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The Effects of iPad Apps on Student Achievement in Literacy for Children in 2nd and 3rd Grade

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The Effects of iPad Apps on Student Achievement in Literacy for Children in 2nd and 3rd Grade

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Signature Sheet

This thesis, written under the direction of the candidate's thesis advisor and approved by the Chair of the Master's program, has been presented to and accepted by the Faculty of Education in partial fulfillment of the requirements for the degree of Master of Science. The content and research methodologies presented in this work represent the work of the candidate alone.

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Abstract

Many educators consider using educational iPad Apps to supplement literacy curriculum and facilitate greater student engagement. Student literacy achievement is crucial at the lower elementary level. Students who do not progress through the grade level literacy standards of the Common Core State Standards need intervention instruction to achieve mastery.   The purpose of this paper is to examine the effectiveness of using iPad Apps based instruction in reading intervention programs for second and third grade students.

This study followed a mixed method approach, a pretest, post-test quasi experimental design where students enrolled in an after school reading intervention program used iPad educational apps to improve literacy. Participants in the focus group used specifically designed educational iPad apps aligned to specific Common Core State Standards in literacy. Data were collected using student pretest and posttest information and teacher and researcher observations. Students were assessed using standardized, literacy pretest and post-tests. For the duration of the study, the teachers and the researcher recorded observations of student progress. Teacher notes on student performance were analyzed for commonality.

Results indicated that all students in the study improved in literacy mastery by the end of the study. English language learners also demonstrated gains in literacy skills.

In conclusion, the study demonstrated that the use of iPad Apps in building mastery of literacy skills of students in second and third grade has a positive effect. Under certain conditions, iPad Apps are useful in literacy instruction.

Chapter 1 Introduction

After twelve years as a social studies teacher in a traditional junior high school serving seventh, eighth and ninth grade students, I took a position as a sixth grade social studies and language arts ITI teacher in a middle school serving sixth through eighth grade students. The transition from junior high school to middle school combined with the added load of teaching reading and language arts proved to be the greatest challenge of my career.

The differences between the between literacy development of a seventh grader already established in a middle school routine and an incoming sixth grader was phenomenal. While I knew many effective literacy strategies for teaching social studies, the sixth graders struggled to read the social studies text book and understand the information. In fact, many of them were not even reading or writing at grade level. My training or experience to bring these students up to grade level literacy standards was limited. As a teacher, it was important to go back to the basics and teach strategies for reading comprehension before teaching the more difficult tasks of critical thinking and writing.

One of my students that first year, Jared (a pseudonym), was particularly low in reading. His test scores indicated that he performed at the second grade level for reading and writing. He was acutely aware of his own deficits and asked me to help him learn to read.

He wanted to be like everyone else and was tired of being, as he said, "the dummy", who no one wanted in their cooperative group. He intuitively knew this was a "make it or break it year for him" and he wanted to learn. His challenge awakened in me a passion to teach reading. I began to examine the research literature, talk to reading specialists, and attend professional development trainings to learn strategies.

We met after school, before school and during lunch. Within six months, Jared improved by two grade levels on tests of reading. By the time he left my class, Jared was reading at grade level independently. I wanted his success to be the experience of all my students.

After that year, I gave myself to developing programs through social studies to incorporate literacy intervention for students who were below grade level. However, not all students were as motivated as Jared and the English language learners proved to be particularly challenging to motivate. I realized that if I was going to be effective, I had to incorporate different methods of engagement and motivation into my instruction.

I began to look to technology and apps based learning using the iPad as a way to increase student motivation and engagement. Digital learning became a tool in my intervention arsenal for helping students access a scaffolded, standards based intervention curriculum. I was given the opportunity teach small group literacy intervention in a K-8 private school where I saw the crucial need at the second and third grade level. Then, through an opportunity to volunteer at a public elementary school as an instructor in a second and third grade, afterschool intervention program using Apps based learning on an iPad I began to explore the possibilities of iPad apps to effectively enhance instruction.

Statement of Problem

The recent implementation requirements of the Common Core State Standards (California Department of Education, 2013) coupled with challenge of student demographic needs in California have sent educators on a search for new ways improve student achievement. Many educators are looking to digital tools such as the iPad and apps based learning programs to transform traditional literacy instruction to equip 21st century students. The advent of new, high

quality educationally innovative digital tools has created both an immense opportunity and an incredible challenge to literacy educators. How do educators actually use these tools to effectively increase academic achievement and facilitate the development of literacy skills for today's students? Some educators have called for the use of iPads and apps based learning programs in the classroom to address the need for literacy invention programs. Yet, how can educators be sure that students who perform below grade level are adequately progressing in their literacy goals while accessing iPad apps based learning?

Purpose Statement

The purpose of this study is to examine the effectiveness of iPad apps on student achievement in literacy for children in second and third grade in an afterschool intervention program. The study is based on a comparison of student pre- and post-test performance scores in literacy.

Research Question

What is the effectiveness of iPad Apps based literacy instruction in after school intervention programs for second and third grade students as measured by pre and post test scores in literacy skills?

Definition of Terms

For the purpose of this research project, the key terms are described below.

1) iPad apps

iPad apps are software applications developed for use on Apple's iPad devices. iPad apps are available through the Apple App Store and are designed to run on Apple's iOS mobile

operating system, which powers the iPad. All of the iPad Apps referred to in this paper are categorized in the Apple App Store as educational, early or primary learning, and/or reading literacy.

2) Literacy skills and literacy instruction

In this paper, literacy instruction refers to the teaching of literacy skills and strategies that make up best practices that effectively deliver early reading instruction. University of Oregon's team of researchers in conjunction with the National Reading Panel (1997) identified "Five Big Ideas of Early Reading" Instruction as phonemic awareness, alphabetic principal, accuracy and fluency with text, vocabulary and comprehension (University of Oregon Center on Teaching and Learning, 2014). For the purpose of this paper, "literacy instruction" in "literacy skills" is limited to University of Oregon's definitions and characteristics of said five big ideas of early reading.

3) Afterschool intervention programs

Afterschool intervention programs in this paper are defined as a singular program that was conducted for thirty minutes; three times a week beginning thirty minutes after school dismissal.

4) Test scores

For the purposes of this study, test scores refer to formative assessment results that provided progress monitoring for the teacher and the researcher in literacy skill development. Test scores measured improvement in individual achievement in literacy skills.

Theoretical Rationale

Since the introduction of digital tools to education over 30 years ago, much has been written about their potential to help improve academic achievement in literacy (Falloon, 2013). Yet, very little has been written to document actual research based evidence that empirically demonstrates the benefits of using digital tools such as the iPad to access and improve literacy achievement. In order to establish a theoretical rational, one must sort through sales rhetoric, promotions and promises behind the use of iPad Apps in the classroom. The learning theory behind the use of iPad Apps based instruction in intervention programs is rooted in the research on engagement (Kearsley & Schneiderman, 1999).

> Engagement Theory is a framework for technology-based teaching and learning.
> The fundamental idea underlying engagement theory is that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks. While in principle, such engagement could occur without the use of technology, we believe that technology can facilitate engagement in ways which are difficult to achieve otherwise. So engagement theory is intended to be a conceptual framework for technology-based learning and teaching. (para. 1)

The theory of engagement learning is different from motivation in that "engaged agents choose to participate because they can influence the choice of the subject and method" (Marcum, 2011, p.1). In engagement, the individual is not being moved to engage in some pre-determined activity but rather applies their own intrinsic motivation to grow in their own learning, development and improvement. Engagement then is a "bottom up" (Marcum, 2011, p.2) theory of education rather than "top down". When applied to literacy achievement the use of iPad and

instructional apps improves student engagement (Godzicki, L., Gozicki, N., Krofel, & Michaels, 2013).

Assumptions

In order to create learning environments in which today's students can thrive, teachers must incorporate 21st century literacy skills into classrooms. Digital media in the form of iPad apps based instruction can be a powerful tool to promote student engagement and address the achievement gap. Students are motivated to learn when they can use technology independently through the touch screen of an iPad. Apps based technology platforms provide students with access to literacy instruction in a way that is attractive, motivating and effective.

Background and Need

As Hutchison, Beschorner and Schmidt-Crawford (2012) have shown, iPad apps and mobile devices can be effective instructional tools when applied appropriately by trained teachers. "We found that using the iPads for literacy instruction not only supported student learning, but students were also highly engaged and able to demonstrate ways of responding to text using technology tools that offer some unique affordances to users" (p. 23). However, most of the research regarding the effectiveness of iPad apps based instruction is reflective of observations, surveys or other qualitative data. There is very little quantitative evidence that conclusively shows that iPads or apps based instruction actually improves students' literacy achievement. Even less evidence is available to document how iPad Apps can be effectively implemented in literacy intervention programs in the lower elementary. Therefore, the verdict is still out regarding the effectiveness of iPad Apps based learning in intervention programs. More

research must be conducted so that educators can be sure that students who need literacy intervention instruction are progressing in their academic goals while accessing apps based learning.

Yet, while there remains a need for further research regarding the use of iPad apps based literacy instruction in second and third grade, conclusive research exists to document the need for literacy intervention programs in general. Achievement in literacy by third grade is a crucial factor for a student's future academic success. Sara Mead (2009) in her issue brief for the New American Foundation said,

"Third grade marks a critical turning point in children's education, when they shift from "learning to read" to "reading to learn." Children who cannot read proficiently by the third grade, or who lack solid math and social skills, will struggle to master more demanding academic content in later grades, falling further and further behind. Achievement in third grade is a strong predictor of children's later academic and life outcomes" (Mead, 2009, para.5).

According to The Campaign for Grade Level Reading, a non-profit organization,

"Reading proficiency by the end of third grade is a key predictor of high school graduation and career success. Yet every year, more than 80 percent of children from low-income families miss this crucial milestone. The statistics are even worse for low-income dual language learners and children of color" (The Campaign for Grade Level Reading, para 7).

Additionally, The Campaign for Grade Level Reading reported, "74% of students who fail to read proficiently by the end of third grade falter in the later grades and often drop out before earning a high school diploma" (Grade Level Reading Campaign, 2014, para 4). There is a need

for literacy invention programs to close the achievement gap and reduce the high school drop-out

rate. The research presented in this paper seeks to explore the viability of the iPad apps as a tool

to meet the need for based literacy instruction in intervention with second and third graders.

Chapter 2 Review of the Literature

Introduction

The release of the Apple iPad April of 2010 provided a new platform of mobile technology that increased the potential of computers to improve and transform teaching and learning in the classroom. There has been much written about the influence of technology in education since the introduction of computers nearly 30 years ago, but the research on the effectiveness of mobile technology in general , the iPad and its Apps specifically, is still in its infancy (Falloon, 2013).

The following review of the literature addresses the effectiveness of iPad apps on student achievement in literacy for children in second and third grade. Information was gathered from academic library searches using online resources. Research information is organized in the following categories: Historical context, a review of the academic research associated with iPad apps specifically and a review of the related literature associated with mobile devices and literacy in general. The review of the literature revealed the following themes: 1) iPads and literacy based Apps increase student motivation and produce high levels of engagement; 2) the mobile design features of the iPad make it a viable tool to enhance literacy instruction; 3) the iPad and literacy based Apps are effective tools for differentiation; 4) the use of iPads fosters collaboration among students and 5) iPad app content and design can be shown to effectively facilitate enhanced literacy achievement.

Historical Context

Mobile technology is recognized as a valuable tool for promoting the development of literacy skills. While technology in general has rapidly been integrated in K-12 classrooms, the use of mobile devices for literacy instruction such as the iPad is still in its infancy. The release of the Apple iPad in April of 2010 opened the door for many possibilities to enhance instruction in literacy (Rossing, Miller, Cecil & Stamper, 2012). The unique features of the iPad such as the potential to develop creativity that engages student's multiple learning styles, opportunities for "any-time" or "anywhere" flexibility, multi-touch screen for greater access and a wide variety of applications have motivated educators to explore the iPad's viability for increasing effectiveness in instruction. (Rossing, Miller, Cecil & Stamper, 2012) As educators begin exploring the possibilities of using mobile devices, it is important to consider how to integrate the tools into curricular goals not merely facilitate technology goals. "Today the question that educators ask is no longer about whether and to what extent technology should be used with young children in the classroom, but rather how it should be used" (Couse & Chen, 2010, p. 75).

In their study (Project Tomorrow, 2013), the researchers identified five major factors that are driving educators to consider mobile technology as a tool for classroom instruction.

1. Potential of digital tools as resources to address the instructional demands of the Common Core State Standards (Project Tomorrow, 2013, p. 2).

2. Majority of teachers (52%), parents (57%) and district administrators (52%) already regularly use social networking through mobile technology making it easy to adopt and integrate into schools (Project Tomorrow, 2013, p.2).

3. Because many people already own mobile devices, the BYOD (Bring-Your-Own-Device) approach to integration addresses the lack of funding for extensive technology purchases.

In 2011 to 2012, BYOD pilot programs increased in schools by 47%. (Project

Tomorrow, 2013, p. 3).

4. Mobile devices are emerging as a key component of 21st century home to school

   communication. (Project Tomorrow, 2013, p. 3).

5. Corporate employers are pressuring educators to equip students to excel in global, 21st

   century skills for the workforce. The emphasis on career readiness and technology for all

   students is paramount. (Project Tomorrow, 2013, p. 3).

While these five factors from the Project Tomorrow Study point out the advantages of mobile

technology in K-12 classroom, there remains little research as to how to effectively implement

that technology. Therefore, while hardware and software developers continue to promote new

technology as an answer to improve student achievement and promote educational reform, it still

remains to be seen if these technologies perform as promised.

The source of much of the information on the actual effectiveness of iPads and their apps

is based on qualitative accounts from student observations in a classroom setting. "Scant

evidence exists beyond perceptions-based studies or observational accounts and teacher stories,

evaluating how this new round of technology innovation is affecting students and their learning,

and if indeed it is living up to the hype and rhetoric surround it" (Falloon, 2013, p.505).

Falloon (2013) pointed out that the scholarly studies that are available concentrate on

qualitative accounts that address factors such as student engagement and motivation, cost-

effectiveness, increased administrative efficiency supported by "paperless" systems, advantages

of mobile technology that delivers "anytime, anywhere" learning. (Falloon, 2013) Most of these

qualitative accounts come from studies conducted either in secondary schools or early childhood

education. There are few qualitative studies that focus on lower elementary, specifically second

and third grade. "The introduction of tablet computers in educational settings has been primarily limited to middle and high school students" and specifically applied mostly to the subject of writing and organizational skills (Couse & Chen, 2010, p.78).

Review of the Academic Research Associated with iPad Apps & Literacy

The quantitative evidence that measures the effectiveness of the iPad apps in literacy instruction with elementary students and specifically second and third graders in intervention programs is sparse. The researcher reviewed four educationally sound studies that connect the use of iPad mobile technology and its applications for literacy instruction from the years 2012-2013. Studies conducted by Hutchison, Beschorner and Schmidt-Crawford (2012), Falloon (2013), Beschorner and Hutchison (2013) and Chou, Block & Jesness (2012) all present common themes across the literature for iPad app integration in the classroom. None of these four studies were conducted using second and third graders as the focus group, however they all provide valid information that is related to the subject of this study.

Hutchison, Beschorner and Schmidt-Crawford (2012) conducted a study to determine the effectiveness of the iPad for literacy learning with elementary students. Because iPads are relatively unexplored as a tool for literacy instruction, the researchers sought to gather information that would assist educators in making informed decisions in using mobile technology. They related the importance of integrating digital technology into literacy instruction in order to equip students with 21st century literacy skills. They pointed out that many teachers acknowledge the need for reading, writing, and communication instruction in digital environments.

The purpose of this exploratory study was "to understand the viability of using iPads to support and enhance literacy instruction" (Hutchison, Beschorner & Schmidt-Crawford, 2012, p. 17). The study was conducted in one fourth grade classroom with one teacher and 23 students. The iPads were integrated into literacy instruction every day for three weeks. The goals of the literacy instruction directly corresponded with the print-based literacy goals that were outlined in the reading curriculum. The teacher agreed to "enhance the students' learning opportunities with the iPads and provide them with opportunities to also learn some of the new literacy skills associated with 21st century technologies" (Hutchison, Beschorner & Schmidt-Crawford, 2012, p. 17).

Each lesson incorporated iPad apps that the researchers determined would best facilitate the learning goals according to the TPACK framework for curriculum based technology integration (Hutchison, Beschorner & Schmidt-Crawford, 2012, p. 18). The students were instructed using iPad apps that facilitated written response to text, graphic organizers, drawing tasks, digital, interactive reading books, and sound to text opportunities, that is, listening and recording, and picture animation. The reading skills addressed by the apps included: independent reading, sequencing, visualization, retelling, cause and effect and main idea.

The results of this study indicated that there were three common themes in the students' learning experience. First, during the comprehension/sequencing learning experience, the researchers observed that when students were allowed to create their own graphic organizers after reading, their understanding improved especially when compared with the same activity in a printed worksheet. "Through this experience, the students were able to recognize how the visual component of a message must complement the written text" (Hutchison, Beschorner & Schmidt-Crawford, 2012, p. 20). Second, when considering independent reading, the

researchers found that although the students were highly motivated to read the iBooks it was important for the teacher to carefully select books suited to their individual reading level to ensure the quality of the literacy learning experience. Third, they also found that the students were more likely to use the strategy of re-reading to revise their work when using the apps to practice the skill of visualization for comprehension.

The researchers made the following observations based on their study for educators who were considering iPads to enhance literacy instruction.

Useful aspects of iPad for literacy instruction:

1. Students applied their prior knowledge about mobile technology to become independent in navigating the iPad without instruction.

2. Students collaborated together to navigate the iPad

3. The availability of relevant, high quality apps made it easy to differentiate instruction

4. iPads reset very quickly with the on and off switch unlike a desktop computer

5. Because iPads are so thin and small they could be stored in the students desks making integration spontaneous, easy and readily available unlike a trip to the computer lab

6. The iPad can be programmed to display in many different languages.

Special considerations for using iPads in literacy instruction:

1. Manipulation of images and text was difficult within some of the apps which frustrated the students.

2. Special considerations must be made for saving work. Teachers must adjust to new ways of receiving and reviewing student work.

3. Due to sensitivity of the touch screen, students were distracted by the accidental engagement of unwanted functions. For example, accidentally engaging the highlighting function when students used their fingers for tracking while reading in iBooks.

4. Teachers must troubleshoot when problems arise

5. Limited features of the apps make normal word processing more challenging when it comes to editing documents.

(Hutchison, Beschorner and Schmidt-Crawford , 2012, p. 22)

The overall conclusion of this study indicated that the iPad was a viable tool for literacy instruction. "We found that using the iPads for literacy instruction not only supported student learning , but students were also highly engaged and able to demonstrate unique and creative ways of responding to text using a technology tool that offers some unique affordances to users" (Hutchison, Beschorner and Schmidt-Crawford, 2012, p. 23). Instead of using mobile technology as merely an add on to literacy instruction, the researchers concluded that iPads can enhance literacy instruction and improve student achievement in literacy skills.

Falloon (2013) conducted a research study that focused on design features of apps and how they affect student learning. The purpose of the study was to determine how the "design and content features of selected apps used on iPads affect the learning pathways of young students using them independently for problem solving tasks" (p.505).

Falloon (2013) found that the trend in education to jump from one technology fad to the next without appropriately addressing the actual learning capabilities of these technologies limited progress toward gains in student achievement. He encouraged educators to refocus their technology in education research agenda away from the trend of adoption decisions prioritized by emotional, epistemic and social values to the intrinsic value of carefully designed apps for

educational purposes. He recommended that new research methodologies be developed in order to inform instruction regarding the most effective ways to improve use of technology.

Fallon's study (2013) took place over a six month period in a rural school in New Zealand. Eighteen, five year old students were observed up to 90 minutes every day at different times of the day while the researchers observed their interaction with 45 iPad apps. Devices were made available to enable one per two students. The area content focus of the selected apps was in literacy, numeracy and thinking skills and problem solving. The teacher evaluated each app based on five criteria: professional judgment on instructional alignment, feedback from the children, on line reviews, Apple ratings, and cost. Both free and paid-for full versions of apps were used.

Data were recorded using video and audio input using the device itself to more accurately reflect natural student use of the apps. Falloon and his assistants coded the data and analyzed it for the "occurrences of incidents affecting the students' learning pathways" (Falloon, 2013, p.509) Fallon (2013) found the results centered around three broad themes of app content and design that influenced the effectiveness of the apps. Data were classified according to the themes as supported learning, hindered learning, and parameters around learning.

Theme 1: Content and design features that supported learning

Falloon (2013)found that the apps that contained design features that scaffolded the students interaction with the content or systematically "stepped them through" the learning content in an organized fashion "generated more evidence responses indicating learning than those that were primarily learning game or game/practice based" (Falloon, 2013, p. 511). Falloon found that the most effective of the supported learning apps "closely resembled a traditional teaching model, often involving video of a "real" person teaching a particular

knowledge or skills" (Falloon, 2013, p. 511). Also Falloon (2013) noticed an increase of student evidence responses whenever the teacher herself presented instructional supports such as introducing the objectives with age appropriate language, providing and explaining examples, modeling, and reflection prompts. Falloon (2013) observed that when the app design included appropriate, clear communication of learning purposes and directions, the students were enabled to be more independent in learning content.

Falloon (2013) recognized the importance of text to speech capabilities of the apps as the five year old students in the study were limited by their independent reading skills. " The text-to-speech greatly assisted them to understand what to do and once started, provided them with a means of accessing and using content that they struggled to grasp through text clues alone" (p. 513). When students failed to understand the directions or were unable to interact with the content, they became distracted and would leave the learning objective and engage in off-task tangents. "Tangents included app skimming (sampling apps without engaging with them), adopting 'hit and miss' cognitive strategies such as random guessing, or engaging in 'gamification' (eg., turning apps into games by deliberately entering wrong information to see what happens)" (Falloon, 2013, p. 513). Falloon summarized that at a distance it appeared the students were engaged and thoughtfully learning but his recordings indicate the opposite.

Theme 2: Content and design features impeding learning

Falloon's data revealed that the apps containing content and features that impeded learning were largely the "free" apps from the Apple App Store. The "free apps" reliance on external web links and problems with connectivity tended to frustrate student learning. Accessing content on higher levels in the web-based apps usually presented students with advertisements and other meaningless distractions that led students to engage in off task

behaviors. The pop-ups and advertisements that are characteristic of the free apps had the

annoying effect of interruption student's work at crucial times, disturbing fluency of their

interactions. In addition, banners with advertisements in the free apps, limited the student's

work space which required that they clear their work more often which also created frustration.

Theme 3: Design parameters and learning

The design parameters that place structures around students' interaction with content

such as time limits, ability to pre-set difficulty, and feedback helped younger students stay on

task and maintain focus. Falloon reports that the data "strongly argues the case for learning apps

to provide guidance and structure for young children through the use of thoughtfully designed

embedded parameters" (Falloon, 2013, p. 514). In the absence of these parameters, students

tended to "gamify" these apps by playing with the features that were amusing or intentionally

providing incorrect responses to see what the app characters responses would be. In fact, much

time was spent gamifying the apps because they did not contain sufficient parameters to discern

the intent and purpose for learning (Falloon, 2013, p.518). The lack of age-appropriate design

parameters had the effect of "unproductive, divergent interactions" of students with the app

content resulting in wasted time (Falloon, 2013, p.519).

Falloon concludes that app design and content features are very important in delivering

instruction for students. The apps must appropriately communicate learning objectives, provide

smooth connections to the learning goals, include understandable instructions, incorporate

feedback, combine a blend of game practice and learning components, and provide interaction

parameters that match the learning characteristics of the target student group.

This study extended the research on implementation of new technology in classrooms by

the addition of theory about the effectiveness of software design for student learning. The wide-

spread availability of mobile devices in the classroom does not necessarily mean that students

can successfully use the device to effectively improve academic achievement.

Beschorner and Hutchison (2013) conducted a second study on the use of iPads as a tool

for teaching literacy in early education. Beschorner and Hutchison (2013) commented that

"digital technology is rapidly becoming an essential part of the daily life of many adults; its use

may be influencing young children's emerging ideas about literacy" (Beschorner & Hutchison,

2013, p. 16). According to the researchers, the purposeful use of technology can encourage the

cognitive and social growth of young children. The research question however that Beschorner

and Hutchison (2013) sought to explore was "how can the iPad be used as an instructional tool to

facilitate emergent literacy?"(Beschorner & Hutchison, 2013, p. 16).

Beschorner and Hutchison (2013) point out that the emergent literacy may also include

knowledge about digital forms of reading and writing. "Children's awareness of print may,

depending on a child's exposure to text in digital environments, include knowledge about the use

of the internet and other digital tools for reading and writing" (p. 17). Therefore, it is important

to understand what types of literacy children in the 21st century use beyond print-based text. The

feature of tablets and iPads address some of the concerns about different forms of technology

that may be developmentally inappropriate for use in early childhood classrooms, like high level

decoding and interpreting reading tasks and navigating forms of technology like the keyboard

and mouse.

The development of new, more interactive touchable interfaces may be more suitable for

children, because they allow for physical manipulation that encourages curiosity,

creativity, self-expression, and discovery. The touchable interface is one feature of the

iPad, and similar tablets, which make the tool potentially suitable for young children (Beschorner & Hutchison, 2013, p. 18).

Beschorner and Hutchison (2013) conducted their study in two pre-school classrooms over a seven week period. Teachers were given six iPads as instructional tools. Apps that required problem-solving, initiated decision making, and had a high level of interactivity in the context of reading, writing, speaking and/or listening skills were selected. The apps were selected by the researchers. Because of the availability of many apps that fit the criteria of the study, new apps were presented to the students bi-weekly. Older apps were not removed from the iPads, therefore the students had access to many different apps from which they could choose by the end of the study. This created a problem in that students preferred to use the old apps because they were familiar with them and did not progress to engage in new apps that required them to practice new skills.

The iPads were used as a tool to teach literacy during centers, for small group instruction, story listening, whole group instruction and one-to-one learning.   All the students were in between the ages of four and five and had at least one year of prior preschool experience. None of the teachers had any experience using an iPad in any setting.

Beschorner and Hutchison's (2013) finding suggest four themes:

1. The design of the iPad itself allowed the children to develop and interact with the meanings of the print in their situational experiences. Children were able to recognize icons and text and relate them to the apps they desired to play. They applied the concepts of print to obtain desired results (Beschorner & Hutchison, 2013, p. 20).

2. Children developed emergent cognitive writing skills when they were able to communicate in text using letters, symbols or drawings provided by the apps. The drawing apps were frequently used by the children to write their messages using letters drawn with their fingers (Beschorner & Hutchison, 2013, p. 20). Some children who could not accurately form their letters in print writing chose to use the on-screen keyboard to write letters and form words. Because they could identify the letters but not yet write them, they chose to sound out the words and then write letters sound by sound to form words. Some students were able to eventually write simple stories in the apps using the keyboard (Beschorner & Hutchison, 2013, p. 21). The children also developed an understanding of the functions for writing. Because the teachers often shared the child's work with parents via email or other digital means, the children became excited about creating writings to share with others. Teachers also shared the children's work with the whole class digitally which provided an effective platform of communication among the students (Beschorner & Hutchison, 2013, p. 21).

3. Many of the iPad apps naturally connected reading, writing, listening and speaking. When children used the iPad to listen to familiar stories and then interact with the text though the recording options, they became excited about hearing themselves read or retell the story. When a child could change the picture or the text in a story, they developed creative writing strategies. The students had frequent opportunities to collaborate with each other in the interactive process which helped develop the connection of reading, writing, listening and speaking (Beschorner & Hutchison, 2013, p. 22).

4. As the children worked with the iPads, they engaged in meaningful conversations

    through asking questions and commenting on each other's work.   The conversations

    promoted the development of social learning among the students (Beschorner &

    Hutchison, 2013, p. 22).

 Beschorner and Hutchison (2013) conclude that iPad can be used effectively as tool that young

children can navigate and use independently to develop literacy skills. "Children use

environmental print to navigate within and between apps, and can use the iPad to read, write, and

talk about print" (Beschorner & Hutchison, 2013, p. 23). Additionally, when used in a small

group setting, the iPad becomes a social activity for young children as they often talk and work

together while using the tool. It is possible that the mobility of the iPad design contributes to this

socialization because children can see the screens of other children easily and can manipulate the

touchscreen in groups (Beschorner & Hutchison, 2013, p. 23). "In light of these possibilities, the

iPad could be a promising instructional tool for early childhood educators" (Beschorner &

Hutchison, 2013, p. 23).

Chou, Block & Jesness (2012) conducted a study on the impact of iPad integration on

student learning in the secondary school setting. "The use of mobile devices for learning in the

K-12 classroom is changing the educational landscape but the impact on student achievement is

unclear" (Chou, Block & Jesness, 2012, p. 12). The goal of their research was to explore the

impact of "iPad integration on learning activities and teacher/student perceptions of one-to-one

learning with iPads in the classroom" (Chou, Block & Jesness, 2012, p. 12).

Chou, Block & Jesness (2012) found that most of the data on the impact of iPad

integration was collected from college students. The studies they reviewed revealed that the use

of mobile devices in activities such as "real-time polls, discussions, blogs and other course

activities" (Chou, Block & Jesness, 2012, p. 12) had the effect of increased engagement, collaboration, productivity, technology competency, innovation and critical thinking" (Chou, Block & Jesness, 2012, p. 12).   Yet, the researchers also noted mobile devices used alone did not encourage student engagement or productivity. Educators must be trained how to successfully integrate mobile devices and their apps into the curriculum in order to implement them to their full potential.

Chou, Block & Jesness (2012) identified five learning opportunities for mobile learning devices:

1. Mobile devises provide the opportunity for "anywhere, anytime learning" (Chou, Block & Jesness, 2012, p. 13). Students can learn in real-time formats both inside and outside the classroom.

2. Mobile devices are a relatively inexpensive way to reach under-served children. "The low-cost of mobile devices makes it accessible to low income families" (Chou, Block & Jesness, 2012, p. 14).

3. Mobile devices create opportunities for communication and collaboration which are all important skills of the 21st century graduates (Chou, Block & Jesness, 2012, p. 14).

4. Mobile devices "fit in the learning environment" (Chou, Block & Jesness, 2012, p. 14).

5. Mobile devices make differentiated instruction easy in that it enables a personalized learning experience thereby making learning more accessible for more people (Chou, Block & Jesness, 2012, p. 14).

In addition to the technology component, the researchers sought to examine the role of the faculty in the integration of the mobile devices.   "Technology integration is more than just using the tools. It requires careful instructional design that links learning objectives to specific

learning tasks or activities that lead to measureable outcomes" (Chou, Block & Jesness, 2012, p. 16). Therefore the purpose of Chou, Block & Jesness' (2012) study is twofold: the impact of iPad integration on student learning and the role of faculty professional development in successful integration.

Chou, Block & Jesness (2012) conducted their qualitative case study in a large K-12 school district. The study was a four month pilot project of one-to-one iPad learning integration in four ninth grade geography classrooms. Data were collected from two focus groups. The first focus group was made up of the four teachers from the geography classrooms. The second focus group was made up of 31 ninth grade students at four different school sites. Chou, Block & Jesness (2012) conducted the focus groups, observed the classes and took notes on student and teacher responses and then determined observable instructional themes from the data.

Chou, Block & Jesness (2012) found that there were both observable benefits and challenges to the one to one learning opportunities on the iPad.

Student Benefits:

1. *Active engagement*. The students got on task right away and stayed engaged even during discussion. They were motivated to explore and engage in the many resources that were available at their fingertips (Chou, Block & Jesness, 2012, p. 19).

2. *Increased time for projects*. There was no wasted time waiting for equipment to set up. Students could start immediately and could work independently or in teams (Chou, Block & Jesness, 2012, p. 19).

3. *Improved information literacy and digital citizenship*. Students learned to use a variety of apps and websites to communicate their ideas. They also corrected each other when errors were made (Chou, Block & Jesness, 2012, p. 20).

Student Challenges:

    1. *Distractions*: Students would be distracted by while looking for resources and then attempt to use apps that were more entertaining and not central to their learning task (Chou, Block & Jesness, 2012, p. 21).

Teacher Benefits:

    1. *Student centered activities.* Students could learn at their own pace, collaborate with their team and help one another through the apps. Teachers spent less time in whole-class instruction and more time assisting individual students (Chou, Block & Jesness, 2012, p. 20).

    2. *Enhanced teaching with updated information.* Geography information is changing all the time. The iPad apps offered a way to access real-time information that was relevant and applicable to student's lives (Chou, Block & Jesness, 2012, p. 20).

Teacher Challenges:

    1. *Lack of teacher-selected apps.* Although there are many geography related apps, there are very few for effective word processing or challenge activities. Because only one app selected for class, students who finished early were distracted (Chou, Block & Jesness, 2012, p. 21).

    2. *Need for Training*. The iPad is a relatively new device to the classroom therefore; both teachers and students do not possess adequate experience to troubleshoot. Many students continue to ask technical questions even after teacher demonstrations (Chou, Block & Jesness, 2012, p. 21).

Chou, Block & Jesness (2012) concluded that there is a positive impact of iPad integration on student learning in active engagement, increased time for projects, improved digital literacy, and

digital citizenship. Yet some challenges remain including a lack of teacher-selected apps and the need for more time to prepare and train. Additionally, the study highlights the important role of professional development in the implementation practices as well. Finally, the researchers recommend that educators gather more qualitative data to further study the impact of one-to-one learning with iPads. They call for future research to gather data that might be more conclusive to demonstrate the positive connection between iPad instruction and academic achievement and student performance.

Review of the Related Literature Associated with Mobile Devices and Literacy

Uses of Mobile Devices and Technology in General in the Classroom

Mobile technology has come to permeate the lives of many 21st century citizens regardless of ethnicity, age or socio-economic status (Herro, Kiger & Owens, 2013, p.1). Smart-phones, tablets and media devices can now provide a great potential to deliver education services to a wide variety of students. According to a survey conducted by Herro, Kiger & Owens (2013), "…85% of high school students have access to an iPod, 70% had a laptop/tablet/netbook, and 67% had a cell phone" (Herro, Kiger & Owens, 2013, p.1). They also predicted that by 2020, a majority of internet based apps will be run wireless, through the cloud by smart phones. Rossing, Miller, Cecil & Stamper (2012) projected that by 2015 mobile tablets will overtake desktop usages and 80% of all people accessing the Internet will be using a mobile device. Herro, Kiger & Owens (2013) quote a research study conducted by Rideout, Foehr, & Roberts to report that "iPod/Mp3 player and laptop owners y by 8 to 18 year olds has doubled or tripled since 2004" (Rideout, Foehr, & Roberts as cited in Herro, Kiger & Owens, 2013, p.1). Therefore, the rise in ownership and access to mobile devices cuts across the demographics of race, gender, and socio-

economic status (Herro, Kiger & Owens, 2013, p.1). The prevalence and accessibility of mobile devices provides educators with increased opportunities to enhance literacy instruction.

One example of the way mobile technology can be used to enhance literacy instruction is demonstrated by Liberty Elementary's iPad Initiative. A school principal formed a team in 2011 to examine what literacy instruction could look like in five to ten years. Participants determined that students would most likely, "interact daily with the tablet, consume books via the touch interface, look up words using the dictionary function, conduct research using the web, and engage in a number of mobile applications that could help track data, engage students and drive instruction" (Manko, 2013, p.1).

The participants of the Liberty study included 418 African American students of whom 93.5% who received Federal Free and Reduced Meals. Manko implemented a 1-to-1 iPad initiative with 330 devices. Three years after implementation the school became "one of the highest performing schools in Baltimore City" on the Maryland School Assessment. While Manko does not cite any specific scores to demonstrate improvement, he attributed school success in increasing test scores to iPad integration in reading comprehension instruction (Manko, 2013, p.1).

Pilgrim, Bledsoe & Reily (2012) described how mobile devices in general and the iPad and iPod specifically can be advantageous when used in the classroom. Because many mobile devices can deliver constant and reliable access to internet resources, the researchers report that they are "changing the way educators think about education and literacy" (Pilgrim, Bledsoe & Reily, 2012, p. 16). They identified four advantages that mobile devices bring to the classroom. First, digital textbooks are advantageous because they can be "updated quickly with little expense" (Pilgrim, Bledsoe & Reily, 2012, p. 17) and they conveniently provide students with

access "to all their books on a single iPad, eliminating the need for lockers and backpacks" (Pilgrim, Bledsoe & Reily, 2012, p. 17). Second, iPads afford a vast number of opportunities for communication and collaboration (Pilgrim, Bledsoe & Reily, 2012, p. 18). Third, the widely available and inexpensive resource apps designed for use on the iPad provides management and organization tools to help them be more effective. (Pilgrim, Bledsoe & Reily, 2012, p. 19).Tools such as calendar apps, calculator apps, dictionary and language tools all provide resources for the classroom teacher. Fourth, the content area apps provide ways for teachers to scaffold instruction, to incorporate practice, give immediate feedback, promote student engagement and monitor progress. "Content specific apps are available for students of all ages. Often teachers can control parameters to specific skills or ability levels to monitor progress. The engaging apps make drill and practice more fun for learners and the immediate feedback is beneficial for student learning" (Pilgrim, Bledsoe & Reily, 2012, p. 20).

Walsh & Simpson (2013) conducted a study in which they consider the reading and writing process for students as they interact with the iPad device through touch pads as the mode of gesture. They examined the "cognitive and interactional processes that take place when students read digital text on a touch pad" (Walsh & Simpson, 2013, p. 148). They noted that there is little research available on this aspect of the touch screen and its relationship to effectiveness in literacy instruction. Walsh & Simpson (2013) conducted their study by observing one classroom made up of Year Five, male students, in Sydney, NSW Australia in 2012. Each student was given their own iPad. Observations were conducted once a week over three terms via video and still image recordings as well as field notes and the teacher's reflective journal" (Walsh & Simpson, 2013, p. 151). Walsh & Simpson (2013) found that "by tracking touch we have been able to propose that the physical affordances of the digital platform are an

important component of the exploratory learning experience" (Walsh & Simpson, 2013, p. 156).

Additionally, they surmised that by "tracking touch we have been able to propose that the

learner's physical engagement with the task provides visible traces of their internal thought

processes (Walsh & Simpson, 2013, p. 151). Walsh & Simpson conclude that there exists is a

positive relationship between touch screen modality of the iPad and "semiotic meaning making"

(Walsh & Simpson, 2013, p. 156).

iPad Apps

Castek and Beach (2013) examined apps that strategically enhanced learning in the

content area of science. They found that although science content literacy needs to be

established before the apps based instruction can be effective, the integration of iPad apps in the

science classroom can be beneficial for collaboration, the sharing of productions and visual

representations of content to show causal relationships. They found that these benefits of the

apps were not realized in the apps themselves but rather "they were fostered by how teachers

exploited these affordances to achieve their own specific learning objective" (Castek & Beach,

2013, p. 563). They suggested that teachers who seek to incorporate apps into their instruction

need to consider how those tools can enhance instruction.

Richardson (2013) agreed with Castek & Beach (2013) when he commented in his article,

"it's not about layering expensive technology on top of the traditional curriculum. Instead it's

about addressing the new needs of modern learners in entirely new ways" (Richardson, 2013,

p.12). Cole (2014) in his article indicated, "It's not about the apps, at all" but rather "effective,

measured and considered teaching" (Cole, 2014, p.49). Both Richardson (2013) and Cole (2014)

emphasized the primary consideration of educators should be the research based goals of literacy

instruction before incorporating iPad apps.

Integration of Technology with Literacy Instruction

Kervin, Verenikina, Jones and Beath (2013) conducted a survey of 213 teachers across Australia to determine the way technology is currently being used by literacy teachers. Of the teachers surveyed, 62% worked in classrooms with children four to eight years old (Kervin, Verenikina, Jones & Beath, 2013, p. 135). Therefore, the results of this survey suggested that technology integration may be increasing among lower elementary school students and is no longer merely reserved for older students in secondary schools.

The survey revealed there are "multiple layers of personal, social, and institutional contexts which closely interact with each other" that affect the implementation of the technology into literacy instruction (Kervin, Verenikina, Jones & Beath, 2013, p. 135). They identified teacher-related factors that can become barriers to technological and pedagogical integration. These factors include "confidence, positive attitudes, willingness to undertake a change, and understanding the advantages of technology use…and the lack of convenient access, time, resources and staff development as well as the changing nature of the technology itself" (Kervin, Verenikina, Jones & Beath, 2013, p. 136). Overall based on their research, they concluded that it is less effective to separate technology standards from other curricular areas. They argue that "for too long, focus on technology alone has dominated" (Kervin, Verenikina, Jones & Beath, 2013, p. 137). For effective literacy teaching, they found it is necessary to consider the literacy teaching goals first and the technology as a mediating tool in the pursuit of those goals" (Kervin, Verenikina, Jones & Beath, 2013, p. 137). Of the teachers surveyed, "84.3%," said that the children's interest and engagement in learning was their primary motivating factor for integration (Kervin, Verenikina, Jones & Beath, 2013, p. 142).

Saine (2012) conducted a similar study on a much smaller and specific scale that examined how four teachers integrated iPods, iPads, and the SMART Boards into their instructional activities. She interviewed four teachers from diverse classroom settings: one Nigerian teacher, and three American teachers (one from elementary school, one from middle school and one from high school settings) (Saine, 2012, p.74). Saine described the four literacy skill units each teacher taught that integrated technology in each of the four classroom settings. In each setting, Saine reported that at the end of the unit each of the four teachers noted an improvement(s) in student performance. Saine (2012) also concluded that, "we must make it a priority to equip all schools, especially low socio-economic status (SES) schools, with students' access and use, as well as, teacher training and support for keeping up with these digital tools that are transforming literacy instruction" (Saine, 2012, p.79).

Studies by Cummings and Rodriguez (2013) and McCalanahan, Williams, Kennedy and Tate (2012) explored the use of the iPad as a tool in the area of special education. Cummings and Rodriguez (2013) examined the effect of iPad integration would have on "academic engagement of students with language-based disabilities during language arts lessons" (p. 50). They found that when the iPad was introduced "the students' academic engagement increased within the first four lessons" (p. 50). However, they found that engagement decreased toward the end intervention" (p.50). They attributed this decrease of engagement to the initial novelty wearing off, the lack of feedback provided by the apps, or the possibility of boredom with the tasks. However, according to the study, the greatest advantage of the integrated instruction was that the iPad allowed students to perform learning tasks independently which was something that was "previously difficult for them" (p. 51).

McCalanahan, Williams, Kennedy and Tate (2012) studied the effectiveness of the iPad in intervention instruction with one fifth grade male, diagnosed with ADHD. "Comparisons of pre- and post-assessments showed that the student had gained one year's growth in reading with in a six week time period" as a result of the instructional literacy interventions using the iPad (p. 20). McCalanahan, Williams, Kennedy and Tate (2012) also sites that the student "gained in confidence and a sense of being in control of his learning" (p. 20). McCalanahan, Williams, Kennedy and Tate (2012) found that the iPad gives teacher leaders the unique opportunity of differentiated instruction. According to the author, future research may explore the way educators can use tablet computers to allow students to build and develop their weaknesses.

Summary

In summary, the review of the literature revealed that there is a very limited amount of quantitative research that addresses the effectiveness of iPad apps on student achievement in literacy for children in second and third grade. Much of the literature reviewed consists of qualitative information focused on either early childhood education or secondary education. Therefore, educators and researchers are just beginning to discover how the iPad and its apps can be effectively used for literacy instruction at the elementary level.

However, the literature review revealed five themes that address the effectiveness of iPad apps in literacy intervention instruction. Each of the themes is largely based on qualitative data that provides a foundational understanding of how iPads can be used to promote literacy achievement.

1) The iPad and literacy based apps increase student motivation and produce high levels of engagement.

Researchers observed high levels of active engagement and motivation without exception with the use of iPad mobile devices in the classroom. Students demonstrated both longer periods of on-task behaviors and increased motivation when using iPad apps. Also, students were able to complete literacy tasks independently with very little teacher assistance. Students often times confidently and intuitively approached new tasks without any direction or help.

2) The mobile design features of the iPad make it a viable tool to enhance literacy instruction.

The mobile design features of the iPad make it a natural "fit" in the classroom. The literature review identified four mobile design features of the iPad that make it a viable tool to enhance literacy instruction. First, the mobile, wireless nature of the tablet creates opportunities for "anytime" and "anywhere" learning. Teachers do not have to waste time in transitions to travel to a computer lab or take up valuable space in their classroom for desk top computers. Second, the small, thin size of the iPad makes it convenient to store in the student's desk or in a readily accessible cart that can facilitate spontaneous use and shorten transition times. Third, the iPad touch screen affords younger students the unique opportunity to navigate the apps. The touch screen was shown to be more developmentally appropriate for young students because it allows for physical manipulation and intuitive guessing rather than a reliance on the child's level of mastery of concepts of print. Non-readers can easily recognize and navigate the icon system on the touch screens in ways that can compensate for reading text. Also, young children who have not mastered handwriting in traditional paper-pencil modalities can use the touch screen keyboard to write creatively. Preschool children using a writing skill app were able to creatively construct stories using the touch screen keyboard. Fourth, the iPad powers up instantly and connects to the internet which eliminates wasted time waiting for programs and software to load.

Many of the observations made by the researchers also included the need for teacher training and professional development. Classroom teachers must be trained in order to train the students to use the iPad and the apps. Teachers who were not effectively trained to troubleshoot problems with the hardware or apps could not help students effectively access and learn from them. It is one thing to have the technology as an add-on to instruction but it is entirely different to be able to integrate the apps into learning goals and solve problems as they arise. Much classroom time was wasted when teachers were not adequately trained to address iPad device issues effectively.

3) The iPad and literacy based apps are effective tools for differentiated instruction

The plethora of iPad literacy apps makes it very easy for educators to personalize student literacy learning. For example, teachers can pre-determine the lexile, the reading level of the books, on each iPad so that each child is reading at their personal developmental level. Apps and the iPad itself can also be set to display in many different languages. The skill levels of many apps can also be applied to each student's skill level individually. The text to speech function of the iPad also provides ways to help students compensate for areas of weakness in writing, spelling and reading.

4) The use of iPads fosters collaboration among students.

The use of iPads to foster collaboration was a very common theme throughout the literature. Many researchers observed and documented meaningful conversations among student who were making comments on each other's work and asking questions. Many times use of the iPad became a basis of social interaction. In a large number of studies, the students were working with the iPads in a two to one ratio. In those cases, the partners worked together to

accomplish their learning tasks in productive ways. Collaboration has been identified as a 21st century essential skill and is a valuable part of every student's skill set.

5) The iPad app content and design can be shown to effectively facilitate enhanced literacy achievement.

The iPad app content and design is crucial to the delivery of quality literacy instruction. Much of the research revealed that the most effective apps were the ones that were selected for their alignment to learning goals, highly organized and systematized scaffolding, and interactive content that is age level appropriate. While the iPad apps naturally connect reading, writing, listening and speaking, without the intentional integration with literacy goals, the apps can be ineffective in enhancing instruction. For example, if teachers do not select iBooks or apps that directly address standards and learning goals, students will become distracted and the learning time ineffective. Additionally, studies showed that when the teacher provided instruction in the use of the iPad app prior to using the iPad app, students demonstrated greater levels of independence and engagement.

Some of the design features of the apps were shown to actually hinder effective development of literacy skills. Advertisements, banners, pop-ups and errors of touch screen selections actually served to distract and frustrate students. Limitations on "free apps" to move through levels and accomplish "quests" also frequently frustrated students.   When the students failed to understand the directions or were unable to access the content of the apps successfully because of design flaws, they would leave their goals and engage in off-task tangents that include app skimming, random guessing, and gamification (the deliberate choice of selecting wrong answers to get a reaction similar to the features of a game). While these behaviors often times resulted in entertainment for the student, they still showed some progress in their learning goals.

Thus, it is possible for students to be distracted from their goals when using apps that do not have strong design parameters that set limits on the student's ability to "gamify" the apps and engage in distractions.

Conclusion

The available literature that speaks to the effectiveness of iPad Apps for literacy instruction certainly portrays great potential. However, the lack of quantitative data in specifically the realm of literacy intervention instruction with lower elementary students, points to the need for further research in order for educators to make integration decisions. The advantages of iPad app integration were shown to be in the areas of iPad device features, the capability of the iPad to motivate and improve active student engagement, and the way iPads were shown to foster collaboration. Future research should explore how to improve app content and design features to reduce student distraction as well as the important role of teacher professional development opportunities prior to integration of iPad apps literacy instruction in the classroom.

Chapter 3 Method

Research Approach

This study examined the effects of iPad apps on student achievement in literacy for children in second and third grade in an afterschool intervention program. The research relied on a mixed methods approach using qualitative and quantitative data. The researcher followed a quantitative, pretest, post-test, quasi – experimental design along with a qualitative observation notes and interviews. Data were collected through interaction with the members of the focus group and researcher observations during a five month period in an after school reading intervention program targeting second and third grader students. The anecdotal, qualitative and quantitative data were analyzed for themes, correlations and specific recommendations for the integration of the iPad device and apps into literacy instruction.

Ethical Standards

This paper adheres to the ethical standards for protection of human subjects of the American Psychological Association (2010). Additionally a research proposal was submitted and reviewed by the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), approved and assigned number #10258.

Sample and Site

The setting of the study was a suburban school in Northern California which hosted an afterschool reading intervention program for second and third grade students. Twenty eight second and third grade children participated in the program sponsored by a non-profit, non-

partisan organization called the Grade Level Proficiency Project (GLPP).   The program was free

to the participants. The ages of the children ranged from eight to ten years old. Children were

selected to participate in the after-school intervention program based on either referral from their

classroom teacher and/or reading performance based assessments. Students participated in the

program for three days a week for 30 minutes per day, after school during a four month period.

Only students who consistently attended and applied themselves during the appointed time were

included in the data collection process.

Two qualified teachers served as instructors who provided oversight to implement

individualized reading instruction delivered through the use of iPad apps. The first teacher, Ms.

Green (pseudonym) is over sixty years old and has thirty six years of teaching experience in

math, technology and intervention. Ms. Green holds a master's degree in education and a

California State Teaching Credential. The second teacher, Ms. White (pseudonym) is in her

fifties and has twenty seven years of teaching experience. Ms. White holds a bachelors of arts

degree in literature and a California State Teaching Credential.   Ms. White has also served as a

technology teacher for five years and worked as a site coordinator to support teachers in

integrating curriculum with technology. The researcher participated in the implementation of the

literacy instruction with the iPads as a reading specialist and teacher of record and made

observations on student performance. Additionally, the researcher conducted interviews with the

GLPP program instructors.

Access and Permissions

The researcher served as the teacher of record in a specialized after school program. Data

were collected through the researcher's observations and interviews. Teachers involved in the

interviews and observations received written and verbal explanations of the observations and interviews prior to their participation.

Data Gathering Procedures

Quantitative data were obtained from pretest and post- test results from formative assessments used as part of this project. Data were also collected within specialized apps which focused on Common Core State ELA Standards for improving literacy. Qualitative data were obtained from teacher interviews, classroom observations and researcher's journal entries on student progress over time.

Data Analysis Approach

Quantitative assessment data were collected and organized into a chart characterized individually by student to determine any growth in literacy achievement over the time of the study. Additionally, the assessment data were compiled into grade level categories and compared to other school sites in the same district with similar demographics which did not implement literacy instruction with the iPads to determine if any positive relationships existed.

Qualitative information was gathered using teacher interviews and classroom observations. Notes were taken and analyzed to determine if there are any recurring themes to generalize that can demonstrate any effectiveness of iPad apps based instruction in literacy intervention.

Chapter 4 Findings

Description of Site, Individuals, Data

Research Context and Participants

The setting of the study was a suburban school in Northern California. The school served as a pilot site to field test the program Grade Level Proficiency Project (GLPP). The GLPP was developed by educators Ms. Green (pseudonym), Ms. White (pseudonym) and the directors of Sonoma Teaching Project a private, non-profit, non-partisan organization. The GLPP is designed to improve student performance in language arts and math, and is aligned to the school district's strategic plan goal that all children will test at grade level in reading by third grade. The GLPP was funded by private supporters of early literacy programs and supported by the school district. The researcher volunteered to assist the GLPP in the implementation of the literacy program.

The GLPP used a blended learning model that incorporated iPad hardware and software technology, professional development, trained instructors, Common Core State Standards (California Department of Education, 2013) aligned curriculum in math and English language arts (ELA), and progress monitoring assessments. The GLPP provided on-site instructional support, training in the implementation of technology, progress monitoring and resources to the teachers of three multi-age second and third grade classrooms.

The model incorporated iPad apps based, data driven math and language arts programs in combination with whole, small group and individualized focused instruction to achieve their goal of 90% of third graders in their district reading at grade level by 2017. Before the start of the GLPP, Dibels ELA Assessment data showed that "91% of the second and third graders in the

school needed focused instructional support in ELA" (Grade Level Proficiency Project, 2014 slide 6).

Ms. Green, Ms. White and the researcher implemented the GLPP pilot program at the school study site. Ms. Green served as the math specialist. Ms. White served as the English Language Arts and technology specialist. The researcher served as the reading specialist in order to assist with the after school intervention program. Ms. Green and Ms. White worked during the school day in three classrooms with three teachers and a total of seventy four students. Of the seventy four, twenty eight second and third grade children participated in the afterschool literacy program. Ms. Green and Ms. White assisted all three teachers and their students with the implementation and incorporation of iPad apps based instruction in the classroom in addition to administrating the afterschool program.

The dual focus of the GLPP program consisted of math and English language arts. However for the focus of this paper, the researcher will limit reporting of data that corresponds only to literacy program within the English Language Arts focus. Participation in the program was voluntary and the school, in conjunction with the GLPP, received appropriate parental permissions for the students to participate in the GLPP focus group. The program was free to the participants. The ages of the second and third grade children ranged from approximately eight to ten years old.

Description of iPad Literacy Instruction

iPad apps based literacy instruction occurred both during the school day and in an after school intervention program. The duration of the entire program was 18 weeks; however students in the larger control group of 74 only participated in ELA iPad apps based instruction in the classroom during the last eight weeks; five days a week for 20 minutes a day. The second

focus group of 28 from within the control group participated in the after school ELA intervention

program from January to May of 2014, or 18 weeks; three days a week for 30 minutes a day.

Therefore for the last eight weeks of the study, the second focus group received ELA instruction

using the iPad apps twice a day: during class time and after school. Hereafter, the whole control

group of 74 second and third grade students will be referred to as the Grade Level Group. The

focus sub-group of 28 who participated in the after school ELA intervention program will be

called the ASES Group (After School Education & Safety).

Group Student Participation in GLPP
January to May 2014
Table 1.1

GROUP	Instruction During Weeks #1-10 January to March (10 Weeks)		Instruction During Weeks #10-18 April to May (8 Weeks)	
	Frequency	Time of Day	Frequency	Time of Day
ASES Group (28 Students)	3x's per week; 30 minutes per day	Afterschool	5x's per week; 20 minutes per day	During school day in classroom
Grade Level Group (74 Students)	No instruction	No instruction	5x's per week; 20 minutes per day	During school day in classroom

*Students in the ASES group received literacy based instruction using the iPads twice during the school day (after school and in class) in the last eight weeks of the program for a total of 50 minutes, three times a week and 20 minutes two times a week.

Second and third graders were selected to participate in the Grade Level Group and

ASES sub-group based on either referral from their classroom teacher and/or reading

performance scores on formative assessments. Each student was assigned their own iPad to

work on for the duration of the study. Each student used their own headphones during each

session to navigate the speech to text to touch functions of the apps. Only students who

consistently attended and applied themselves during the appointed time of the program were

included in the data collection and analysis process.

Description of the Apps: Design, Content and Selection

The iPad apps were carefully selected in order to facilitate specific literacy objectives. The GLPP instructors chose iPad apps whose content was limited to the development of basic literacy skills identified by the CCSS for early intervention in literacy. The iPad app's design had to be adaptive, interactive and focused on the practice or instruction of essential literacy skills. The iPad apps had to be designed with adaptive features that allowed for differentiated, individualized literacy learning. Each app had to have speech to text modalities in order to enhance phonics instruction. All the iPad apps used in this study where paid-for, full versions in order to avoid potentially distracting advertising commonly included in free versions.

There were 152 iPad apps used within the study. The apps were loaded onto each iPad. Students had access to every app. The GLPP instructors monitored the student's use of the iPad to ensure that they were working on their assigned apps and making adequate progress. The three major literacy based iPad apps that students used throughout the study were eSpark, Lexia and Spelling City. The eSpark app provided the organization, assignment, and structure for student use of the rest of the 152 apps.

The ASES group literacy instruction was facilitated by an app called eSpark. eSpark was designed to provide a framework where students could access a wide variety of apps. The eSpark app platform facilitated scaffolded instruction and provided sequenced, individualized practice specifically designed to address ELA weakness on the student's individual level. ESpark organized instruction and practice into "quests" that represented levels of instruction within the app. Each quest began with a pre-test and ended with a post test. Students were not allowed to progress to the next "quest" or level until they could pass the post test. If a student failed the post-test more than three times, eSpark would require the instructor to adjust the level for

decreased difficulty. Each quest consisted of a small number of two to three minute

instructional videos that were always a person introducing the CCSS standard and providing

instruction. The videos incorporated many engaging interactive modalities such as music,

demonstrations, and animation. Following each video, the students were directed to leave

eSpark and go to other independent apps to practice the skill they saw on the video. GLPP

provided a total of 152 independent apps that were recommended by eSpark and aligned with

each quest level. The apps that matched each student's individual assigned quest were added to

their iPad by the GLPP instructors.

As each student independently followed the prompts to complete "quests" through the

apps, they worked toward mastery of literacy skill standards. Before they began the program,

Ms. White assigned each student to their beginning level in eSpark by Common Core State

Standard (CCSS), (California Department of Education, 2013). Test scores on the Dibels ELA

Assessment, Star-E Assessment, Curriculum Based Fluency Measures and the classroom teacher

referral determined the CCSS strand the student began with. No student was placed lower than

first grade standards and no student was placed higher than fourth grade standards.

ESpark data was collected through the instructor dash board. The eSpark data dashboard

recorded the date of beginning and completion of each level and the pre and post test scores.

The data dashboard also showed the number of levels by CCSS standard the student completed.

After approximately ten weeks of consistent use of eSpark by the ASES subgroup, two

additional web-based literacy apps called Lexia and Spelling City were introduced to the entire

grade level group. Lexia and Spelling City were implemented during the designated classroom

time for all second and third graders in the school. Therefore, at the ten week marker, the ASES

subgroup spent approximately twice as much time in practice and development of literacy skills

on the iPad. Each student in the grade level group received iPad apps based literacy instruction

for approximately thirty minutes per day, five days a week with Lexia and Spelling City.

Additionally, the ASES subgroup engaged in iPad apps based instruction for thirty minutes three

days a week with eSpark and many other iPad apps.

Lexia is a web-based interactive literacy program that individualizes instruction in six

components of reading from the CCSS for ELA. Initially, students complete a placement test that

personalizes and differentiates the instruction as they progress through the levels of the app. The

design of Lexia explicitly provided instruction and guided practice that continually adapted to

the types of errors the student made. If the student made an error, Lexia is designed to remove a

level of complexity by reducing choices or embedding supports that help the student. Lexia

contains a very sophisticated data dashboard that helps teachers design personalized instruction.

Lexia also provides paper and pencil skill builder lessons that match the levels within the content

to facilitate small group intervention instruction by the teacher. Lexia can be used to set literacy

goals and action plans for each student.

Spelling City is interactive spelling and vocabulary iPad app that facilitates word

instruction using spelling rules, sentence structure, sight words and vocabulary development.

Spelling City provides teachers with ways to give spelling tests on line and practice weekly

spelling words. Spelling lists can be personalized so that the spelling instruction is differentiated

and supports literacy achievement.

From week 12 until week 18, the students of the ASES subgroup was allowed to choose

between eSpark, Lexia and Spelling city in the 30 minute afterschool time. At the end of the

study, the researcher surveyed 19 of the 28 students of the ASES group as to determine student

preferences in regards to their "favorite" app. Students could choose between eSpark and Lexia.

The results were similar. Nine students chose Lexia as their favorite while ten chose eSpark.

All the students who chose eSpark said it was their favorite because it was "fun" and they liked

the apps. All the students who chose Lexia as their favorite said it was because it "helped them

with reading" or "lets them learn on their own". The responses of the students were very similar

and every student who chose their favorite gave the same reason why.

Findings: Themes

Analysis of the data revealed three broad themes that relate to the effectiveness of iPad apps

based instruction:

1) The iPad app content and design can be shown to effectively enhance literacy

achievement.

2) The iPad and literacy based apps are effective tools for instructional differentiation

3) The iPad and literacy based apps increase student motivation and engagement

The researcher provides both qualitative and quantitative data to give evidence to these three

themes.

Findings Theme 1: iPad Apps Enhance Literacy Achievement

To demonstrate that the iPad app content and design can be shown to effectively enhance

literacy achievement, the researcher assessed the students in both the Grade Level focus group

and the ASES group with three independent formative assessments. The first assessment is

known as the STAR Early Literacy Enterprise Assessment (STAR E) from the program

Accelerated Reader. The STAR E is an on-line, grade level comprehension test. STAR E is a

district mandated assessment given four times a year by all elementary schools where the study

took place. The STAR E assesses students' reading level range between PrePrimer (pre-

Kindergarten) and grade five. The STAR E is product of Renaissance Learning Inc. The second

assessment is the CBM Reading Fluency Assessment. The CBM test is given three times a year

by the second and third grade teachers to test the oral fluency (number of words correctly read

per minute) of each student. The CBM test is a product of McGraw-Hill Education Corp. The

third assessment is the Lexia Placement and Progress Monitoring assessment that initially places

the students at levels ranging from one to eighteen, beginning at Pre-K to Grade five and then

tracks their performance levels as they progress through the curriculum. The Lexia Placement

Test is on-line within the Lexia app itself. The researcher compared student completed levels of

performance from where they began to where they ended.

Table 2.1 demonstrates the percentage of improvement in reading comprehension and

oral fluency scores overall of the combined second and third Grade Level group as compared to

the ASES group.   Only students who consistently attended and applied themselves during the

study time were included in the data collection process.

The combined grade level group consisted of 74 second and third grade students. The

scores used in the tables are the May final assessments for STAR E, CBM Oral Fluency and

Lexia Levels. The ASES group demonstrated the highest achievement with 61% of the students

showed improvement in reading comprehension. It is significant to note that the Grade Level

group also experienced improvement even though their time within the program was

significantly less.

Assessment Percent Improvement Overall May 2014
2nd & 3rd Grade Combined
TABLE 2.1

	STAR E IMPROVEMENT	CBM FLUENCY IMPROVEMENT	LEXIA IMPROVEMENT
ASES Group 28 Students	61%	25%	25%
Grade Level Group 46 Students	32%	15%	7%
Total Group 74 Students	36%	22%	14%

Table 2.2 further specifies the range of the percentage of improvement in reading comprehension and oral fluency into three categories: greater than 20%, greater than 40% and greater than 70%. The ASES group experienced significant growth in achievement in comparison to the grade level group. Eighteen percent of the ASES second and third graders improved by 70% or better during the study while 7% of the grade level group improved.

These percentages of improvement demonstrate that the iPad apps based instruction contributed to overall growth in literacy achievement. The amount of improvement is directly related to how much time the student spent engaged in learning using the iPad apps.   The ASES group spent considerably more time using the iPad apps. Not only did they use them for 10 weeks longer but during the last eight weeks they spent almost double the amount of minutes engaged because of their involvement in the afterschool program. The ASES students who participated in the literacy instruction intervention program for 18 weeks achieved higher than the grade level group who only participated in focused instruction for eight weeks. The ASES students used the eSpark apps based instruction and the grade level group did not. Therefore, there is a direct correlation in the relationship between the amount of time spent in practice using

the literacy based apps and enhanced literacy achievement. The amount of time spent in

instruction and practice as well as the content and design of the apps positively affects student

performance.

Range of Improvement Overall May 2014
2nd & 3rd Grade Combined
TABLE 2.2

	STAR E		CBM FLUENCY	
Improvement	ASES GROUP (28 Students)	GRADE LEVEL GROUP (46 Students)	ASES GROUP (28 Students)	GRADE LEVEL GROUP (46 Students)
Greater than 20 percentage points	21%	14%	7%	4%
Greater than 40 percentage points	14%	7%	10%	0
Great than 70 percentage points	18%	7%	4%	4%

According to Ms. Green and Ms. White the most important factor in student

improvement during the study was the content and design features of the apps when

appropriately aligned with the student's literacy performance level. When asked if the iPad was

an effective tool for providing instructional support for students who are below grade level, Ms.

White said, "Yes, absolutely. You must find the right app on the iPad and as long as the student

is carefully monitored, they showed improvement".   Ms. Green credited the touch screen design

of the iPad itself for accelerating student learning during the study. She commented that,

"Younger kids learn through their fingers, not just visually." She said that she saw significant

growth among students with special needs and English Language Learners. Both Ms. Green and

Ms. White agreed that the iPad as a tool used by younger students was much more effective than

a desk top computer with a mouse.   Therefore, the rise in student overall literacy improvement

demonstrates that iPad app content and design can be shown to effectively enhance literacy achievement if implemented while taking into consideration amount of time on task and alignment to the student's present levels of literacy performance.

When considering grade level scores of the students in the study, the iPad app content and design can be shown again to effectively enhance literacy achievement. The STAR E student scaled score can be converted to a grade level equivalency. Table 3.1 divides the Grade Level focus group into second and third grade and illustrates the growth of second and third graders in their grade level from September 2013 to May 2014. In September 2013, 15% of second graders in the grade level group were assessed at grade level proficiency. By May 2014, 24% of second graders had reached grade level proficiency. In September 2013, 30% of third graders in the grade level group were assessed at grade level proficiency. By May 2014, 27% of third graders had reached grade level proficiency. In the second grade group, the most significant gains in grade level proficiency occurred in February to May where scores doubled from 12% to 24%. In the third grade group, as well, the most significant gains in grade level proficiency occurred in February to May where scores increased from 19% to 27%. The time of February to May is when students in the ASES program began their literacy iPad apps based intervention and the rest of the group began in April. It is significant to note that as the transition of reading skills becomes progressively harder in the curriculum by the end of third grade, there is a slight decline in performance scores. The researcher acknowledges that there may be other factors that contributed to the positive growth in grade level proficiency such as small group instruction, tutoring and traditional instruction but the significant increase in scores from February to May is a definite indicator that the iPad apps based instruction had a positive influence on student achievement in literacy.

Grade Level Improvement 2014
Scaled Score STAR E
Grade Level Group
Table 3.1

	Grade 2		Grade 3	
	# of Students	STAR E *Scaled Score	# of Students	Star E *Scaled Score
Sept 2013	36	15%	37	30%
Nov 2013	36	18%	37	27%
Feb 2014	36	12%	37	19%
May 2014	36	24%	37	27%

*The Scaled Score (SS) is the actual score that a student received on the STAR E Early Literacy Enterprise Assessment. The numbers show the percent of students whose scaled score converts to their grade equivalency according to the STAR E.

Lexia Reading Progress Monitoring Results, Table 4.1 and Table 4.2, showed significant gains in student achievement as well. Lexia was implemented with the Grade Level group for the last 8 weeks of the GLPP, 5 days a week, 20 minutes a day. Additionally ASES subgroup group was allowed to choose between eSpark and Lexia in the after school program at week 10. All the students in the total grade level group showed growth. At the start of Lexia, 17% of the second graders were working in their grade level. By the end of eight weeks, 42% were working at their grade level and 3% had moved up into the third grade level. At the start of Lexia, 7% of the third graders were working in their grade level. By the end of eight weeks, 9% were working at their grade level and 9% had moved up into the fourth grade level. In third grade, it is significant to note that there was a reduction of the number of students who were two or more grade levels behind.

Additionally it is significant to note that when the students were placed in Lexia, 17% of second graders and 50% of third graders were two or more grade levels behind.   By end of the study, there was a significant increase to the total number of students working at or above grade

level. Also, the more advanced students were able to accelerate within the program. Therefore,

iPad apps based instruction can be shown to be an effective tool for literacy instruction.

Lexia Reading Progress Monitoring Results
Grade Level Group
Table 4.1

Grade 2	# of Students	Pre-K	K	1st	2nd	3rd	4th	5th
April 1, 2014	36	3%	14%	67%	17%			
May 30, 2014	36	0%	3%	53%	42%	3%		

Table 4.2

Grade 3	# of Students	Pre-K	K	1st	2nd	3rd	4th	5th
April 1, 2014	46	0	7%	43%	43%	7%		
May 30, 2014	46	0	0	24%	59%	9%	9%	

During the study the researcher observed certain challenges students faced when

attempting to access literacy learning using iPad apps. The challenges were directly related to

the content and design of the iPad apps themselves. The first challenge was academic language.

The instructional videos in the eSpark apps and the practice apps that followed contained

academic language that both second and third graders did not understand or recognize. Specific

language terms like "digraphs", "inflective endings", "vowel", "prefix", "suffix" and "rhyme"

all challenged the students. For the most part, while the instructional videos attempted to pre-

teach the terms contained in the coming apps, they were not effective. Therefore when the

students didn't understand the terms and thus the directions, rather than asking for help, the

researcher observed that in almost every case the student would be distracted, gamify the app or

leave the app and go on to something else without practice. As a result the students could not answer their post-test questions and would be directed back a level and not allowed to progress. This was frustrating to the students as their independence was now threatened and they could not progress to the next level without help. At this point the instructors would give very short mini lessons on the concept and help them through the post-test process. In some instances with the very low performing students, the instructors placed them in a new level that was more appropriate for them so that they could independently access the apps again.

When students encountered the academic language they did not understand in Lexia, the adaptive nature of the app only allowed them three error responses and then it sent the student back to a level more appropriate to re-teach the concept they needed to progress. Students had no choice about which app to go to for practice, therefore when they encountered difficulties with understanding the language or directions in Lexia, the transition was seamless and did not allow for distractions or gamification. When the lower students reached this point of lack of understanding, some of them asked if they could go out of eSpark or the other apps on their iPad or they stopped working because they were "tired". One third grader, whenever he reached this point without fail would ask to go to the bathroom. Then when he returned he would passively resist working on the iPad and engaged in off task behaviors.

The English Language Learners (ELL) had the greatest challenge not only with the academic language but the literacy skills required to decode language in general contained in the apps themselves. There were a total of 15 English Language Learners (ELL) in the after school ASES group, all of them at some point during the study experienced significant challenges with reading decoding and present levels of performance in literacy skills. For example, one second grade, ELL student while accessing instruction through an app that required him to visually and

auditory match long and short vowel sounds in simple CVC words gamified the app without regard to the instruction. He was required to move a frog icon with his finger to "eat" the word that matched the vowel sound he heard. If he was correct, the word turned into a "fly" that the frog ate. The student randomly guessed the sounds of the words, without reading in order to see the frog "eat" the fly. It was clear that he was not applying strategies, but simply visually matching letters without regard to the sound the letters made. When I asked him to stop and read the words to me, he replied with, "I'm not good at that…I can't read it". When I asked him further why he wanted to play that app he replied that "he liked the frog". Another third grade ELL student, consistently attempted to skip the instructional videos and go directly to apps that he could gamify. When I asked him, why he liked those apps so much, he replied because "I can win and don't have to learn." Thus, the content and design of the iPad apps must be accurate to each student's individual literacy level and students must be appropriately monitored in order for the instruction to be effective. Yet, regardless of the design and content challenges, ELL students still made significant gains using iPad app based instruction.

Graph 5.1 compares the ELL student's number of completed levels in the eSpark iPad apps to the English speaking students number of completed levels in the ASES group. This table indicates that the majority of the English speakers were able to complete more than 10 levels in the same amount of time that the majority of ELL students completed between five and ten levels. Therefore, this table demonstrates that the English speaking students were able to progress through more levels using the apps than the ELL students. This difference in progression may indicate that the language comprehension issues within the apps themselves can contribute to a student's lack of growth in literacy achievement.

eSpark App Progression Levels Completed of ASES Group
Comparing ELL to English Only Speakers
2nd and 3rd Grade Students 28 total
Graph 5.1
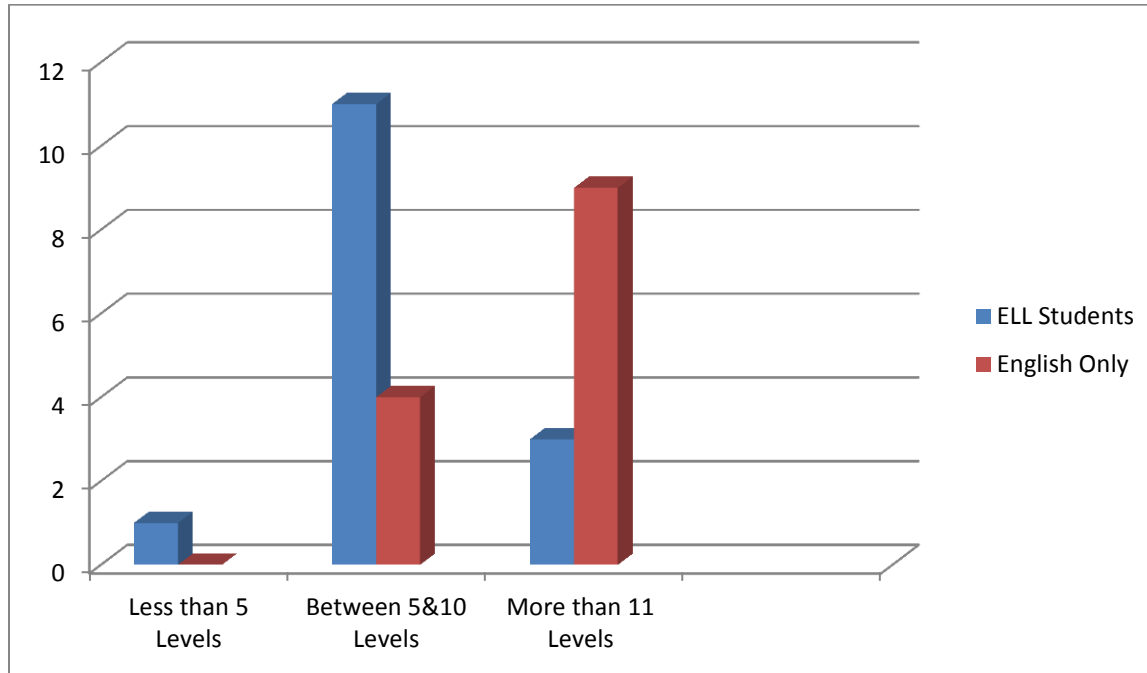
The second challenge students faced with the design and content of the apps has to do with the auditory/speech function of the apps. Because the independent reading levels of these students was limited, the text to speech component greatly assisted them to understand what to do. Once students started, it also provided them with a means of access and use of the content that they previously struggled to grasp through the use of text prompts only. The researcher observed that when a student didn't understand how to navigate in the app or the learning purpose of the app he or she tended to go off on tangents. Tangents include behaviors such as sampling other apps without engaging with content, random guessing using a "hit and miss" strategy or "gamification" which is purposely getting prompts wrong to get an entertaining reaction. The researcher observed that while the text to speech component was an important aid

for those students who were not independent readers, it did not make much difference with those students who had very low literacy levels. Those students who were not able to independently access the purpose and directions of the app due to their low literacy levels frequently engaged in tangents regardless of the text to speech component.

Additionally, many students who struggle with reading compensate by developing strong memory and listening skills. Their auditory vocabulary tends to be significantly higher than their visual or spoken vocabulary. All of the iPad apps are designed with touch to text to speech capabilities. It is very easy for the students to listen to directions, instructions or content and never have to read or decode the words independently. In most cases, students could rely on their strengths of listening and memory without applying reading strategies to text within the app. They were able to show progress without really reading or learning new content. The researcher found this to be especially true with the second grade ELL students. None of the seven ELL second graders within the ASES group, could complete their post-tests after practice with the apps, independently without using the sound/speech component. With the sound/speech component, three of these students could complete the post-test independently. The other four students, required instructor prompts and assistance in addition to the sound/speech component. The third grade ELL students also relied on sound/speech component but more of them could be independent and did not require teacher prompts as frequently. Therefore, because of the app text to speech design component students were able to rely on their reading strengths and did not potentially improve their reading decoding weaknesses.

It is important to note however that the assessments showed growth as demonstrated by the tables contained in this study regardless of the challenges observed by the researcher. The growth in spite of the challenges was most likely influenced by the close monitoring of students

by the instructors, the appropriate amount of time on task with the iPad apps and the careful selection of apps to directly fit each student's personal literacy objectives.

Findings Theme 2: The iPad and literacy based apps are effective tools for instructional differentiation

Using STAR E Scaled Score results, the researcher compared the third trimester literacy grade level growth among second and third grade students separately within the study site school and between schools with similar demographics in order to determine if the iPad and literacy based apps are effective tools for instructional differentiation. Third trimester growth was chosen because that was the time of this study. Overall the comparison tables show growth in literacy achievement for the study school site is greater than the growth of schools in the same district with similar demographics.

As shown in Tables 5.1- 5.4, both second and third grade growth was measured by demographic group at the school study site according to English Only Speakers, English Language Learners, Special Needs, Socioeconomically Disadvantaged and Reclassified Fluent English Proficient (third grade only). The greatest gains within the demographic groups occurred within the categories of English Only Learners and Socioeconomically Disadvantaged. However, it is significant to note that all learners across the demographic groups experienced growth.

By personalizing the literacy instruction using the specific design and content features of the literacy apps, the GLPP instructors were able to effectively differentiate instruction. Students worked at their individual level and pace during the time of the apps based instruction. All students demonstrated growth and benefited from iPad apps based literacy instruction regardless of demographics or starting level.

The data in Tables 6.2 and 6.4, compares the second and third grade STAR E scaled scores of the study school site to other school sites within the district with similar demographics. In third trimester growth, the study school site demonstrated more growth than the similar school sites. In the second grade comparison (Table 6.2), the study school site shows 27% more third trimester growth.

In the third grade comparison, the similar school site actually showed negative growth in most of the demographic categories. Over all the similar school site demonstrated only 5.4 growth points. The study school site showed 55.5 growth points in the third trimester. This is a 90% improvement in third grade at the study school site over other schools in the district in third grade. These results demonstrate that a large number of students fell behind in grade level literacy development in the similar schools while the study school site grew in grade level literacy achievement. The third graders from other school sites will not be as well prepared for the rigors of the next grade curriculum as the third graders from the study school site.

The comparison data in Tables 6.1-6.4, all students from the various demographic groups benefited from differentiated instruction using the iPad literacy apps.

Table 6.1

2nd Grade Study School Site STAR E Scaled Score					
Demographic Group	Percent	Total Students	Students Tested	Trimester 3 Growth	Average Year's Growth
English Learners	69.4%	25	24	36.6	86.6
English Only	30.6%	11	10	61.1	124.8
Special Needs	13.9%	5	5	31.2	64.4
SED	77.8%	28	24	51.2	90.0
Total 2nd Graders		36	34	43.8	97.8

Table 6.2

2nd Grade Schools with Similar Demographics STAR E Scaled Score					
Demographic Group	Percent	Total Students	Students Tested	Trimester 3 Growth	Average Year's Growth
English Learners	72.1%	106	64	29.1	98.1
English Only	27.9%	41	25	36.2	136.2
Special Needs	12.2%	18	10	9.3	35.9
SED	77.6%	114	68	30.1	104.3
Total 2nd Graders		147	89	31.9	108.8

Table 6.3

3rd Grade Study School Site STAR E Scaled Score					
Demographic Group	Percent	Total Students	Students Tested	Trimester 3 Growth	Average Year's Growth
English Learners	60.0%	27	22	45.9	106.9
RFEP	2.2%	1	1	10.2	133.0
English Only	37.8%	17	16	88.7	123.6
Special Needs	20.0%	9	8	53.5	107.0
SED	71.1%	32	27	42.7	92.3
Total 3rd Graders		45	39	55.5	100.3

Table 6.4

3rd Grade Schools with Similar Demographics STAR E Scaled Score					
Demographic Group	Percent	Total Students	Students Tested	Trimester 3 Growth	Average Year's Growth
English Learners	63.9%	85	80	-2.3	65.2
RFEP	4.5%	6	6	-5.8	47.8
English Only	31.6%	42	39	22.8	106.0
Special Needs	18%	24	19	-8.6	53.7
SED	82%	109	103	-1.3	71.3
Total 3rd Graders		133	125	5.4	77.1

The trimester three growth shown in tables 6.1-6.4 demonstrate by comparison tables that literacy achievement for the study school site is greater than the growth of schools in the same district with similar demographics. The growth of all groups, ELL, RFEP, English Only,

Special Needs and SED at the study school site is an indicator that when effectively used as a tool for differentiation the iPad apps enhance literacy learning.

Both the instructors and the researcher observed that using the iPad as a tool for differentiation and scaffolding of instruction enhanced literacy learning. All students regardless of their background, language or culture demonstrated growth and benefited from the instruction. Each student worked independently on their assigned quests and levels according to their literacy and grade level needs. The instructors used progress monitoring to inform their small group intervention instruction which also enhanced learning. Ms. Green pointed out that the use of the iPad in a 1:1 program such as the GLPP address school equity issues. The program allowed for equal access to the development of 21st century technology skills that children from socioeconomically disadvantaged backgrounds may not have had. Ms. White said, "if a student can access and use iPad apps they will have an advantage over a student who has never been on a tablet".

Findings Theme 3: The iPad and literacy based apps increase student motivation and engagement

The only whole group instruction that occurred throughout the 18-week study designed to facilitate classroom management and instruct the students about the proper functioning of the iPad device itself. After the initial training in specific routines of the proper way that students would use the iPads, the program sessions were opened with a brief greeting and announcements that took no more than one minute. The instructors allowed for as much independence and individual time on task with the iPad as possible. Because, instructors allowed the individualized videos and apps to teach the directions, skills and competencies necessary for success at each

quest level, whole group instruction was unnecessary. Instructors mainly worked individually

with students to provide prompts and support when needed. Occasionally instructors provided

small group support around literacy instruction.

Additionally, because each student was assigned their own iPad with their personal

differentiated literacy program, there was no provision made for collaboration among the

students using the iPads. Therefore, the high levels of engagement seen by the researcher can be

attributed to the apps and program itself and not the rewards of social interaction commonly

associated with small group, collaborative, cooperative learning.

There were three indicators observed by the researcher and the instructors that

demonstrate that the iPad literacy based apps increased student motivation and engagement: 1)

student's focused time on task; 2) structural components of the learning and 3) student testimony.

First, the researcher and instructors observed that the most of the students remained focused and

on task during the entire session of instruction using the iPad apps. Students were motivated to

complete their levels and quests and very often drew attention of either other students or the

instructors when they had moved on to a new level or quest. There were no tangible rewards

offered to the students to motivate them to progress through the levels. The feelings of success

and achievement in an area where they had not previously succeeded motivated them to apply

themselves and focus on their learning tasks. This focused engagement in differentiated learning

increased student's levels of performance in their literacy objectives. Conversely, whenever

there were problems with the internet or hardware infrastructure and the students were

consequently interrupted; they expressed great frustration and injustice at being denied the time

to play the apps. During the last two weeks of the program, only four out of the 28 students

within the ASES group (who used the iPads twice a day) complained that they were "bored" or

engaged in tangents. Those four students were among the lowest readers and three were ELLs

who were challenged by the language presented in the apps. Overall, the students in the grade

level group and the ASES group, remained focused and on task without the use of external

motivators. This speaks to the way iPad apps based literacy instruction can increase levels of

engagement among students who need intervention in literacy.

Second, the differentiated, individualized structure of the program and the design of the

iPads was very motivating to students. Because the instruction was at their level, they could

independently succeed and that success became addictive. Ms. Green commented that there was

"Such excitement when they succeeded…they had an 'I can do it' attitude". Ms. Green further

commented that she felt that the structure of the iPad apps "allows for more creativity and fosters

curiosity; it is so easy for them to search and find what they are looking for". The reward of

success and positive reinforcement with in the apps themselves motivated students to achieve.

Third, the students themselves reported at the end of the study how much they liked using

the iPad for literacy instruction. The instructors and researcher interviewed 19 of the 28 ASES

group to cause them to reflect on their own level of engagement and what they liked about the

program. Overall the responses were very similar. Students either said they liked the iPad apps

because they were "fun" and "exciting". Or they said that the apps helped them in reading,

learning or spelling. The students themselves testified to their increased motivation and

engagement using the iPad apps. The researcher saw one of the students in a grocery store during

the time of the study. The student introduced her mother by saying, "I am so excited for eSpark

tomorrow, I just got to idioms". She went on to explain how many levels she has completed and

how "fun" the program was. In another encounter at a restaurant, a different student while

introducing the researcher, told her dad, "This is my teacher. She lets me play apps on the iPad

that help me read. I am getting better at reading." Other students comments regarding

motivation and engagement are as follows:

- *"I like the apps. I like how it works; it makes you a better reader. I like the programs you do." – 3rd grader*
- *"The games to me are really fun and it is exciting to do it." – 3rd grader*
- *"It helped me read better and helps me understand things I didn't understand." – 2nd grader*
- *"I like it because it is very, very fun and when you get it wrong it helps you better because it lets you take your time. It lets you learn it twice and it gets into your head then you get to go to other levels." – 3rd grader*
- *"I got to play and learn my letters at the same time." – 2nd grader*
- *"There are more activities so I don't have to do the same thing over and over." – 2nd grader*

The student's sustained focused time on task, the structural components of the learning,

and student testimony give a strong indication that iPad literacy based apps increased student

motivation and engagement. Without exception, students who had previously experience failure

and felt as though reading was hard, were able to engage and easily access iPad apps based

literacy instruction to improve achievement.

Summary

The data strongly indicates that iPad apps can be used as an effective tool to enhance

literacy instruction in elementary intervention programs. The results of progress monitoring

literacy assessments and demographic comparisons demonstrate that iPad apps, when

consistently used, can contribute to increased literacy achievement. Certain parameters should

be in place however, to ensure this benefit. In order to actually facilitate growth and literacy

achievement in intervention programs, there must be a close alignment of the app content and

design to the student's present levels of performance through differentiated instruction within the

apps. The apps must be carefully selected to fit individual literacy objectives and promote

motivation and engagement through successful interactions in the iPad app framework.   The

instructors must closely monitor student behavior while accessing the iPad apps based instruction

to prevent tangents and troubleshoot questions and challenges.   Students must have the

opportunity to access the iPad apps based instruction consistently and frequently during the week

to in order to improve.

Chapter 5 Discussion /Analysis

Summary of Major Findings

The findings of this study suggest that iPad apps based instruction can have a positive effect on student achievement in literacy for children in second and third grade. Analysis of the data revealed three broad themes that relate to the effectiveness of iPad apps based instruction. Based on the qualitative and quantitative data presented in this study, the researcher concludes the validity of these three themes.

1) The iPad app content and design can be shown to effectively enhance literacy achievement.

2) The iPad and literacy based apps are effective tools for instructional differentiation.

3) The iPad and literacy based apps increase student motivation and engagement.

The progress monitoring data conclusively demonstrated improvement in literacy achievement with all elementary children who participated in the study. All students regardless of their background, English language acquisition level, or socio-economic status demonstrated literacy growth and benefited from the iPad apps based instruction. However, students who participated in the afterschool ASES group demonstrated greater levels of improvement due to the increased amount of supervised time spent accessing appropriate iPad apps for practice and instruction. The potential for student improvement increases when the nature of the literacy instruction and practice meets certain conditions.

The finding of this study demonstrated that student literacy achievement can be improved when certain specifically defined conditions of literacy intervention instruction are met. These

conditions are the parameters of effective iPad apps based instruction with elementary students.

Conditions for improving literacy achievement using iPad Apps are as follows:

1) iPad app content and design must be specifically aligned to the student's present levels of performance.

2) iPad apps must be carefully selected to fit individual literacy objectives and promote engagement through successful interactions in the iPad app structure and framework.

3) Instructors must closely monitor student behavior to prevent tangents and troubleshoot.

4) Frequency and consistency of time on task affects levels of student improvement.

The overall results of this study indicate that the iPad apps based literacy instruction can be an effective tool to improve elementary student achievement. When applied within certain parameters and conditions, the effectiveness of iPad apps based instruction increases. The second and third graders that participated in this study showed improvement through the opportunity to participate in the iPad apps based intervention program provided through this study.

Comparison of Findings to the Literature

The findings in this study are aligned with prior research. While much of the literature reviewed primarily consisted of qualitative information focused on either early childhood education or secondary education, this study provides educators with more data to document how to effectively implement iPad apps based literacy instruction at the elementary level. This study provides additional quantitative research that addresses the effectiveness of iPad apps on student achievement in literacy for children in second and third grade.

The previous literature reviewed revealed five themes that address the effectiveness of iPad apps in literacy intervention instruction.   Each of the themes is largely based on qualitative data that provides a foundational understanding of how iPads can be used to promote literacy achievement.

1) The iPad and literacy based Apps increase student motivation and produce high levels of engagement.

2) The mobile design features of the iPad make it a viable tool to enhance literacy instruction.

3) The iPad and literacy based Apps are effective tools for instructional differentiation

4) The use of iPads fosters collaboration among students.

5)   The iPad App content and design can be shown to effectively facilitate enhanced literacy achievement.

The research findings of this study are closely aligned with four of these five themes. First, the findings of this study demonstrated increased levels of student engagement with literacy instruction. Additionally, because each student was assigned their own iPad with their personal differentiated literacy program, there was no provision made for collaboration among the students using the iPads. Therefore, the high levels of engagement can be attributed to the apps and program itself and not the rewards of social interaction commonly associated with small group, collaborative, cooperative learning. The benefit of collaboration as seen in the literature review was not seen in this study. Second, the mobile design features of the iPad were also shown to contribute to instructional effectiveness. Third, the iPad apps themselves in terms of content and design and as a tool for differentiation can be shown to enhance effectiveness as well. The findings in the area of content and design show a direct correlation to the research and

findings of Falloon (2013) and Hutchison & Beschorner (2013). Both studies reinforced the finding of this study in the importance of aligning the app content and design to differentiate instruction. Falloon's research (2013) revealed content and design features as well that impeded learning. This study's findings mirrored those same impediments and challenges in tangents and gamification. Therefore, the finding of this study will serve to add to the body of research available on iPad apps based literacy instruction with a unique application to second and third grade.

Limitations/Gaps in the Research

This study was limited by several factors. First, the study was limited to the GLPP program parameters itself. The times of student instruction of both the Grade Level group and the ASES group, the limited number of specific apps used in the study (out of thousands of apps available) and the progress monitoring assessments all limited the scope of application of this study to iPad apps based literacy instruction. Second, the study is limited to second and third grade students who were referred by their teachers for literacy intervention instruction. Third, the study is limited by the training, qualifications and professional expertise of the instructors of the GLPP program. The individual instructor's input was critical in the selection process of the apps, to determine time on task for each student, progress monitoring assessment and the differentiation of instruction. The highly individualized application limits the research.

Implications for Future Research

There can be no denial that technology, mobile devices and apps are here to stay as an integral part of 21st century literacy education. However, the scope and impact remains to be

determined. Although the present study suggests that iPad apps based instruction can be used effectively for improved achievement, future research may focus on how to more practically and specifically integrate iPad apps into the literacy curriculum.

Future research should focus on measuring the impact of effective of integration strategies using iPad apps based literacy instruction on student achievement. Future research should build upon the premise that iPad apps based literacy instruction is a vital part of an individualized, differentiated student program not merely an "add-on" that runs parallel to literacy or technology standardized content.

Additionally, concerns about the lack of theory driving the incorporation of iPad technology in literacy classrooms should be enlarged to include a new domain – theory about effective iPad app content and design for student literacy learning. Too little attention has been paid to the software aspects of technology integration in favor hardware considerations. But as this study begins to explore, the apps or the software aspects of the technology are just as important, if not more important, when reaching for growth and improvement in literacy achievement. Research that outlines the best practices for selecting apps, the amounts of time on task, productive design features of apps and effective literacy content would be beneficial for educators in the future.

This study provides literacy educators with a portrait of the viability of the iPad as a tool to enhance and differentiate instruction. The study adds to current research on integrated literacy instruction in the lower elementary. In the future, the study may be useful to teachers as a foundation for exploring the use iPad apps for literacy learning.

Overall Significance of the Study

iPad apps based instruction as a tool for intervention at the second and third grade level has only been available to the education community for less than five years. There is very little research based data on the effectiveness of the iPad apps on student literacy achievement. As educators look to digital tools such as the iPad to transform literacy instruction this study may provide some answers. This study is significant because it provides additional quantitative and qualitative evidence which demonstrates that all lower elementary students can benefit from iPad apps based literacy instruction to improve achievement. The study will also be helpful to educators to determine the parameters of successful and effective integration of technology in literacy instruction.

About the Author

Deena M. Reyes has been a classroom teacher for twenty three years. Deena's passion for education and literacy developed through her efforts to improve instructional opportunities for students who cannot read at grade level. Deena seeks to incorporate technology in literacy instruction as a way to motive students who otherwise have given up on their own potential to succeed. Deena is excited and eager to further develop ways that teachers can use technology to enhance literacy achievement.

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