participants of this study were third graders from a local school and were selected by convenience sampling. This particular classroom was selected because of the researcher’s familiarity with the teacher and the teacher’s willingness to participate in the investigation. According to Grace, the students represented a range of below average, average, and above average readers. Grace wanted her research to be consistent with the teacher’s curriculum and, therefore, chose a book that students would typically read themselves. The participants read the first two chapters of *Ramona Quimby: Age 8* by Beverly Cleary (1992) in paperback format and also on iPads using the iBook application. It is important to take into consideration the limited scope of this study since the sample size only consisted of one class of students from a suburban school district with limited ethnic diversity. Thus, the results from this study are not necessarily representative of all third graders.

The study was conducted over two days during one hour of in-class instructional time. On the first day, the researcher conducted the first part of the research by having participants in the control group read a paper-based text and participants in the treatment

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group read the same text on an iPad³. Both groups took a six-question comprehension assessment. On the second day, the participants continued to read from the same text, but the control group became the treatment group and switched to reading on iPads and vice versa. After the second day, students took another six-question comprehension assessment and a four-question post-survey about their experiences reading on an iPad. In addition to the two comprehension assessments and the post-survey, Grace also used observational field notes as data for her claims about the effects of the iPad on reading comprehension.

The researcher collected quantitative data in the form of post-reading comprehension assessments. To see what the effects of reading on iPad versus reading traditional print-based text, Grace compared the mean score for the control group with the mean score from the experimental group for each day of the experiment. The data shows that there is no statistical significance between the two reading modalities. All students had access to the same resources while reading: personal resource binders that had information about vocabulary and pre-reading notes, paper dictionary, teacher assistance, and sticky notes. She observed that students reading paperback copies of the text consulted their resource binders. Students using iPads relied solely on the instant dictionary, sticky notes, and highlighting that are all iBook features.

Initially, Grace claimed that e-readers should only be adopted if they improve reading comprehension when compared to previous paper-based texts. She found that the students' silent reading comprehension was neither negatively nor positively impacted by the iPad in comparison to paperback books. Ultimately, Grace concluded that, "The

³ Half of the class read paperback books and the other half of the class read on iPads because only ten iPads were obtained from Bowling Green State University for this study due to budget and technology limitations.

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results do not indicate that students comprehend better or worse while using the iPad compared to paper-based text. Despite the fact the iPad did not impact reading comprehension does not mean that it should not be used” (pg. 43). While no improvements in reading comprehension were achieved, students were excited to read the text on iPads and gained experiences interacting with new electronic devices that are quickly becoming part of our daily lives at home, work, and school. A final consideration that Grace raised is that if students have a positive attitude towards reading on e-readers and they want to continue to use these devices to read, as indicated by the students’ post-survey, then students may become more motivated to read and more confident in their reading abilities.

This final study investigated the effects of incorporating tablets on reading performance among adolescents. In her micro level doctoral dissertation Scholin (2013) evaluated the use of tablets for usability, effectiveness, and satisfaction as related to adolescents’ reading comprehension and engagement. Scholin also explored if text modality—whether a text is presented on a tablet or in traditional print format—directly influences reading comprehension and engagement. This study was guided by five research questions surrounding the relationship between text modality, reading comprehension, and the quality of behavior during student learning.

Scholin used a self-efficacy scale to measure student motivation, which required students to rate their confidence (on a scale from 1 to 10) in their ability to perform 11 sub-skills.⁴ To measure reading comprehension, Scholin created a 20-question multiple-

⁴ The 11 sub-skills that students rated themselves on were: “Stay focused while reading, read the words easily, understand the meaning of the words, identify the main idea of what I read, re-tell what I read in my own words, comprehend what I read, use strategies to help me remember what I read, use strategies when I

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choice test. The participants in this study were 281 ninth graders, enrolled in a social studies course. They attended two rural Midwest high schools that already implemented a one-to-one iPad initiative on campus.⁵

A total of 44 students from School 1 and 189 students from School 2 participated in the study. It is important to note that the sample taken for this body of research was a convenience sample because it only included two high schools in the state that were known to already have one-to-one iPad initiatives, meaning that the study results “may not generalize to different populations of students” (pg. 11). The texts selected for ninth grade students to read were expository history texts that were presented on iPads in static format (static texts do not include hyper links, cloud computing, and other interactive multimedia features that tablets offer) and in traditional print-based format.

The researcher employed a between-participant experimental design. This means that there were four conditions for the participants from both schools: reading on iPads with strategy review, reading on iPads without strategy review, reading printed text with strategy review, and reading printed text without strategy review. Students in the strategy review group received 40 minutes of instruction twice during the study. During the time of the study, students from both schools were learning about the early stages of World War II. Therefore, Scholin chose passages that were related to the content that students were used to reading. Students reading on iPads used the apps iAnnotate or Noterize to read static texts and take notes. Students reading printed photocopied packets of the texts were provided with a pen and highlighter.

read something difficult that I don't understand, take notes while I'm reading, use my notes to study for a test, and remember what I read for a test” (pg. 122).

⁵ Students at both high schools had regularly used iPads for 3 months prior to the start of this study. However, students from School 1 were less familiar with iPads and needed more instruction on how to use some of the iPad features in comparison to students from School 2.

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One week prior to the study, Scholin sent passive consent forms home to the parents of all the potential participants. Parents were asked to return the consent forms if they did want their student to participate in the study. Students that were eligible were then randomly assigned to one of the four conditions of the study. The research was then carried out over the course of two days. On the first day, students in the strategy condition (both iPad and printed text) were provided with instruction on using reading comprehension and annotation strategies⁶ while the students in the control condition worked independently. On the second day students were put into different rooms depending on text modality. Students were given 20 minutes to read and then completed the 20-question comprehension test and the motivation scale.

Ultimately, Scholin found that the results of this study “indicated that text modality did affect the degree to which students physically interacted with text, but there was no effect on student comprehension or task motivation” (pg. 86). Additionally, when the researcher controlled for the students’ prior reading achievement, the descriptive statistics show that the effects of strategy review on reading comprehension were not statistically significant. While there were no significant differences in comprehension between the two text modalities, Scholin noted that students who read on iPads annotated the text less than those who read on paper.

At a time when educators are quick to adopt new technologies in hopes of inspiring innovation and greater degree of achievement, it is important to understand exactly how these technologies will or will not support learning. The researcher concluded that, “the observed differences in annotation, but not comprehension, across

⁶ Scripted lessons on five strategies were taught: “clarification, identifying the main idea, identifying key words and supporting details, question generating, and connecting text to prior knowledge and text” (pg. 56”).

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modality conditions underscore the importance of considering both process and outcome variables” (pg. 87). These results suggest that note-taking skills and the use of readings strategies, if initially learned on paper, do not necessarily transfer when students begin to read on iPads or other tablet computers. Therefore, schools adopting new technologies need to consider continued instruction and opportunities to practice reading skills using tablets.

These seven studies present different conclusions about the relationship between technology and reading comprehension. Ciampa (2012), Wijekumar, Meyer, and Lei (2012) all found that digital devices used during reading instruction yielded statistically significant increases in reading comprehension. Conversely, Milone (2011), Wright, Fugett, and Caputa (2013), Sheppard (2011), and Scholin (2013) did not find statistically significant changes in reading comprehension when digital reading devices were introduced and compared to print-based texts. This means that reading on digital devices did not positively impact reading comprehension for the students in these three studies.

However, Milone, Wright, Fugett, and Caputa made important claims about the novelty factor associated with using new technology in the classroom. The researchers suggested that the observed novelty factor related to technology can be leveraged to increase student motivation to engage with required readings. Grace (2011) also concluded that—while reading on iPads neither negatively nor positively affected reading comprehension—students were more motivated to read on the devices and reported positive attitudes toward reading.

Conclusion

Digital devices—such as computers, electronic readers, and tablets—have been on the market and available to consumers for quite some time. The devices have become more sophisticated, affordable, accessible, and have with increasing frequency been adopted in a variety of ways to alter learning environments in schools. However, the field of study surrounding education technology, in its many forms, is still emerging and constantly changing. The different works included in this literature review and the range of results presented throughout speaks to the need for additional research that presents results that are generalizable to the greater population of learners using digital devices for learning. Despite the absence of a conclusive verdict about the kind of impact that technology has on literacy instruction and reading comprehension, important implications for further research can be drawn from these works.

This thesis, similar to the research studies in this second chapter, is an exploration of how the integration of technology with literacy instruction affects reading comprehension. It aims to demonstrate that using reading apps on the iPad for reading comprehension enrichment, in addition to classroom literacy instruction, can improve student reading comprehension. The following chapter details the methodology of the case study presented in this thesis. It explains the procedures and methods used in a five-week reading comprehension enrichment plan with three kindergarten students.

Chapter Three: Procedures

This chapter outlines the methods and procedures used for my case study in five sections. The first section details the setting of the study, including the classroom and school setting. The second section gives a detailed description of the three students used in the study. The third section describes the Booksy reading app that was used for the reading enrichment plan for this research. The fourth section provides context for daily literacy instruction in the classroom and also the procedures for implementing the reading comprehension enrichment plan. The fifth and final section is an explanation of how student data was collected.

Setting of the Study

This five-week case study was conducted during the spring of 2015, beginning in the second week of May and concluding in the second week of June. The study was carried out in a kindergarten classroom at an urban charter school in the Midwestern United States. The neighborhood where the school is located is predominately low-income, however, students are bussed to the school from across the city. At the time of the study, approximately 99% of the students qualified for free-or-reduced-price lunch. While only one of the three kindergarten classrooms at the school participated in the study, baseline data was collected from three students in the other classrooms for comparison purposes.

The three students involved in this study worked on reading enrichment work through iPads during morning centers three to four times a week, in addition to whole-group literacy instruction. Each session on the iPad was 20 minutes long and took place

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in the classroom library. After completing their work on the iPads, the students joined their center groups to work on other activities with the rest of the class.

Description of the Sample

A second year kindergarten teacher taught the kindergarten class from which the participants were selected. The three participants of this study were part of this kindergarten class, which consisted of 19 students between the ages of five and six years old. Eight students were boys and 11 students were girls. Every student in the class identified as African-American and all were native English speakers. Some students from my classroom were receiving Special Education services during the time of the study, as described below. However, the three participants in this study did not have IEPs.

Student 1, Student 2, and Student 3 were all from the same kindergarten classroom and were also together in the same prekindergarten classroom the previous year at the same school. The students were very familiar with each other and with the school. None of the participants in this study received special education services and did not have any identified medical conditions, information processing delays or difficulties, or emotional/behavioral disorders.

According to the results from Measures of Academic Progress (MAP) assessment—administered three times during the school year—the participants in this study were performing at or above grade level in English language arts (ELA). The results from the Phonological Awareness Literacy Screening (PALS) assessment, administered once in the fall and once in the spring, indicated that all three students in the study had mastered kindergarten phonological awareness and phonics skills. While these

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tests provide valuable information about student performance, it is important to remember that assessment scores are not a complete reflection of student achievement.

In addition to assessment results, teacher observations during guided reading groups indicated that the participants were decoding words with ease and reading fluently at the kindergarten level. In light of these observations, the focus with the students during guided reading instruction was on developing and improving their reading comprehension. The students needed additional instruction and practice with providing detailed retellings of texts they read, asking and answering questions, and making inferences. The reading app, in conjunction with the core literacy instruction, was intended to improve the students' reading comprehension.

The Booksy App

For the purpose of this research, I chose to use a reading app called Booksy: Learn to Read Platform for K-2, which I refer to as Booksy from here on. The app was designed for students in prekindergarten through second grade to develop and practice reading skills. The app is a platform for reading books with interactive features that made it easy for the participants to use independently. I selected Booksy for the participants to use because they could quickly learn how to use the app, which was important since my research was only five weeks long.

There are a few notable features worth mentioning here. The pages in the book turn just like the pages in a printed book, which made the app intuitive for the students to use. The images in the books were in full color, which made the texts engaging to the students. The app also included a feature that assists students with reading unknown

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words—when a word is tapped the app reads it aloud. Therefore, students were able to read the texts in Booksy independently.

Overview of the Procedures

The following section provides a detailed description of the procedures followed for this research study. It begins with a brief description of how permission was obtained and explains why this particular group of students was selected for study. Next, it describes how baseline reading comprehension data and post-study data was collected, and also outlines how the five-week reading enrichment plan was conducted.

Permission to conduct the study was obtained from the parents/guardians of the students and also from the school director. The informed consent forms sent home with students can be found in Appendix A and the affiliation agreement form for the school director is in Appendix B. The sample selection process used for this study is a reflection of the explicit purpose of this research. Since this case study was concerned with how *reading comprehension* in young readers was affected by the use of reading apps on the iPad, the participants needed to be advanced enough readers so that they were working on comprehending the texts they were reading. Therefore, it was necessary to carefully choose the students to be included in this case study.

A concern regarding random selection that was present during the research design phase was that an element of randomness would introduce the chance that students who were not yet advanced enough to be working on reading comprehension would be selected. Any potential changes in such students *reading comprehension achievement* would not be accurately captured by this case study since such students would still be working on developing phonological awareness and phonics skills

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After three students were selected for the case study, the *Qualitative Reading Inventory, 5th Edition (QRI-5)* by Lauren Leslie and Joanne Schudt Caldwell (2011) was individually administered to each of the students to gain baseline information about how students read and comprehended texts. After five weeks of engaging with the Booksy reading app on the iPad, the *QRI-5* was given a second time to measure any changes in how students read and comprehended texts. The results from the first evaluation were compared to the results from the second evaluation.

To determine whether or not the Booksy reading app had an effect on the students' reading comprehension skills, I compared the pretest and posttest scores from Student 1, Student 2, and Student 3 to a group of control students. The control group students were from the other kindergarten classroom at the same school. The three students in the control group received the same core literacy instruction as the experimental group since all the kindergarten teachers at the school used the same curriculum and materials for teaching English language arts.

The control group of students were administered the *QRI-5* at the beginning of the study but did not use the Booksy app in addition to the core literacy instruction they were receiving. I want to reiterate the fact that the control group did not participate in the study since they did not follow the enrichment plan that Student 1, Student 2, and Student 3 did. When the five-week study concluded, the group of control students were then administered the *QRI-5* again. Any concerns about the limitations of this method are discussed in detail in Chapter Five.

Qualitative Reading Inventory (QRI-5)

The *QRI-5* is a unique informal reading inventory because, unlike standardized tests, it can be used in different ways depending on the goals of the assessment. It can be used to identify reading levels, confirm a suspected reading problem, determine strengths and weaknesses of readers, and suggest directions for reading interventions. Leslie and Schudt (2011) explain that the assessment “can be used for charting growth across a school year or after completion of a special intervention program” (pg. xi). For this reason precisely, I chose to use this particular informal reading inventory for my research.

Additionally, I used the *QRI-5* because it is a robust measure of reading comprehension. The authors state that it “measures comprehension in several ways: through an analysis of the student’s retelling; through the student’s answers to explicit and implicit comprehension questions” (Leslie & Schudt Caldwell, 2011, pg. ix). While the *QRI-5* is a highly informative reading inventory, it does not provide a raw score like standardized tests or other assessments do. Therefore, I present student scores for the retelling section and the question section of the assessment.

Since the focus of this research study is on reading comprehension, I only explain how the retelling section and the question section of the *QRI-5* is administered because these are the two parts of the assessment used to measure reading comprehension. For this same reason, only the scores from the retelling and question sections of the *QRI-5* are presented in the next two sections.

The retelling section of the assessment was administered to students before the question section—both were used to assess a student’s comprehension of orally read

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passages. After a student finished reading a passage, I removed the text and asked the student to retell the passage as if they were retelling it to somebody who had never read it before. I used the *QRI-5* Retelling Scoring Sheet to record the number of ideas that the student correctly recalled and compared his/her score to the idea units shown on the sheet.⁷ After the student gave a retelling of the passage, I asked the comprehension questions provided by the *QRI-5* and scored his/her responses as either right or wrong. No half points were given for responses as recommended by the assessment procedures.

Data Collection Methods

As briefly mentioned in the previous section about procedures followed for this study, the *QRI-5* was used as the tool for evaluating baseline reading comprehension achievement before students engaged with the Booksy reading app on the iPad for five weeks. This test was also used to collect data about the participants' reading comprehension after they had completed five weeks of reading enrichment. The pre-test and post-test results for each student were then compared to each other to see what kind of change the students experienced after using a reading comprehension iPad app, supplemental to the core literary instruction they were already receiving.

Conclusion

Chapter Three provided a detailed explanation of the methods and procedures that were followed for this case study. The first section described the neighborhood where the school is located, the school itself, and the classroom where the study took place. The second section described the group of participants who were included in this study. The

⁷ According to the *QRI-5*, "Scoring is determined by comparing the idea units recalled by the student with those on the Retelling Scoring Sheet. The scoring sheet was designed on the basis of an examination of the idea units most frequently recalled by students in our piloting sample, as well as a theoretical analysis of the important units" (Leslie & Schudt Caldwell, 2011, pg. 71).

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third section gave an overview of the procedures used to carry out this research. The fourth section in this chapter explained what kind of data was collected and how that data was collected. The next chapter presents the results of this case study from the data collected after a five-week study including an analysis of the data.

Chapter Four: Results

Chapter Three provided a description of the setting of the study and also of the sample population. It also gave an overview of the procedures I used for my case study and the method of data collection. This chapter presents five sections. The first section presents the pretest data collected from the retelling section of the QRI-5. The second section shows the posttest data collected from the retelling section. The third section presents the pretest data from the question section. The fourth section provides³ the posttest data from the question section. The pretest and posttest scores from the experimental group—the three students who used the Booksy app—are compared to the pretest and the posttest scores from the control group. This chapter concludes with a final section that provides an analysis and discussion of the results.

Retelling Scores Pretest

I used the Retell Scoring Sheet to record the number of ideas that students retold. Since the idea units recalled by the student are compared to those on the scoring sheet, I divided the first number by the second number to calculate a percentage of ideas retold by the student. Students read different narrative passages and the different passages had varying number of ideas to retell.⁸ Therefore, the total number of ideas to retell is not the same for each student. Converting the retelling score to a percentage makes this measure comparable across students.

Table 1, shown below, shows the pretest retelling scores from the participants in the experimental group and from the students in the control group. The table shows the

⁸ Each student read passages that were at their instructional level for the pretest and the posttest. I used the instructional level because it sufficiently challenged students, but not to the point of frustration. Texts or passages at the instructional level were normally used during guided reading as a part of core literacy instruction.

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number of ideas retold, the total number of ideas in the passage according to the *QRI-5*, and the ideas retold by the student as a percentage of the total.

Table 1: *Pretest Retelling Scores for Both Groups*

Student	Number of Ideas Retold	Total Number of Ideas	Percentage (%)
Student 1	9	30	30.00
Student 2	12	30	40.00
Student 3	8	21	38.09
Control Student 1	15	44	34.09
Control Student 2	10	21	47.61
Control Student 3	9	30	30.00

Synonyms and paraphrases were accepted as correctly retold ideas. Before using the Booksy app Student 1 retold 30.00% of the ideas from the passage, Student 2 retold 40.00% of the ideas, and Student 3 retold 38.09% of the ideas. Control Student 1 retold 34.09% of the ideas from the passage, Control Student 2 retold 47.61% of the ideas, and Control Student 3 retold 30.00% of the ideas. It is important to remember that since the total number of ideas for the different passages is not the same, I compare the *percentage* of ideas retold, not the *number* of ideas retold. This percentage of ideas retold is what I used as baseline data for the retelling section. To find the percentage of ideas retold, I divide the number of ideas retold by the total number of idea units (as determined by the *QRI-5*).

Retelling Scores Posttest

Table 2 shows the posttest retelling scores from the students in the experimental group and the control group. After the participants used the Booksy app for five weeks through the use of learning centers, I administered the *QRI-5* again to them and the control group.

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Table 2: *Posttest Retelling Scores for Both Groups*

Student	Number of Ideas Retold	Total Number of Ideas	Percentage (%)
Student 1	15	30	50.00
Student 2	20	30	66.67
Student 3	12	21	57.14
Control Student 1	21	44	47.72
Control Student 2	13	21	61.90
Control Student 3	16	30	53.33

The same passage that each student read for the pretest was used again for the posttest.

Therefore, the total number of ideas for each passage did not change. Student 1 retold 50.00% of the ideas from the passage, Student 2 retold 66.67% of the ideas, and Student 3 retold 57.14% of the ideas. Control Student 1 retold 47.72% of the ideas from the passage, Control Student 2 retold 61.90% of the ideas, and Control Student 3 retold 53.33% of the ideas.

Finally, Table 3 compares the average percentage of ideas retold for the experimental and control groups from the pretest and posttest. For the pretest, the average percentage of ideas retold was 36.03% for the experimental group and 37.23% for the control group. For the posttest, the average percentage of ideas retold was 57.94% for the experimental group and 54.32% for the control group.

Table 3: *Pretest and Posttest Average Percentage of Ideas Retold*

	Experimental Group	Control Group
Average Percentage of Ideas Retold, Pretest (%)	36.03	37.23
Average Percentage of Ideas Retold, Posttest (%)	57.94	54.32

When comparing the average percentage of ideas retold during the pretest across the experimental group and the control group, we see that the percentage for the two groups

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are closely matched. The average percentage for the control group was 1.2% higher. After five weeks of using Booksy, we see that both groups made gains in retelling. However, the average percentage for experimental group was 3.62% higher than the control group.

Question Scores Pretest

Table 4 shows the pretest question scores from the three participants in the experimental group and the three students in the control group. It presents the number of questions correctly answered, the total number of questions on the assessment, and the percentage of questions correctly answered. To calculate the *percentage* of questions correctly answered, I divided the number of questions correctly answered by the total number of questions.

Table 4: *Pretest Question Scores for Both Groups*

Student	Number of Questions Correctly Answered	Total Number of Questions	Percentage (%)
Student 1	4	6	66.67
Student 2	6	6	100.00
Student 3	3	5	60.00
Control Student 1	4	6	66.67
Control Student 2	4	5	80.00
Control Student 3	4	6	66.67

Before participating in the reading enrichment plan on the iPad, Student 1 correctly answered 66.67% of the questions about the passage, Student 2 answered 100.00% of the questions, and Student 3 answered 60.00% of the questions. Control Student 1 answered 66.67% of the questions about the passage, Control Student 2 answered 80.00 % of the questions, and Control Student 3 answered 66.67% of the questions. Like the retelling section, the number of questions asked about each passage varies. Therefore, I compare

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the *percentage* of questions answered correctly, not the actual *number* of questions answered correctly.

Question Scores Posttest

Table 5, shown below, presents the posttest question scores for the experimental group and the control group after the participants completed the five-week reading enrichment plan. This percentage of questions answered is what I used as baseline data for the question section.

Table 5: *Posttest Question Scores for Both Groups*

Student	Number of Questions Correctly Answered	Total Number of Questions	Percentage (%)
Student 1	6	6	100.00
Student 2	6	6	100.00
Student 3	4	5	66.67
Control Student 1	6	6	100.00
Control Student 2	5	5	100.00
Control Student 3	5	6	83.33

Student 1 correctly answered 100.00% of the questions about the passage, Student 2 answered 100.00% of the questions, and Student 3 answered 66.67% of the questions.

Control Student 1 answered 100.00% of the questions about the passage, Control Student 2 answered 100.00 % of the questions, and Control Student 3 answered 83.33% of the questions.

Lastly, Table 6 compares the average percentage of questions correctly answered from the pretest and posttest for the experimental group and the control group.

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Table 6: *Pretest and Posttest Average Percentage of Question Answered*

	Experimental Group	Control Group
Average Percentage of Questions Answered Correctly, Pretest (%)	75.56	71.11
Average Percentage of Questions Answered Correctly, Posttest (%)	88.89	94.44

For the pretest, the average percentage of questions correctly answered was 75.56% for the experimental group and 71.11% for the control group. For the posttest, the average percentage of ideas retold was 88.89% for the experimental group and 94.44% for the control group. Before the participants used the Booksy app, the average percentage of questions correctly answered was higher for the experimental group in comparison to the control group. After the course of the five-week reading enrichment plan for the experimental group, both groups saw an increase in the average percentage of questions answered. However, the average percentage for control group was 5.55% higher than the experimental group.

Conclusion

The results from the *QRI-5* indicated that all the students, in both the experimental group and the control group, experienced gains in the retelling section and the question section of the assessment. While both groups experienced growth, the experimental group saw greater gains in the retelling section than the control group. However, the opposite is true for the question section of the *QRI-5*. For the question section, the control group actually experienced greater gains than the experimental group.

This chapter presented the data from the five-week reading enrichment plan. The results in this chapter supports the conclusions that all of the students, regardless of

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whether they used the Booksy app or not in addition to core literacy instruction, demonstrated growth in reading comprehension as measured by the retelling and question sections of the *QRI-5*. These scores presented in this chapter do not provide definitive support for the use of reading comprehension apps in addition to core literacy instruction. The next chapter provides a discussion of the results and considers the strengths and limitations of this study. It also draws connections to current research and makes recommendations for future research.

Chapter Five: Conclusion

This action research project aimed to study the effects of reading comprehension app use on the reading comprehension of three kindergarten students. The study was focused around the experiences of three kindergarten students who demonstrated high reading abilities and high levels of achievement in all the core subjects. The data collected over the course of a five-week period using the *QRI-5* was provided in Chapter Four. This chapter includes four sections, beginning with a section that draws connections between the results found here and the existing body of research reviewed in Chapter Two. The second section is an explanation of the results of this case study. The third section considers the strengths and limitations of this action research project. The fourth section offers recommendations to best meet the learning needs of the participants and makes explicit connections to the Common Core State Standards.

Connections to Existing Research

The literature surrounding the effects of technology use on reading comprehension was reviewed in Chapter Two of this thesis. Currently, the body of research on the relationship between technology use and reading outcomes does not reveal a general consensus about whether or not digital devices have a positive or negative effect on student reading achievement. As demonstrated in Chapter Two, some researchers found technology to positively affect reading outcomes, while other researchers found that technology had neither a positive nor a negative effect on reading outcomes. This field of research continues to develop and grow as more and more schools adopt technology and integrate it with daily instruction. The key findings from this growing body of research shaped the design of this research action project.

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Ciampa (2012) found the integration of digital devices with literacy instruction to have a positive impact on reading outcomes. The researcher argued that technology-rich classrooms for literacy learning were important for maximizing gains in reading achievement. The aim of this research project was to use technology as a means for developing and improving reading comprehension for kindergarten students and understand how digital devices can affect reading comprehension. Ciampa's claim that using digital devices can positively affect reading comprehension informed my decision to use the iPads available to my classroom for this study.

Additionally, Ciampa states that the interactive features of electronic storybooks such as the read aloud function, moving words, and highlighted text were interesting to the participants and encouraged higher levels of engagement among students. Consequently, I searched for a reading app in the iTunes App Store with similar interactive features based on Ciampa's findings. The Booksy app used in this research also had a read aloud function and highlighted text. It should be noted that instead of using the read aloud feature in Booksy, the participants read the electronic text themselves and used the tap-to-read function when they encountered unknown words.

Like Ciampa, Korat (2010) investigated whether educational e-books could support reading for young readers. The researcher designed an e-book with a read aloud function accompanied by animated pictures and sound effects that relate directly to the storyline. He concluded that the kindergarten and first grade participants did benefit from the interactive e-book software even with limited exposure to the intervention. Korat argues in favor of integrating reading software and e-books into reading instruction, but cautions that teachers need to carefully consider all the different features available in

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order to best meet their students' needs. These recommendations, in addition to Ciampa's findings, were crucial to my search for a reading app to use with the participants for this study. While the Booksy app did not have animated pictures or sound effects, it had other engaging features that the participants engaged with. The students could tap on an individual word to have it read aloud and the illustrations and images were in color.

Another study conducted by Hutchinson, Beschoner & Schmidt-Crawford (2012) also explored how the integration of iPads into literacy instruction would affect reading, writing, and communicating skills. The goal for this study was to enhance learning opportunities by providing the fourth grade participants with the chance to practice new literacy skills on the iPad while also continuing to teach print-based literacy goals in the prescribed reading curriculum. The researchers used independent reading, sequencing, visualization, retelling, identifying cause and effect, and identifying main ideas and details as measures for reading comprehension. The researchers came to the conclusion that students were highly engaged while using the devices and the teacher successfully enhanced literacy instruction and promoted progress toward a literacy learning goal, instead of just using the iPad as an add on.

I used Hutchinson, Beschoner & Schmidt-Crawford's design of their study as a model for the design of this research action project. Like Mrs. Dill used iPads to provide additional reading practice as a supplement to the core literacy curriculum, I also had this goal in mind when conducting my research. Another important connection that I draw from this research is the use of retelling as a measure of reading comprehension. For this thesis I wanted to use a measure of reading comprehension that students were already familiar with so that I would not need to introduce any new factors or skills during the

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reading enrichment plan. Having to teach students a new skill in order to provide a measure of reading comprehension for this study would have been too complex for such a short study. Since retelling is a skill that kindergarten students learn through literacy instruction and also, it was the skill that the participants needed practice with, it was an appropriate measure of reading comprehension for this study.

Explanation of the Results

As the researchers in the previous section concluded, technology-rich learning environments can enhance student learning and reading outcomes. In addition to improved reading outcomes, Hutchinson, Beschoner & Schmidt-Crawford (2012) stated that iPads brought about higher levels of student engagement and improved students' motivation to engage in required reading. While engagement and motivation were not the variables under investigation for that particular study, the authors found that it was an additional benefit that came from using iPads. The aim of this action research project was to explore if reading app use affects reading comprehension in three kindergarten students, but also to capitalize on these other benefits that researchers reported when studying technology integration with reading instruction. This study was designed to provide high-level readers with supplemental reading comprehension practice through an app on the iPad, in addition to the core literacy instruction.

According to the Measures of Academic Progress (MAP) and Phonological Awareness Literacy Screening (PALS) data collected prior to the start of the reading enrichment plan and teacher observations, these three participants high reading abilities. However, during guided reading groups I identified that these students needed additional practice with retelling and answering questions about the texts they read. Prior to using

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Booksy on the iPad, Student 1 retold nine out of 30 ideas on the pretest, 30.00% of the total ideas units predetermined by the *QRI-5*. Student 2 retold 12 out of 30 ideas, 40.00% of the total idea units. Student 3 retold 8 out of 21 ideas, 38.09% of the total idea units. The average of the percentage of ideas retold on the pretest for the experimental group was 36.03%—*lower* than the average of the percentage of ideas from the control group.

On the question section Student 1 correctly answered 4 out of 6 questions, or 66.67% of the total questions. Student 2 correctly answered 6 out of 6 questions, 100% of the total questions. Student 3 correctly answered 3 out of 5 questions, 60% of the total questions. Prior to using Booksy, the average of the percentage of questions correctly answered by the experimental group was 75.56%—*higher* than the average of the percentage from the control group.

While administering the pretest I observed that the participants needed prompting during the retelling section and the question section. I provided retelling and questioning prompts to the extent that was permitted by the *QRI-5*. For example, Student 2 read a passage called “Fox and Mouse” and only provided a very surface level retelling with four ideas. To encourage her to provide more ideas, I asked her “Is there anything else you want to say about the passage?” as suggested by the *QRI-5* general procedures.⁹ These prompts, when necessary, were given to all the students in the experimental group and the control group.

All the students were familiar with the *QRI-5* procedures after having been assessed once before for the pretest. I found that the students were more comfortable

⁹ The *QRI-5* general procedures for the retelling section recommends that, “After the student has finished retelling, the examiner should ask whether there is anything else the student would like to say. If the student remembers nothing further, the examiner can draw the student’s attention to the title of the passage and ask whether he or she can remember what the author wrote about” (Leslie & Schudt-Caldwell, 2011, pg. 71).

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during the posttest and needed less prompting from me for both the retelling and question sections. Student 3 was the only student that needed additional prompting, as permitted by the *QRI-5*, during the retelling section. This indicated to me that all the students were more adept at providing retellings and answering questions about the passages they read.

The same passages used for the pretest were used again for the posttest. None of the students in the experimental group and the control group required additional prompting from me during the retelling section. On the posttest Student 1 retold 15 out of 30 total ideas, which means that he retold 6 more ideas on the posttest. Student 2 retold 20 out of 30 total ideas, providing 8 more ideas on the posttest. Student 3 retold 12 out of 21 ideas, providing 4 additional ideas on the posttest. The participants showed gains in the retelling section. According to their posttest average of the percentage of ideas retold, 57.94%, the experimental group outperformed the control group in the retelling section.

For the question section, only Student 3 from the experimental group needed additional prompting from me. On the posttest Student 1 correctly answered 6 out of 6 questions, which means he answered 2 more questions correctly on the posttest. Student 2 correctly answered 6 out of 6 questions, the same as on the pretest. Student 3 correctly answered 4 out of 5 questions, meaning she answered 1 more question correctly on the posttest. While their performance on the posttest showed that the students made gains on the question section (except for Student 2 who answered all the questions correctly on the pretest and the posttest), their average percentage was actually lower than the average percentage of the control group on the posttest.

The data indicates that all students, in the experimental group and in the control group, made gains in reading comprehension as measured by the retelling and question

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sections of the *QRI-5*. The experimental group, on average, saw a higher level of achievement in the retelling section in comparison to the control group. However, this same group did not see a higher level of achievement in the question section when compared to the control group. The results from this study do not support the claim that the use of technology—in this case the Booksy app—improved reading comprehension outcomes for the students that used the app.

I chose to present the averages for the percentage of ideas retold and the averages for the percentage of questions answered correctly because I wanted to compare the effects of using the Booksy app across the two different groups. It was not my intention to compare the results from one student in the experimental group directly to the results of another student in the control group. The posttest average from the retelling section was 57.94% for the experimental group and 54.32% for the control group. The posttest average from the question section was 88.89% for the experimental group and 94.44% for the control group.

However, when considering the averages of the percentages from the retelling section and the question section, it is important to remember that outliers can easily skew averages. This is especially true when the sample size is very small, like in this study. Given this consideration, overall, the results suggest that the participants' reading comprehension improved over the course of the five-week reading enrichment plan on the iPad as measured by the *QRI-5*. However, the data revealed mixed results. While the experimental group outperformed the control group on the retelling section, they did not outperform the control group on the question section. Even though conclusive results

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about whether or not iPads impact reading comprehension were not achieved this does not mean that devices should not be used at all for reading instruction.

Strengths and Limitations

This action research project was designed with the reading needs of the three participants in mind. While the students demonstrated high performance on standardized tests and read fluently during guided reading groups, they needed additional practice with retelling and answering questions about texts they read. The strength of this study is that it was designed to address these specific students' reading needs. It presented these students with additional practice in retelling and answering questions, both skills they were also processing during classroom literacy instruction. Despite the strengths associated with this study, there were also a number of limitations.

One of the strengths of this study was the high level of student engagement while students were engaging with the Booksy app on the iPad, which is consistent with the findings from Milone (2011) and Wright, Fugett & Caputa (2013) as discussed in Chapter Two. When students were using the iPads to read during learning center time, they were on task and very focused on reading. They remained in their seat and worked independently for the entire duration of the center time and were not distracted by other apps on the iPad. The students were excited to use the iPads to read and were motivated to engage with the required readings.

Another strength of this study was the assessment used for measuring reading comprehension. A strength of using the retelling section and the question section of the *QRI-5* was that students were already familiar with these two reading comprehension strategies. By May, students in kindergarten had already learned what these strategies

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were and how to use them. I wanted to avoid introducing new variables and teaching skills during the course of this research because I wanted an accurate measure of student reading comprehension as it was affected by the Booksy app. Furthermore, I did not want to overwhelm or frustrate the students, especially since the *QRI-5* is a lengthy assessment that is not usually administered during the school year.

While these strengths were beneficial to the participants' learning experiences during the course of this research, there were also limitations to consider as well. The first is the short duration of this project. This case study was only conducted for five weeks, which may not have been sufficient amount of time to demonstrate growth in reading comprehension using the Booksy app. If the study had been conducted for a longer period of time, the participants might have made greater gains on the posttest.

A second limitation was that the same passages used for the pretests were also used for the posttests. This procedure is one of several recommended by the *QRI-5*. However, by using the same passage for the pretest and the posttest, there is the potential that "memory for the initial passage may confound comprehension performance on the same passage" (Leslie & Schudt-Caldwell, 2011, pg. 33). If this occurred, students retelling scores might have been inflated because they were retelling key details from the story due to familiarity with the passage. For future research, to avoid this issue it would be prudent to use a different passage for the posttest.

A third limitation of this study was the introduction of several potential intervening factors by using students from the other classroom as the control group. These factors included differences in instruction style and delivery, teacher experience and background in teaching literacy skills, and the learning environment in different

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classrooms. These differences might have affected the outcomes of this study, but due to the limited number of students that possessed high reading abilities and were capable of participating in the study, it was necessary to use students from another kindergarten class as the control group.

Finally, in addition to the short duration of the study, a fourth limitation was the small sample size. A small sample size, just three participants, means that the students included in this study were not representative of the general population. Therefore, the findings from this study cannot be generalized to a larger group of students.

Recommendations

This section begins by identifying the two kindergarten Common Core State Standards this study addresses with focus on reading comprehension. It also explains how the study addressed these two standards and follows with several recommendations for future reading instruction and technology use to best meet the participants' reading needs, both for the school and the home. Then it gives recommendations for future research.

This study was focused on kindergarten reading comprehension as measured by retelling and answering questions and was designed with the participants' reading needs in mind. During the course of the five-week study, the participants used the Booksy app on the iPad during centers in addition to receiving regular literacy lessons that provided direct instruction about retelling and answering questions. According to the Common Core State Standards for reading, kindergarten students are expected to provide key ideas and details about texts they read. Standard CCSS.ELA-Literacy.RL.K.1 states that students will "With prompting and support, ask and answer questions about key details in a text" and Standard CCSS.ELA-Literacy.RL.K.2 states that students will "With

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prompting and support, retell familiar stories, including key details” (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). These two standards were addressed by the study and also by the literacy instruction provided during the course of the study.

Prior to this study the participants already had high reading abilities and were performing above kindergarten grade-level in terms of foundational reading skills. I was interested in working with the participants to enrich their retelling and question answering skills. While the results from this study do not fully support the argument that technology is an important factor for improving reading outcomes, the participants’ performance on the *QRI-5* demonstrated that they were able retell key details and answer questions about the texts they read. This means that the students met the expectations of the standards.

Before the time of this study, as previously stated, the three participants had high reading abilities. They already demonstrated mastery of foundational reading skills and were reading with a level of fluency that was consistent with kindergarten expectations. Given their reading abilities and their posttest results, it is recommended that the participants continue to receive explicit instruction that includes teacher modeling about how to retell key details and answer questions about texts they read, especially during guided reading groups. The guided reading approach provides students with support as they read aloud and gives teacher opportunities to prompt when necessary. This valuable time spent during guided reading cannot be replaced by technology or a reading app because the teacher feedback given during guided reading is responsive to students’ needs in a way that a reading app cannot be.

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Another recommendation for the classroom is to incorporate graphic organizer use with the time spent using an interactive reading app like Booksy. Since the read aloud and tap-to-read function on reading apps can act as scaffolds so that students can focus their efforts on understanding the texts, students would benefit from using a graphic organizer to help retell details and answer questions. For younger students to effectively read using a reading app and use a graphic organizer at the same time, they would first need to learn specific procedures in order to be successful.

A recommendation for the home that can be used to support participants' reading comprehension is, if the technology is available, using some sort of digital device or software that has a read aloud function or a tap-to-read function like Booksy. Using interactive reading apps like these at home can support students' reading comprehension because the read aloud function can provide a scaffold when a teacher or adult is absent so that students can focus on understanding what they read, instead of trying to decode unfamiliar words. Additionally, interactive texts can be more engaging to young students than print-based texts. If households do not have tablets to download reading apps, there are a number of free websites that have texts that are read aloud (starfall.com, storyonline.net, justbooksreadaloud.com, istorybooks.co) that can be accessed from a computer either at home or at the library. The participants can use this additional time reading at home with technology to practice the comprehension strategies they learned at school.

The results from this study do not support the use of reading apps as being critical to positively affecting reading comprehension outcomes for kindergarteners. However, students were very engaged and on task during the time they spent engaging with the

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Booksy app. This study does not discount the importance of interactive reading apps, but further research is required to understand if different kinds of interactive reading apps are more effective than the one chosen for this study. It is recommended that future research investigate what kinds of features best support reading comprehension in young readers.

Another recommendation for future study would be to examine if technology and reading apps are more effective for supporting the reading comprehension of narrative texts versus informative texts, especially in young readers. If technology, such as interactive reading apps, is more effective for supporting and developing the reading comprehension of a particular kind of text, then it would be beneficial to use that technology in a targeted way. Finding answers to these research questions can shape best practices for using technology to teach reading comprehension.

Conclusion

The purpose of this thesis was to study the effects of reading app use on reading comprehension. The results do not suggest that using the Booksy reading app had negative effects on reading comprehension, but also does not support the importance of the app to reading instruction. Similar to Grace's (2011) findings outlined in the literature review, I found that the effect of reading app use on reading comprehension was neither negative nor positive, but students were highly engaged and on task when reading on the devices. These benefits suggest that there are merits to using technology, but the integration of technology with literacy instruction still requires further investigation to understand exactly how it can and should be used to improve reading comprehension.

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Appendix A

Informed Consent Form

May 11, 2015

Dear Parents or Guardians:

I am conducting research to study the effects of the use of iPad technology on reading in kindergarten. I am currently pursuing my Master's degree in Early Childhood Education at Cardinal Stritch University and this study is part of the research requirement.

This study will involve 3 students who are currently in our kindergarten class at Milwaukee Math and Science Academy. The students for this study have been identified as high-level readers according to our classroom reading assessments and the Measures of Academic Progress (MAP) assessments. The participants for this study will be determined prior to the initial phases of the research. Before the research begins, I will administer a pretest to the students to gather baseline reading comprehension data. For this pretest I will be using the Qualitative Reading Inventory (QRI-5), a common reading assessment used to gather information about conditions under which students can comprehend text successfully.

Afterwards, I will introduce the iPad technology to the students and teach them how to use the technology. After the students are familiar with the technology, I will provide these three students with 30 minutes, two times a week for a period of five weeks. Students will be using an iPad application to develop their reading comprehension skills. This intervention is supplemental to our classroom reading instruction. At the end of the five-week period, I will administer the QRI-5 again to gather summary reading comprehension data so that I can see the effects of using iPad technology with the participants of this study.

I am a licensed PK-6th grade teacher in the state of Wisconsin and have been trained in effective research methodology. I am familiar with the work of other researchers who have also investigated the impact of technology on reading attainment.

All data and information will be confidential and stored in a secure location. Student names and identifying characteristics will not be used in order to protect the confidentiality of students. Benefits from this research study include a better understanding of how iPad technology affects students' reading achievement.

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Participation is voluntary. Please respond by returning the form below indicating whether or not you want your child to participate in this study. If you wish to withdraw your child from the study at any time, you may do so without prejudice or penalty and the information collected up to that point will be destroyed upon request.

If you have any questions regarding this research, please call or write:

Ashley Yang
110 W. Burleigh St.
Milwaukee, WI 53211
414-263-6400 (ext. 1103), or ask for Ms. Yang
ayang@mmsacademy.org

Luann Dreifuerst (Advisor)
6801 North Yates Rd.
Milwaukee, WI 53217
ldreifuerst@wolfmail.stitch.edu

If you have any concerns about your treatment/your child’s treatment as a participant in this study, please call or write:

Darnell Bradley (Institutional Review Board Chairperson)
Cardinal Stritch University
1037 W. McKinley, Box 103
Milwaukee, WI 53205
414-410-4907

Note: All complaints are kept in confidence.

I have received an explanation of the study.

_____ I **agree** to permit my child/dependent to participate in the study.

_____ I do not permit my child/dependent to participate in the study.

Name of Minor Child/Dependent

Signature of Parent or Legally Authorized Representative

Date

This research as been approved by the Cardinal Stritch University Institutional Review Board for the Protection of Human Participants on _____ for a period of 12 months.

Appendix B

Affiliation Agreement

Milwaukee Math and Science Academy is giving permission to Ashley Yang, graduate student in the Master of Arts in Urban Education at Cardinal Stritch University, to conduct action research at Milwaukee Math and Science Academy.

Nature of the Research Project: The researcher will conduct an action research study on the effects of the use of iPad technology on the reading comprehension of kindergarten readers. Students will use reading comprehension iPad applications as a supplemental intervention to general language arts instruction. The researcher will require access to three kindergarten students from another kindergarten classroom in the school to use as the control group to compare the results of the experimental group to.

Contact Person at Milwaukee Math and Science Academy: The contact person at our organization with whom the researcher is to communicate regarding the research project is:

David Chief, Director
110 W. Burleigh St.
Milwaukee, WI 53212
414-263-6400
dchief@mmsacademy.org

Contact Person at Cardinal Stritch University: The contact person at Stritch with whom our organization is to communicate regarding the research project is:

Luann Dreifuerst, MUE Advisor
Cardinal Stritch
6801 N. Yates Rd., Box 435
Milwaukee, WI 53217
ldreifuerst@wolfmail.stritch.edu

Confidentiality of Data: The researcher has agreed to protect the confidentiality of data collected. Participants will not be individually identifiable.

Report: The researcher will share a copy of the final report with our organization upon our written request.

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Questions: If there are any questions or concerns regarding this project, please notify in writing and mail to the following address:

Dr. Darnell J. Bradley
Cardinal Stritch University
6801 N. Yates Rd., Box 103
Milwaukee, WI 53217
414-410-4907
djbradley@stritch.edu

Thank you for your cooperation.

Signature of Research Student

Date _____

Signature of Official of Cooperating Organization

Date _____

Signature of Faculty/Staff/Faculty Advisor

Date March 25, 2015