

ELECTRONIC BOOKS OR PRINT BOOKS FOR INCREASED READING
COMPREHENSION AND VOCABULARY ACQUISITION IN
THIRD GRADE STUDENTS

By

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Abstract

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This study examined whether E-books can contribute to increased vocabulary acquisition and reading comprehension for third grade students. Teachers face difficult decisions when determining whether or not to use interactive e-Books in the classroom. Studies (De Jong and Bus 2004; Jones and Brown 2011; Larson, 2009; Verhallen, Bus, and De Jong, 2006), have determined that the multimedia features of e-books have the potential of being beneficial to young children over traditional printed texts; however, studies have failed to demonstrate that these additional text features increase reading achievement over traditional printed text. There has not been enough evidence to show that students' reading achievement increases in the general education classroom when they read from interactive e-books rather than traditional printed texts. This study was conducted to determine the differences in third graders' vocabulary acquisition and reading comprehension according to the medium of presentation. Two different story book formats were used, printed copies and electronic versions of the books. Twelve third graders participated in the study. All participants alternated between reading print versions of books and electronic versions using a counter balanced design. When students read the electronic versions of the books, they had access to the multimedia features that

the e-books provide, whereas the printed versions of the books had the support of the teacher when the students asked for help. After each participant read a book independently they answered ten multiple choice questions and one short answer. All test questions and short answer responses were completed on paper. The results of this study did not provide significant evidence that the additional text features of interactive e-books increase reading achievement over traditional printed text. Observations did suggest that e-books increased motivation and engagement.

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Introduction

According to Prensky (2001), “today’s students think and process information fundamentally differently from their predecessors” (p. 1). Today’s students, also referred to as the Twenty-first century students, do not learn the same way as their teachers did when they were students. Yet most schools continue to teach without taking into account the needs of the 21st century student. The same is true in the reading classroom. It is imperative that changes be made in the way we teach to better meet the needs of the 21st century reader.

Is the integration of technology the answer? The appropriate use of technology in the classroom can be a challenge for the 21st century teacher. Technology in the classroom can be appealing to educators. However, determining the benefits of technology and asking whether those benefits outweigh the traditional tools of instruction is very challenging. One specific technology issue educators are currently debating is whether or not interactive e-books benefit student learning over traditional printed text.

Electronic books (e-books) are relatively new, and the research up to this point has been inconclusive as to whether interactive e-books truly increase reading achievement and student interest over that of printed text. Yet despite inconclusive data, many schools across the country are in the process of purchasing e-books or e-book licenses for classroom and library uses.

Research Question

Specifically, this study sought an answer to the following overarching question: Do the additional text features of interactive e-books, which are independently read by third grade students; increase student vocabulary acquisition and comprehension over traditional printed text?

Definitions

The following definitions are provided by the researcher, unless otherwise indicated, to promote clarity throughout this study:

E-books: “An EBook (also spelled Ebook, ebook, eBook, e-book, or e-Book) is electronic text (also known as etext or e-text) that is available in a digitally encoded format readable via an electronic device” (Wexelbaum, Miltenoff, & Parault, 2011, p. 2).

“E-books feature adjustable text size, highlighting, bookmarking, note taking, dictionaries, and reading aloud software” (Weber & Cavanaugh, 2006, p. 59).

Raz-Kids: “Raz-Kids is an award-winning resource that provides a library of differentiated books at 29 levels of difficulty that students use to practice reading in school, at home, or on the go. Digital and mobile access means that students get the personalized reading practice they need anytime, anywhere. With easy-to-use online controls, teachers can quickly manage and track their students’ reading progress in a matter of minutes” (<https://www.learninga-z.com/site/products/raz-kids/overview>)

Given that digital books are still relatively new to the field of education, there are few studies that investigate the effects these books can have on the teaching and learning process particularly with elementary students. Most of the extant studies do not focus on the academic benefits that digital books may provide. Furthermore, these studies do not present descriptions of how educators can successfully integrate digital books into their classroom in order to provide a more comprehensive reading curriculum. It is my hope that this pilot study will provide educators, administrators, parents, and anyone else interested in digital books with additional evidence to aide in the decision as to whether or not to implement them in the classroom setting.

Literature Review

Introduction

The integration of technology in public schools has produced significant changes in educational settings: “The technologies of literacy are rapidly changing. Today, children need to be prepared for much more than book literacies” (Leu, 2000, p. 424). Researchers Colwill and Gallagher (2007) agree with Leu, and argue that what children need to learn and how they learn has notably changed with the integration of technology.

Most public schools in the United States now provide students with opportunities to use computers, including Chromebooks, laptops, Nooks, Kindles, Ipads and/or other hand- held devices for educational purposes. In the 2014-2015 school year, students in California began taking the California Assessment of Student Performance and Progress (CAASPP) state standardized test via technology, rather than the historical and traditional pencil and paper route. As technology is becoming a big part of classroom teaching and assessments, so too is the use of electronic books.

For many students, electronic books (e-books) can promote increased reading engagement, comprehension and vocabulary development. This study will explore the interactive features of digital electronic books for primary students (K-3) vocabulary and comprehension growth, as compared with hard copies of books. Many electronic books are accompanied with features such as the text-to-speech option and/or audio of specific vocabulary terms, which makes them more interactive and allows children to become actively engaged in the text. According to Leu, when young children have access to

technology at an early age, they gain the necessary experience to become familiar with 21st century devices for reading (2000).

This review of the literature is a comprehensive collection of related works and previous research of studies about reading strategies to advance comprehension and vocabulary growth in the primary grades (K-3), and it will focus on the use of e-books to promote vocabulary and comprehension development. This chapter reviews the literature as it reflects the following variables of the study: reading strategies, vocabulary development, reading comprehension, engagement and motivation, and the effect and use of technology for reading instruction. This review will close with how and why e-books can promote increased reading engagement, comprehension and vocabulary development.

Reading Strategies

According to Stanovich (1986), vocabulary and comprehension have a mutual relationship. Stanovich uses a metaphor to describe a widening gap between good and poor readers over time: the Matthew Effect. On the Balanced Reading website, Wren (2003) reported that the Matthew Effect metaphor was originally coined by sociologist Robert K. Merton in 1968 from a line in the book of Matthew's Gospel: "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath" (XXV:29, King James Version). The research behind the Matthew Effect theory in education is that when it comes to foundational reading skills, some children begin their school career somewhat wealthier

than other students do. As time goes by, the students who begin school with literacy advantages will excel academically, and at a quicker rate, while their less fortunate classmates will fall further behind. The analogy of the “rich get richer and the poor get poorer” can be a problem in schools.

Research on effective reading strategies concludes that explicit teaching techniques are effective for teaching comprehension. In explicit instruction, it is important for teachers to tell readers when and why they should use particular strategies, what strategies to use, and how to apply a given strategy. According to Armbruster, Lehr & Osborn (2001), the steps of explicit instruction typically include direct explanation, teacher modeling, guided practice, and independent application. One way effective reading strategy instruction can be accomplished is through cooperative learning. Teachers guide students to learn to work in groups by explicitly modeling cooperation and reading strategies.

There is substantial agreement between researchers that vocabulary growth takes place through the contextual learning of meanings of unknown words that readers face in oral and written language, and equal agreement that the majority of vocabulary growth does not occur through direct instruction (Jenkins & Dixon, 1983; Jenkins, Stein & Wysocki, 1984; Sternberg, Powell, & Kaye, 1982). As children learn to read, they map the printed vocabulary encountered in texts in combination with the oral language they bring to the reading task. Therefore, understanding text depends on being able to translate

letter-sound correspondences into known words and comprehensible concepts (Kamil, 2004).

When students read e-books they can choose to have unknown words read aloud. Many of the words in e-books will highlight when students click on them. The highlighted text provides students with word pronunciations, definitions, and illustrations that enhance the story's actions. A wide range of portable devices (e.g., Ipad, Amazon Kindles, Sony's Reader Digital Books, and even some cell phones) offer instant access to thousands of books and are easily transportable, but some may require wireless capabilities (Larson, 2009). These digitized multimedia features also provide students with opportunities for rereading texts independently, which may result in the potential to decrease the Matthew Effects in education. Most educators recognize that vocabulary is a fundamental skill in learning to read.

Vocabulary Development

Children comprehend more vocabulary when they know the meaning of the words they hear and read (Freebody & Anderson, 1983). According to Beck and McKeown (1991), children who are immersed in oral and written language learn 2,500 or more words a year without the help of direct instruction. However, children begin school at varying levels of literacy exposure and development. This can be referred to as the Matthew Effect in education. Children who begin school with higher levels of vocabulary

awareness tend to increase their vocabularies at a higher rate than their peers that have received limited exposure to books.

Researchers in the field agree that it is beneficial for all students to receive effective vocabulary instruction. It is the responsibility of instructors to create many opportunities for students to learn words, their meanings, and related concepts. The traditional method of learning the definition of words at the surface level is not enough. Students need solid instructional opportunities to help them develop deep levels of word knowledge and to build their personal lexicons or cognitive storehouses of words (Beck, McKeown, & Kucan, 2002; Graves, 2006).

An example of an instructional method for assisting students to develop deep levels of word knowledge is to teach vocabulary as a pre-reading step. Teachers use this pre-reading strategy when students lack background knowledge necessary for successfully comprehending text. It is important for teachers to embed vocabulary words and meanings in the pre-reading discussion of the text with the students (Beers, 2003). Before reading, teachers need to engage students with the story, introduce vocabulary, and help them connect to any new information. Many teachers believe that comprehension is determined by questioning after reading, but students will not be able to answer questions correctly if teachers do not engage the readers before reading the story (Beers, 2003). When a teacher stimulates students' prior knowledge before reading, students' comprehension is increased. The additional prior knowledge that is activated

before reading helps the student connect to the text in a meaningful way (Toboada & Guthrie, 2006).

When students read e-books, they can choose to have the text read aloud to them. The words in the text will highlight as the student follows along. Therefore, definitions, word pronunciations, graphically stimulating illustrations that depict the story's actions and opportunities for rereading without adult supervision have the potential to enhance students' vocabulary development. Students may also choose to read the e-book independently. Many e-books have features that pronounce and define words when students click on the unknown words. Having this feature available to students during independent reading promotes vocabulary acquisition. However, many researchers agree that optimal student learning from e-books requires adult support and guidance (De Jong & Bus, 2002; Kim & Anderson, 2008; Korat, Segal-Drori, & Klein, 2009). Therefore, it is imperative that teachers activate students' prior knowledge before reading a text, static or digitized, to support students' reading comprehension.

Reading Comprehension

In order for students to become effective readers, they need explicit instruction in specific reading comprehension strategies, so they can apply these strategies to everything they read. Several researchers agree that instruction in metacognitive strategies improves students' reading comprehension (Cross & Paris, 1988; Paris & Oka, 1986). Research studies have shown that students who use metacognitive strategies while

they read become better readers and more clearly comprehend what they read (Cross & Paris 1988; Dewitz & Dewitz, 2003; Paris & Oka, 1986).

Gil and Labar (2001) as well as Lin (2001) agree with prior researchers that teachers need to model metacognition so their students can see and hear the thought processes that occur during reading. After the teacher models metacognition, the students need time to practice the strategies in an environment that promotes self-learning. Lin (2001) believes that with guidance from the teacher, the students will develop in metacognitive awareness.

Yuill and Joscelyne (1988) focused their research on students that struggled in comprehension and found that those who were less skilled in reading comprehension benefited from explicit comprehension instruction, while those who were more skilled in reading comprehension did not benefit significantly. They concluded that training less-skilled readers to use comprehension strategies brought them closer in ability to those students who were more skilled in reading comprehension. Paris and Oka (1986) conducted a study to investigate students' use of reading comprehension strategies by teaching them to be metacognitive about their reading process. The results revealed that students who used the Informed Strategies for Learning (ISL) instructional approach improved their reading comprehension. Additionally, readers of all skill levels benefited from using ISL. The Informed Learning Strategies instructional approach uses teacher led direct instruction. This approach to learning is very explicit and systematic with a gradual

release of responsibility from the teacher to the student. Cross and Paris (1998) defined

ISL as:

Informed Strategies for Learning (ISL) includes several features of direct instruction such as (a) directing children's attention to the material to be learned, (b) generating high levels of student involvement, and (c) providing frequent practice and immediate feedback. In addition, instruction progressed so that there was a gradual release of responsibility from the teacher to the student. This was accomplished through (a) modeling of the target strategies, (b) guided practice, and (c) independent application of strategies. Furthermore, we provided rationales for each of the strategies so that students would be motivated to use them selectively and independently (p. 132).

Cross and Paris (1998) conducted a similar study that used ISL to examine the relationship between metacognition and reading ability. However, unlike Paris and Oka (1986) they did not find ISL to have a significant effect on all readers. Rather, they found that ISL for reading comprehension had the greatest impact on less-skilled readers. Cross and Paris' (1998) research suggests that when metacognitive strategies for comprehending all text are explicitly taught to less-skilled readers, comprehension improves. Explicitly teaching metacognitive strategies to students will support their reading comprehension. An example of this would be for the teacher to use a strategy referred to as "think alouds" during instruction. During a read aloud, the teacher deliberately stops throughout the story to share her thinking about what she read, and makes a prediction about what might happen next. By stopping to ask questions and explaining to students her own thinking, the teacher is demonstrating how to use metacognitive strategies. After modeling the think aloud strategy, the teacher might stop while reading a story and ask students to share their thinking and to make predictions.

When the teacher explicitly models metacognitive strategies for students, they will become metacognitive readers as well (Baker, 2005; Palincsar & Brown, 1984).

Afflerbach, Cho, Kim, Crassas and Doyle (2013) agree with previous researchers and support the use of metacognition with reading development, and suggest that the key components of reading development include metacognition, motivation and engagement, epistemic beliefs, and self-efficacy. Electronic books that are engaging and motivating to students may increase comprehension when explicit teaching of metacognition prior to independent reading practice occurs. Explicitly teaching students how to ask questions during the reading process to monitor their reading will contribute to making gains in reading comprehension. Even readers that have strong cognitive skills may not choose to spend much time engaged in reading if they are not motivated to read (Wigfield, Guthrie, Tonks, & Perencevich, 2004). Students that are engaged and motivated during reading will persevere in using strategies to construct meaning from both print and digitized copies of books.

Electronic books can provide supports for readers that printed books cannot. For example, features such as narration, word pronunciation, animations and sound effects, which support the text, can aide in reduce the effort of decoding individual words and assist a student in focusing on comprehension of the text (Lewin, 2000; Matthew, 1997; Miller, Blackstock & Miller, 1994). Many electronic books are created with these features. The research of De Jong and Bus (2004) provides evidence that young children who were capable of understanding stories could retell a story after independent

experiences with the electronic form of the story. De Jong and Bus (2004) also found that children have an understanding of e-books that are read to them that is comparable to their understanding of books that are read aloud to them by an adult. Depending on the child, some of the extra features of e-books might contribute to distractions from the story. However, given that engagement and motivation is an essential building block for early literacy development, enhanced e-books may be valued for their ability to encourage less motivated young readers toward engagement, when they might otherwise avoid text altogether. Therefore, for many students, the supports that e-books provide may open the reading door of engagement through the motivating interest in an e-book.

Engagement and Motivation

The literature addresses the engagement model of reading comprehension development and suggests that engagement in reading is the combination of motivational processes and cognitive strategies during reading comprehension. Highly engaged readers are internally motivated and strategic, while disengaged readers show lower motivation and less use of strategies for comprehending text (Guthrie, Wigfield & VonSecker, 2000; Wigfield, Guthrie, Tonks, & Perencevich, 2004; Wigfield, Guthrie, Perencevich, Klauda, Mcrae, & Barbosa, 2008). Teachers who support their students' perception that they are capable of reading set their students up for success. When this positive perception and belief occurs, students become engaged in reading. Therefore, the growing popularity of

e-books can be one technique to achieve engagement while expanding the reading program.

Leu (2000) addresses the idea of an expanded focus: “All of us must begin to expand our focus to include much more than traditional book literacies” (p. 425). This new technology of e-books for literacy includes the skills necessary to access information, promptly identify important problems, access information relevant to these problems, effectively use the obtained information to solve these problems, and communicate this information to others. Hess (2014), whose research is formative and relevant to this study, agrees with Leu and proposes that “new literacies are continually redefining education and the definitions of learning. Educators are being challenged to integrate technology and new literacies, and the use of e-readers is one way to work towards meeting this challenge” (p. 38). Larson (2009) further supports the use of e-books to foster literacy development:

Integrating e-books into an otherwise traditional literacy program is an effective move toward new literacies instruction. Each reader breathes life into the text through personal meaning making and individual experiences. E-books clearly offer new opportunities and extended possibilities for personal interpretation of and engagement with texts (p. 256-257).

Jones and Brown (2011) agree with Larson and state that electronic storybooks are similarly becoming more popular and a motivator for personal reading. When using e-books the reader has access to a large selection of book titles to read anytime and anywhere as long as they have a device to access the multitude of available books. Electronic books provide instant access and are available through personal electronic

devices and online websites. Jones and Brown (2011) argue that there are two main factors that influence the transition from printed text to an electronic version of text. The first factor is the fact that electronic books have the capability to provide access to vocabulary definitions immediately by the reader. Secondly, when reading an e-book on a computer or through a hand-held device, students can access reading materials and applications (apps) at their reading levels.

In addition to access, motivation is an accurate predictor of a child's willingness to want to read. Motivation is one predictor of the amount students read. Students show gains in reading achievement when the level and time reading is spent engaged in literacy activities (Wigfield et al., 2008). Evidence suggests that e-books can be a source of this type of engagement. Many students are entering elementary school with some level of technology exposure. The 21st century learners are motivated to use personal devices for reading purposes: "Reading from a digital screen is comfortable and familiar for most K-12 students" (Jones & Brown, 2011, p. 4).

The Effect and Use of Technology for Reading Instruction

Electronic books are books that children can read on desktop computers, laptops, or handheld reading devices. Electronic books offer readers print and illustrations much like traditional books. However, e-books engage readers by offering multimodal features that traditional books do not offer. Many e-books come with video and audio links, as well as interactive tools at the touch of a finger.

Such tools invite the reader to physically interact with the text through inserting, deleting, or replacing text; marking passages by highlighting, underlining, or crossing out words; adding comments by inserting notes, attaching files, or recording audio comments; and manipulating the page format, text size, and screen layout. Search features allow the user to locate specific words or phrases with the text or access a particular page (Larson, 2009, p. 256).

Larson's (2009) research support electronic texts as a means to foster literacy development and, in particular, reading comprehension. While the early evidence is promising it is still in its infancy, and there is an ongoing need for further research in this area. Previous research confirmed that electronic book features such as sound effects and animations, narration, and word pronunciation, all support the text and help to ease the decoding effort of individual words, which enables a child to focus on comprehension (Lewin, 2000; Matthew, 1997; Miller et al., 1994). Many electronic books have varying levels of supports. At the most basic level, e-books provide some form of digitized speech that produces word pronunciation and definitions to aid in comprehension. A more sophisticated e-book provides a fully digitized narration that highlights the text while the narration option is on.

When the narrative of a book was long and difficult, Greenlee-Moore and Smith (1996) found that comprehension actually improved for electronic book reading of third graders. They argued that this was due to students having the instant benefits of word pronunciation and definitions of unknown words in the electronic book format. In the same study, Greenlee-Moore and Smith (1996) reported that students reading printed versions of books could have received the same vocabulary support provided by their teacher, but none of the students made use of consulting with their teacher for the

necessary vocabulary support. From their research, they concluded that e-books provide students with privacy to ask for help as compared with printed copies of books that involve asking the teacher publicly. When students ask for help from the teacher that involves time away from the text, the time away might result in comprehension reduction.

Furthermore, when students are embarrassed to ask for help, they will choose to read on, even if they do not understand some of the word meanings. A student may continue reading without comprehension because it is safer than suffering public failure (Greenlee-Moore and Smith, 1996). When students have the opportunity to use e-book apps and websites, they can download and start reading books, at their reading levels, within minutes. With such a large variety of e-books available to students instantaneously, educators might begin to witness the Matthew Effect gap lessening in education. However, continued research is needed since e-books, for classroom learning, are still relatively new to education.

Electronic Books

Several researchers have determined that the multimedia features of e-books have the potential of being both beneficial and, conversely, problematic to young children (De Jong and Bus, 2004; Verhallen, Bus, and De Jong, 2006; Moody, Justice, and Cabell, 2010). In a study conducted by De Jong and Bus (2004), they found that electronic texts did not efficiently support internalization of story content. They concluded that the

attractive digital options of e-books diminished children's attention to the text rather than providing meaningful interactions. In a later study, Verhallen et al., (2006) discovered that the multimedia features of e-books (e.g., video, sounds, and music) could be problematic for some children. They concluded that multimedia features could tax children's working memory. They argued that children might benefit more from e-books without visual, music, sound, or other special effects. In contrast, Verhallen et al., (2006) recognized the benefits of multimedia features to support children's inference making about characters' actions and feelings. Pearman's study (2008) on using CD-ROM storybooks with second graders, reported stronger retellings among readers of e-books. Research conducted by Moody et al., (2010), on using e-books with at risk young children, concluded that e-books with digital scaffolds and supports can contribute to vocabulary development, reading engagement, comprehension, and phonological awareness skills. They recommend using developmentally appropriate e-books that limit distracting digital features that are unrelated to the story.

The relationship between e-books and comprehension continues to be debatable. There is a need for continued research in this area, since research that specifically examines that relationship is scarce (Pearman, 2008; Zucker, Moody, & McKenna, 2009), and fails to clearly identify e-books' features as either supports or impediments to comprehension. However, there is evidence in the research that indicates possible benefits of e-books use for children who are struggling to learn to read. Specifically, studies suggest that the digital features that are available in e-books can support reading

engagement, vocabulary development, comprehension, and phonological awareness skills in young children by utilizing the digital scaffolding supports (Zucker et al., 2009).

In the meantime, there are many apparent benefits that can be utilized by both students and educators. Technology for educational purposes is growing in our 21st century classrooms. There are vast numbers of leveled texts available through electronic book programs and applications (apps). When students have access to electronic books through leveled reading book rooms, they will spend more time on independent practice, which will increase vocabulary development, reading comprehension, engagement and motivation. Educators interested in making evidence-based instructional decisions might consider specific strategies for choosing and using e-books in the classroom. These strategies would include choosing developmentally appropriate storybooks, using e-books in addition to traditional print books, pairing direct instruction with e-books, and monitoring/eliminating distracting features embedded in e-books (Moody et al., 2010).

In the 21st century classrooms of today, reading instruction is experiencing tremendous changes as new technologies demand new literacy skills (Leu, Kinzer, Coiro, & Cammack, 2004). Fasimpaur (2004) proposed that students find e-books to be “a new and unique medium” (p. 12). The 21st century learner will often read more when having access to e-books. Struggling readers may benefit from the additional text tools available with the use of e-books. Technology offers a new vision and dimension of reader response. Students will benefit greatly as teachers consider new ways to integrate

electronic books with traditional literature in 21st century classrooms (Fasimpaur 2004; Moody et al., 2010).

Conclusion

The review of the literature focused on previous and current research about reading strategies to promote reading comprehension, vocabulary development, motivation and engagement, and the effects of using e-books for reading instruction.

Foundational reading skills that children begin school with varies from child to child. Informed Strategies for Learning (ISL) and think alouds are examples of explicit direct instruction approaches used for teaching reading comprehension and vocabulary acquisition. Vocabulary and comprehension have a mutual relationship. It is beneficial for all students to receive effective vocabulary and reading comprehension instruction. Vocabulary growth can also take place through contextual reading engagement. It is essential that teachers activate students' prior knowledge before reading a text, static or digitized, to support students' reading comprehension. Incorporating e-books, in primary classrooms, have the potential to support readers' vocabulary development and comprehension. Electronic books can provide instant access to thousands of books, and offer digitized multimedia features to support students' independent reading. However, ideal student learning from e-books requires guidance from adult support.

Motivation is an accurate predictor of a child's incentive to read. Electronic books that are engaging and motivating to students may increase comprehension when explicit

teaching of metacognition prior to independent reading practice occurs. Electronic books could be one method to achieve extended reading focus and engagement. The multimedia features of e-books that are beneficial to some children could be problematic to others. Children might benefit more from e-books without visual, music, sound, or other special effects.

In the 21st century classrooms of today, teachers need to choose e-books based on evidence-based research. Electronic books should be used in tandem with print books based on the students' independent reading levels. Teachers need to instruct with e-books and monitor distracting features. The 21st century learner will often read more when they have access to e-books.

Although a great deal of technology exists for the use of electronic books in the classroom as an instructional tool, there continues to be a need for more research conducted on its effectiveness on vocabulary development, reading comprehension, and engagement and motivation. The relationship between e-books and increased reading strategies with primary aged children continues to be debatable. This review of literature justifies a call for an increased study on this topic, not only on specific e-book applications (apps) and programs, but also on more specific and diverse outcomes such as reading motivation, engagement, and comprehension.

Absent from the literature is a body of research that supports utilizing e-books, in primary classrooms, to increase vocabulary acquisition, and reading comprehension through motivation and engagement. This study will seek to find the correlation between

print copies of books and e-books in regards to vocabulary development and reading comprehension. The quantitative approach will provide evidence of whether or not third graders' reading comprehension and vocabulary acquisition increases at a higher rate after independently reading e-books versus static copies of books. The methodology of quantitative research will be outlined in the next chapter.

Methods

Introduction

The focus of this research project was to explore the use of digital books in comparison to traditional printed copies of books with third grade students. I wanted to examine whether or not vocabulary acquisition and comprehension; after independent reading, would be greater when students read electronic versions of books with their instant access to comprehension tools. A counter balanced design was used to examine the question: Can electronic books (e-books) contribute to increased vocabulary acquisition and reading comprehension in third grade students?

Sample Selection

I work at a rural elementary school in Northern California, and I conducted my research at this school. The school serves students in grades transitional kindergarten through eighth grade. I am the full time reading specialist. I provide reading intervention for students that are identified in need of additional support. Approximately 50% the students attend the school from outside the school district's geographical boundaries. School enrollment for the 2016-2017 school year, is approximately 450 students. Approximately 17% of students are considered socio-economically disadvantaged and qualify for free or reduced lunch.

A part of my job as the Reading Specialist is to assess all students K-3, three times a year (beginning, middle, and end). The assessment that I use is called the

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) reading assessment. After I conducted the DIBELS mid-year assessment, I had twelve students that qualified to work with me for 25-30 minutes, five days a week, in a reading intervention pull-out program. I selected these twelve students for my pilot study by convenience sampling. The DIBELS mid-year data indicated that the students were slightly below the district benchmarks in reading fluency and/or reading comprehension.

Another reason I chose the third graders on my caseload for my research was their interest and motivation in reading books on iPads using apps like Raz-Kids, and Epic for Educators. I conducted my research in February and March of 2017. My study involved students reading books at their independent levels. According to the Developmental Reading Assessment (DRA) Level Correlation Chart, the six books that I chose for the participants to read were all written at a DRA level of 28. This level correlates to the end of second grade and beginning of third grade reading levels. At the time I conducted my study, a DRA level 28 was the independent reading level of all twelve participants in my research.

Human Subjects Protocol

This study was reviewed by the Humboldt State University Committee for the Protection of Human Subjects in Research and approved (#16-142). To help ensure confidentiality no names were used throughout the report. I obtained written permission from the principal and superintendent at my school site. I also received written consent

from each of the twelve participants' parents. The informed consent also gave contact information for the researcher, research advisor and chairperson of the humans subjects review committee.

The twelve third grade students (4 girls and 8 boys) ranging in age from 8 to 9 years old, also consented to participate in this study. The twelve students that I selected for my study were independently reading at 2.8 – 3.0 reading levels, with fluency scores ranging between 60 – 95 correct words per minute. In our school district, according to benchmark reading assessments in late February, early March, third graders should be independently reading books between 3.5 – 3.8 reading levels, and their fluency scores should be between 105 – 115 correct words per minute. . The mid-year benchmark data revealed that the twelve students independent reading levels were at the beginning of third grade and that their fluency scores were below expectation. Therefore, the students qualified to be in my reading intervention program due to their underperformance on our district mid-year benchmark assessments.

Instrument

The six books that were used for my study were from “Raz-Kids”. Raz-Kids is an application (app) that our school has purchased for primary students (K-3) to use for online, leveled book reading through the website <https://www.readinga-z.com>. The six books that each student read were all nonfiction at a Developmental Reading Assessment (DRA) level 28. The stories are located in the level “N” and “O” book rooms in the Raz-

Kids Leveled Reading Bookroom. The titles and authors of the books are: “Awesome Ants” by Rus Buyok Leveled Book N, “Elephants” by Kira Freed Leveled Book N, “Bats” by Ned Jensen Leveled Book O, “Park Rangers” by Katherine Follett, “Whales” by Vic Moors Leveled Book O, and “Wonders of Nature” by Cheryl Ryan Leveled Book O. Readinga-z.com is the publisher of all of the books in Raz-Kids. The electronic books were printed to provide equivalent paper based readings. These two different story book formats were used, printed copies and electronic versions of the same six titles. The comprehension quizzes were given after the participant read each book. All quizzes were printed and all students in both the experimental and control conditions completed the quizzes on paper. I used the appropriate quiz items that the readinga-z.com provided at the end of each book selection. There were ten multiple choice questions and one short answer. All eleven questions addressed third graders' vocabulary acquisition and reading comprehension according to the medium of presentation.

Procedure

There were twelve third graders that participated in the study. All of the participants alternated between reading print versions of books and electronic versions using a counter balanced design. Each student was their own control in the paper sessions. Over the course of six cycles all students read the same six books in parallel. For example, in the first cycle, the six students in group A read the electronic version of the book, while the six students in group B read paper copies of the same book. In the

second cycle, group B read the electronic version and Group A read the paper copies. At the conclusion of the experiment, all students had read three books electronically and three books printed on paper for a total of six trials. I facilitated the study conducting six trials with all twelve students. We met together two days a week, Monday and Wednesday, for three weeks reading a different book each day. The length of each session was fifty minutes.

At the first session, I randomly assigned six students to the e-book story “Elephants” and six students to the same book but in the print copy version. I discussed with the group that they would all be reading the same six books, and that by the end of my research study they will have read three e-books and three print copy books.

Before independent reading occurred, in the whole group setting, I introduced the book, and provided a brief summary of what the students would be independently reading. Next, I built background knowledge and introduced the vocabulary words that are bolded in the text and defined in the glossary. Readinga-z.com provides a downloadable pdf lesson plan for all the stories that are accessible on the Raz-Kids app. After completing the whole group pre-reading lesson, I explained to the students that they would silently read the book (e-book or print copy). I reminded the students reading the electronic version that they had access to the built in multimedia features that the e-books application “Raz-Kids” provides. The twelve participants were already familiar with the Raz-Kids app and knew how to use the program’s various multimedia features. I explained to the students reading the print version of the book, if they raise their hands

for help, I would come over to them to answer any questions they might have and reminded them of the classroom resources they could use to find definitions or words. Next, I explained to the whole group that after they finish reading the book, they will answer ten multiple choice questions and one short answer questions. On the whiteboard, I wrote a topic sentence for all the students to use to begin the writing prompt. The sentence I provided was restating the question prompt. Finally, I asked the group if they had any other questions before they began to independently read the book. After I answered all students' questions, they began to silently read their version of the book, "Elephants." Some of the students reading the print copy of the book opted to raise their hand to ask about words they were having difficulty decoding. None of the students asked me for the definition of an unknown word.

After each student finished reading the book (e-book or print version) independently, they answered the ten multiple choice questions and one short answer that the application "Raz-Kids" provides. For the comprehension test, I decided to have all twelve participants answer the questions on paper, even when they read the electronic version of the book. I wanted to have assessment commonality between all the participants.

For sessions two through six, I repeated the same process for each additional book (Bats, Awesome Ants, Park Rangers, Wonders of Nature, and Whales) by providing a summary of the book, building background knowledge, and pre-teaching the vocabulary.

The students alternated between print copy and e-book. For example, if students read the e-book in session one, they read the print copy in session two.

Analysis

All quizzes were graded blind without knowledge of the specific student's identity and late, after the results had been recorded, confidential when students added their names. Each student was given a quiz that I numbered 1-12 on the back. When they turned in their completed quiz, I recorded the numbered quiz that they took. After I graded each quiz, I asked the students to write his/her name at the top of the paper. The quantitative data were analyzed separately by mean scores comparing electronic books to printed books, and then a second time comparing individual students' electronic scores to their paper scores.

Methodological Challenges

One challenge that the participants faced was to independently read each book silently, or listen to the book being read to them on the electronic version by using headphones. Without being held accountable by reading aloud, it's hard to determine whether or not each participant actively or passively read each book. Another challenge was the fifty minute time period that was allotted for each book. It was hard to determine if fatigue set in and that by the end of the time period some participants just wanted to be done and began to guess at the multiple choice test questions, rather than going back into

the book to look for information that would provide them with the correct response answers.

Results

The results of my study provided no significant difference on the quizzes after each book. In fact, the mean results for the vocabulary questions were identical after reading the paper copy or the e-book copy of the given books. Independent t-tests were run to examine differences between paper and e-book conditions on comprehension and overall test scores.

Table 1: Two Sample T-Test and CI: Comprehension

1 = electronic 0 = paper	N	Mean	StDev	SE Mean
0	36	6.33	1.64	0.27
1	36	6.67	1.59	0.26

The t-test revealed no significant differences between electronic and paper on comprehension.

Table 2: Two Sample T-Test and CI: Total Score

1 = electronic 0 = paper	N	Mean	StDev	SE Mean
0	36	9.53	1.81	0.30
1	36	9.89	1.74	0.29

The t-test revealed no significant difference between electronic and paper on total assessment score. A One-Way ANOVA was used to determine if the format made a difference in overall test scores for each individual title compared to the others. The

question was: Were there some books that were more difficult to read and did this have an effect on the results?

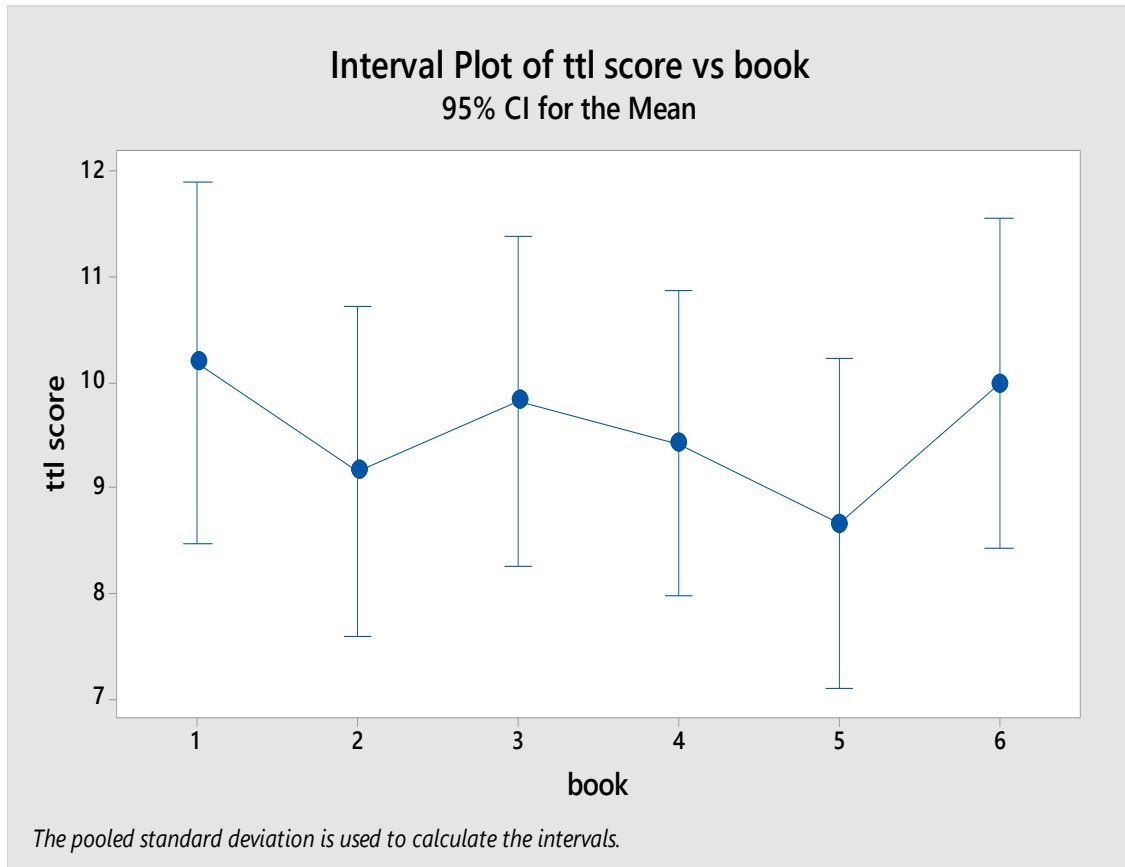


Figure 1: Interval Plot of Total Score vs Paper Book

There were no differences in the overall test scores between paper books ($df = 5$) (F -value = 0.54) $p = 0.746$. This test was repeated for the electronic versions.

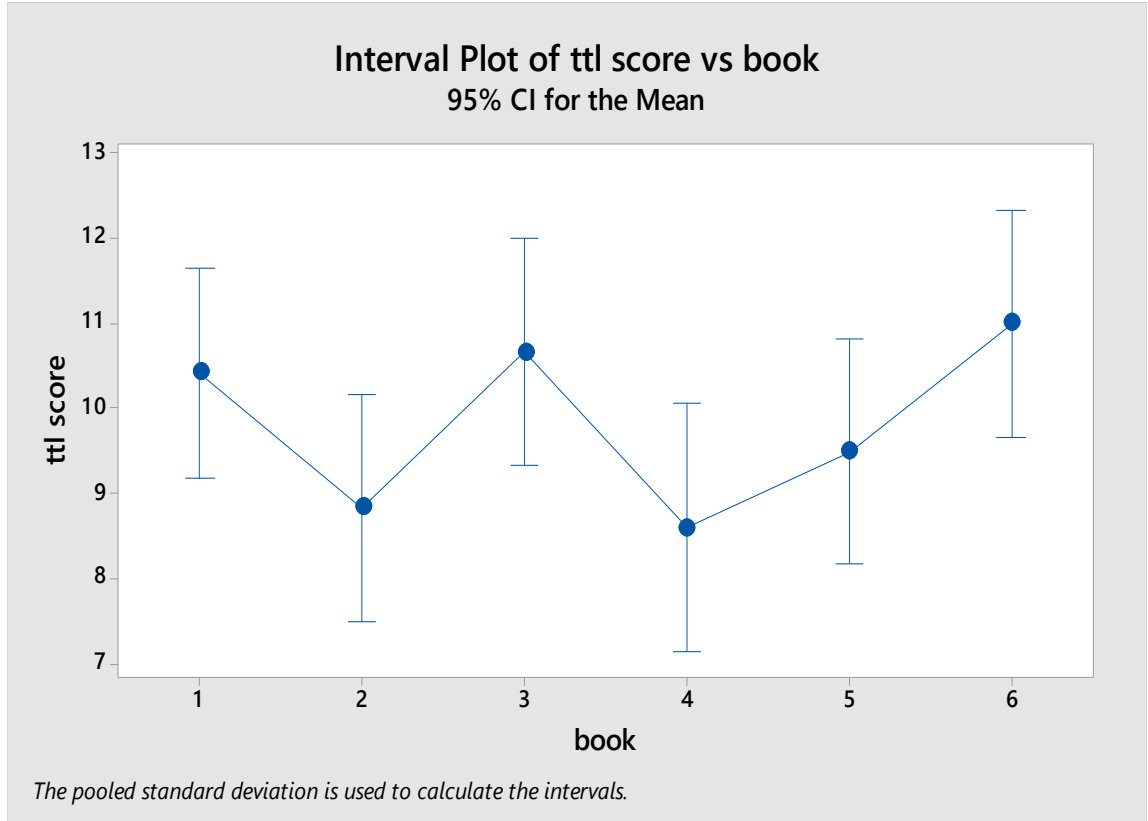


Figure 2: Interval Plot of Total Score vs Electronic Book

The electronic version shows low scores on books 2, 4 and 5. This is a near significant difference ($df = 5$) ($F\text{-value} = 2.27$) $p = 0.073$) compared to the other three e-books.

Low Score Analysis

In order to examine the degree to which low achievers may demonstrate different outcomes, scores below the overall average were separated and tested independently.

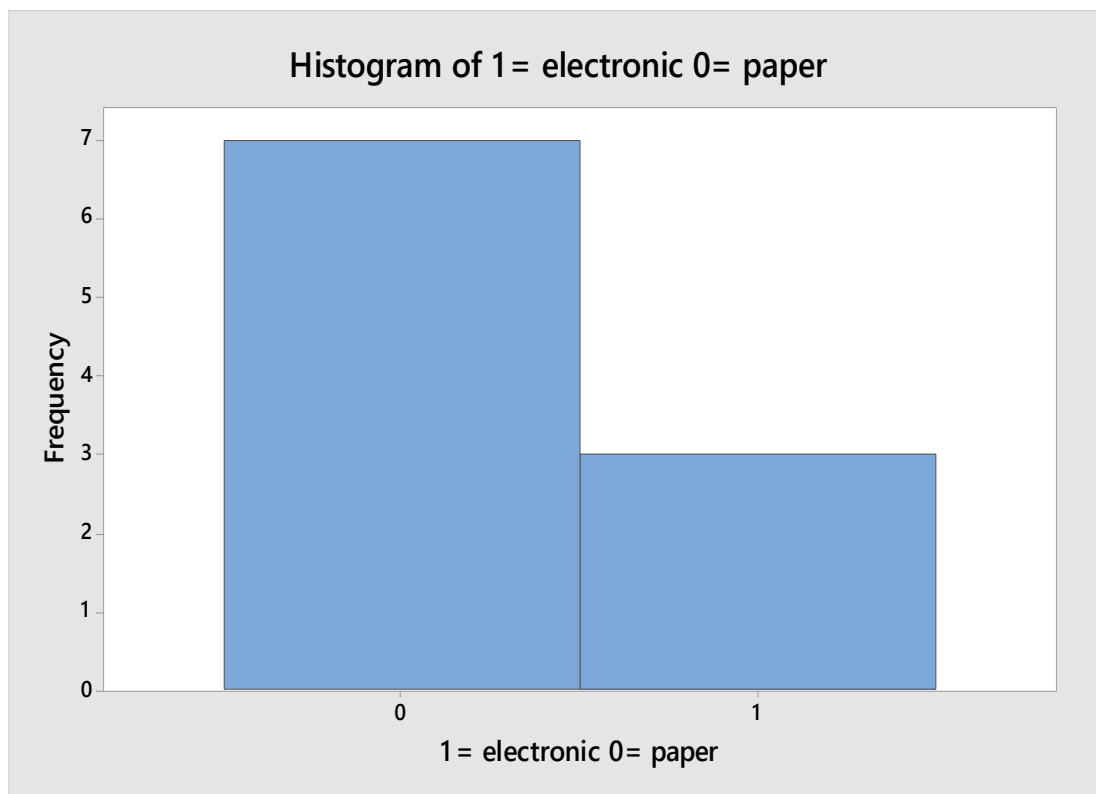


Figure 3: Histogram Comparing E-books to Paper Books

The histogram shows the majority of low scores were when students read the paper version of the books. The graph only includes instances where the score was below the overall average. This finding may raise issues of attention and/or persistence when the book does not have the multimedia features available like the electronic books. To further examine this possibility the bar graph below illustrates the overall scores of the electronic/paper books amongst those earning scores below the overall mean. A clear pattern emerges with all but book #2 showing higher scores for the e-books.

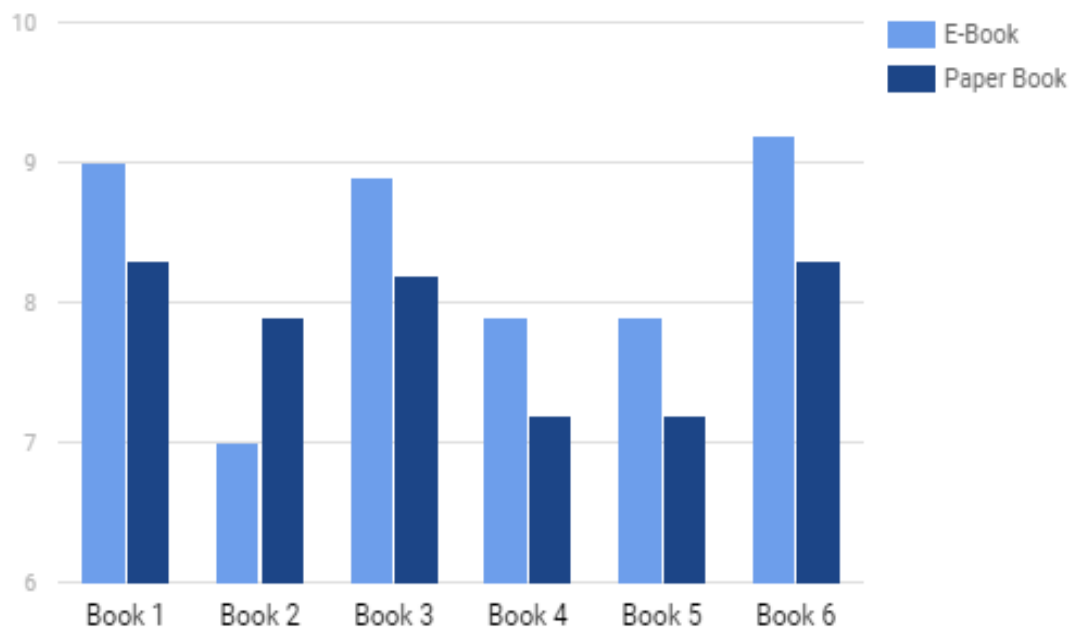


Figure 4: Bar Graph Comparing E-books to Paper Books (Mean Scores)

The bar graph shows that five out of six low scores were when students read the paper versions of the books. As demonstrated earlier, the small differences are nonetheless insufficient, given the size of the sample, to establish a significant difference between the two formats.

Given the small sample size, there is a danger of a Type 2 error in examining the differences between e-books and paper versions. Overall, there was no significant difference between the two formats. Results varied amongst the six titles with three showing significant differences amongst the e-book readers. When low achievers were separated, electronic books appeared to gain a consistent, albeit small, advantage.

Discussion

Summary of Major Findings or Results

There is a vast amount of research on reading strategies, vocabulary development, reading comprehension, engagement and motivation, yet there is little research on the effective use of technology in reading instruction when reading electronic books. This study sought to determine if the additional text features of interactive e-books, which are independently read by third grade students; could increase student vocabulary acquisition and comprehension over traditional printed text.

This pilot study presented slightly improved results on quizzes after reading e-books compared to print copies of books. However, the results of the study did not provide a statistically significant difference on the quizzes after each book. There may be several reasons for this, for example, I explicitly taught pre-reading strategies by building background knowledge and front loading vocabulary for each book. It is possible that this supplemented the understanding of the paper-book readers in ways that overwhelmed the effect of the mode of presentation. Given the small sample size, a variety of factors may have influenced the outcome to obscure the true potential of e-books to enhance reading skills and knowledge.

Studies by several researchers found mixed results that depending on the child, some of the extra features that e-books provide can become distractions from the stories as well as enhance the experience (De Jong and Bus, 2004; Verhallen, Bus, and De Jong,

2006; & Moody, Justice, and Cabell, 2010). This variation may have contributed to the ambiguous results of my study.

The results of this study suggest that the relative difficulty of a reading text is similar in both formats. The e-book does not appear to make harder books easier to read. The results held the same pattern for both formats, books 2,4 & 5 seem to be somewhat more difficult for both groups. The selection of books on a reading level slightly below their current reading levels may also have limited the evidence regarding the ways in which an e-book can mitigate a book's difficulty. There is a need for continued research in this area, since research that specifically examines that relationship is scarce (Pearman, 2008; Zucker, Moody, & McKenna, 2009), and fails to clearly identify e-books' features as either supports or impediments to comprehension. However, there is evidence in the research (Zucker et al., 2009) that indicates possible benefits of e-books use for children who are struggling to learn to read. Specifically, studies by De Jong and Bus (2004); & Moody et al., (2010) suggest that the digital features that are available in e-books can support reading engagement, vocabulary development, comprehension, and phonological awareness skills in young children by utilizing the digital scaffolding supports.

Limitations of the Study

This study is limited in its sample size. The research contained a sample size of twelve students, primarily Caucasian from a middle class background. This sample was effective for conducting a pilot study but limits the generalizations that can be made.

Additional limitations include the lack of direct interaction with the students, the focus on only one electronic book program, and a limited amount of books that students read.

There were very few quiz questions that focused on vocabulary. Each quiz offered two out of twelve questions that focused on vocabulary acquisition. While it was part of the original design, the lack of data for vocabulary acquisition made analysis of this feature impossible. Finally, staffing limitations in the study meant that I was unable to observe students formally during the study to evaluate issues of attention and persistence.

Implications for Future Research

Given that electronic books are fairly new to educators, further research evaluating their academic benefits for accelerated comprehension and vocabulary acquisition in literacy development is needed. Similar case studies with students of different backgrounds and age ranges would be beneficial to this research. Additionally, it would be advisable to conduct further quasi-experimental studies with larger samples in which two groups are compared: one that reads only the electronic book versions and one that reads the printed books. As in the current study, both groups would read the same stories and take the quizzes to test for reading skills such as comprehension and vocabulary acquisition. The results from this type of experiment might allow more robust conclusions to be drawn.

Overall Significance of the Study

This study examined the relative effectiveness of paper vs. e-books for comprehension and retention. The study design was determined to be an effective method of evaluating this question. While the results did not reach statistical significance, they do suggest some areas for further research. Today's elementary students are very different than those of past decades. They are introduced to technology at a very young age and are surrounded by it both in and out of the home. The vast majority of today's youth are excited and motivated by all facets of the digital age, whether it is cell phones, computers or video games. Educators have a responsibility to effectively integrate technology into the current curriculum to prepare students for the real world and to keep them motivated.

Electronic books are one of the key tools teachers have in capturing the attention of today's students. However, according to the literature, very few teachers are utilizing them in the classroom suggesting the need for more evidence assessing their value. In my experience, electronic books not only excite students, but also motivate them to read, and help meet various student needs. Electronic books may be able to provide educators and students new options, scaffolds, and resources for reading materials at all levels and for all purposes. This study contributes to the growing body of evidence exploring the question of how effective e-books are in promoting reading skills.

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Appendices



Feb 5, 2017

1617 Old Arcata Road
Bayside, CA 95519
(707) 822-4896
Timothy Parisi Superintendent
Principal Melanie Nannizzi

Dear Third Grade Parents,

I am currently enrolled in the Master's of Education Program at Humboldt State University, and I am doing research for my Master's Thesis. The study is called, Utilizing E-books for Increased Vocabulary and Comprehension in 3rd Grade. Mr. Parisi and Mrs. Nannizzi have given me permission to do my research with the third grade students that I work with in my reading intervention program. Your child is in my program, so I would like to do my study during our reading intervention time.

In my study, I will investigate the differences in third graders' vocabulary learning, reading comprehension, and enjoyment of story books according to how the book is presented. Twelve third grade students will be in my study. To conduct my research, I will meet with the third graders for seven sessions. The first session will be a review of the app Raz-Kids and all the supporting functions that the electronic book program offers to readers. Students will learn, or review, the functions that the e-book program provides, and they will have time to explore and practice the various functions of the e-book format.

For the next six sessions, two different story book formats will be used, printed copies and electronic versions of the same books. During these sessions, students will be given with a book (half of the students will receive the colored printed version of the book and the other half will receive the electronic book of the same story). All students will read both printed books and electronic books. After the students read a book independently, they will be asked to answer the comprehension questions. There will be ten multiple choice questions and one short answer. The third graders that read an e-book will answer the questions electronically, and the students that read the paper copy book will answer the questions on paper. At the end of the seventh session, each student in my study will have read and answered the comprehension questions to three printed copies and three electronic copies of the same books. Your child already does these types of reading and reading comprehension tasks with me during our normal sessions together.

I am very excited to learn whether or not the format of the book (printed or digital) will make a difference when it comes to comprehending books. The benefits of your child

participating will help me determine the outcome of my study. All data will remain confidential and will be deleted after my Master's in Education is awarded this spring. It is possible that the data collected may be shared with other researchers in the future. I am asking for your permission to allow your child to be part of my Master's Thesis research. Your approval to conduct this study will be greatly appreciated. All students will remain anonymous, that means your child will not be referred to by name. I am willing to answer any questions you have about this study. Your child's participation is voluntary and he/she may stop at any time. If you have any concerns with this study or questions about your child's rights as a participant, contact the Institutional Review Board for the Protection of Human Subjects at irb@humboldt.edu or (707) 826-5165. You may also contact my Humboldt State University supervisor, Eric Vanduzer, at evv1@humboldt.edu.

If you agree and give permission for your child to be part of my study, please sign below and return this form to me. If you have any questions or concerns, please contact me at jbickel@jcsk8.org or at 825-4896. I am more than happy to talk about my study with you.

Sincerely,

Jenney Bickel
Reading Specialist
Jacoby Creek School

Permission granted by:

Print your name

Signature

Date _____

Print your Child's Name



1617 Old Arcata Road
Bayside, CA 95519
(707) 822-4896
Timothy Parisi Superintendent
Principal Melanie Nannizzi

January 25, 2017

Dear Tim Parisi and Melanie Nannizzi,

I am writing to request permission to conduct a research study at Jacoby Creek School. I am currently enrolled in the Master's of Education Program at Humboldt State University, and I am in the process of conducting research for my Master's Thesis. The study is entitled, Utilizing E-books for Increased Vocabulary and Comprehension in 3rd Grade. I am hopeful that the school administration will allow me to conduct my research with the twelve third grade students I currently work with in my reading intervention sessions. I will be conducting the study during their intervention time with me. Since my research involves children, I will need to obtain parent permission for each student. My research will take place during regular school hours and has no foreseeable risks, so I feel confident that I will be able to obtain written parental permission. I have attached the parent permission letter for you to review.

The study that I conduct will investigate the differences in third graders' vocabulary acquisition, reading comprehension, and enjoyment of story books according to the medium of presentation. For my study, I will meet with the third graders for seven sessions. The first session will be a review of the app Raz-Kids and all the supporting functions that the electronic book program offers to readers. Students will learn, or review, the functions that the e-book program provides, and they will have time to explore and practice the various functions of the e-book format.

For the next six sessions, two different story book formats will be used, printed copies and electronic versions of the same books. During these sessions, students will be presented with a book (half of the participants will receive the colored printed version of the book and the other half will receive the electronic version of the same book). All participants will read both print versions and electronic versions. After the participants read a book independently, they will be asked to answer the comprehension questions. There will be ten multiple choice questions and one short answer. Participants that read an e-book will answer the questions electronically whereas; the participants that read the paper copy book will answer the questions on paper. At the end of the seventh session,

each participant will have read and answered the comprehension questions to three printed copies and three electronic copies of the same books.

Your approval to conduct this study will be greatly appreciated. I would be happy to answer any questions or concerns that you may have.

If you agree, please sign below and return this form to me.

Sincerely,

Jenney Bickel
Reading Specialist
Jacoby Creek School

Approved by:

Print your name and title here

Date

Signature

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Date

Signature

General 2 Point Written Response Rubric

Score	
2	Restates the question Has the correct response Gives a solid explanation or reason that relates to the story and give specific examples from the text
1	Attempts to restate the question Has the correct answer, but weak (or no) explanation OR Has incorrect answer but solid explanation Needs more references from the text
0	Does not restate the question Has incorrect answer Has weak or no explanation No references from the text