INSTRUCTIONAL TECHNOLOGY AND LITERACY PERFORMANCE

by

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CERTIFICATION OF THESIS WORK

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candidate for the Degree of Master of Science in Education, is acceptable in form and content and demonstrates a satisfactory knowledge of the field covered by this thesis.

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ABSTRACT

Technology use in schools appears to be growing rapidly in many school districts, so this researcher wanted to determine if the instructional technologies being purchased by schools were in fact beneficial to the students. This thesis was completed to address the research question of how instructional technology impacts literacy development in students. To answer that question, the researcher conducted an extensive literature review and research synthesis. The collected studies were organized into five categories: instructional technology with computer software, with interactive whiteboards (IWB), with digital story booking/podcasting, with mobile devices, and impact of teacher attitude on instructional technology. Analysis of the studies in each category produced the following findings: that instructional technology impacts literacy development in a positive way, specifically by improving reading and writing skills, increasing student participation and engagement, increasing standardized test scores, and increasing reading comprehension across content areas. Instructional technology with digital story booking/podcasting increases literacy development in emergent literacy skills, student performance, and vocabulary. Instructional technology with mobile devices increases phonemic awareness skills and student responsibility. Findings also show that teacher positive attitudes towards instructional technology influence student positive attitudes towards instructional technology, which in turn improves student literacy development. The findings of this literature review are applicable to all teachers in all content areas because instructional technology is used in all content areas at all grade levels.

Table of Contents

Chapter 1: Introduction

Statement of the Problem

Throughout the years, technology is being used more and more in the school setting, specifically for instruction in the classroom. Ten years ago, a classroom did not have computers let alone other technologies to enhance instruction. Lowther, Ross and Morrison (2003) support this idea by saying, "not only are there many more computers in schools than there were a decade ago, the proportion in the classroom relative to laboratories is also increasing" (p.23). With the increase in technology use, more schools are investing large amounts of money into educational and instructional technology. For example, "the United States has invested more than $66 billion on school technology in just 10 years" (as cited in Lei, 2010, p.455). Since instructional technology is becoming more prevalent in schools, researchers are trying to determine the extent of its benefits on student performance. Lei (2010) states that investments in technology are "supported by the strong premise that technology can help students learn more efficiently and effectively, and as a result increase student academic achievement" (p.456). Muir-Herzig (2003) adds that many studies suggest the same idea that "any student, including at-risk students, who have technology integrated into the curriculum, could potentially see a positive change in student classroom grades, GPA and attendance" (p.114). Knowing that schools are investing money on instructional technology, the question arises about whether or not it is beneficial to student academic performance. To address that problem from the perspective of a reading specialist, this thesis proposal asks the question, "what is the impact of instructional technology on the literacy development of elementary students?" To answer that question, a literature review of the research will be conducted and synthesized to produce new knowledge about the benefits and use of instructional technology that will, in turn, cultivate a professional development project to increase educators' knowledge on instructional technology, its use and impact on elementary students, specifically on student literacy development.

Background

During my student teaching practicum at an elementary school, I worked with a teacher who incorporated technology into every lesson, every day. I learned a great deal on the SmartBoard and since then have been very interested in the different technologies that could be incorporated into instructional practices. Also since then, I began working with a private school board and have provided instruction on the use of technology to my coworkers. Doing this enlightened me to the fact that many teachers are not familiar with the varieties of instructional technology that are available and its different uses within the classroom. I have also noticed that teachers were not aware of the different instructional technologies available to them within their own school districts. From my own experiences, I have become very passionate about instructional technology. With that, I strive to learn more about instructional technologies and their purposes. After searching for and finding research studies that showed the impact of instructional technologies on elementary and primary classrooms, I began to wonder how instructional technologies impact the literacy development of students in elementary classrooms. This wondering has led me to my proposed thesis topic; instructional technologies and the benefits they produce on student literacy development.

Terminology

In order to study this topic of the benefits of instructional technology, a clear understanding of some terminology will be helpful. The first key term is "technology." According to Means (2010), technology refers to an electronic or digital resource or devices such as computers, mobile devices, computer software and many more (p.292). One specific type of technology that is used when teaching and is a common technology device being purchased by more and more schools is the Interactive White Board (IWB). This device is a large, often wall mounted, electronic board connected to a computer that can be connected to the internet. A handheld pen controls the computer functions when it touches the

board (Lopez, 2010). This device is sometimes called a SmartBoard because one of the leading manufacturers of interactive white boards is the Smart Company of Canada (Smart, 2013). For this research study, any type of IWB will be called a "SmartBoard". Another group of technology devices specifically designed for instruction are called "mobile learning devices" (Kim, Hagashi, Carillo, Gonzalez, Makany, Lee, and Garate, 2011; Crichton, Pegler, & White, 2012). These include cell phones, iPods, and iPads. For this research study, any type of technology that a teacher uses for instruction when teaching will be referred to as "instructional technology." When all technologies available are brought together and used for instruction to help students learn in a classroom, the room becomes, according to Lopez (2010), a "Digital Learning Classroom" (p.901).

Theoretical Stance

Using the idea that each individual has linguistic, sociocultural and developmental literacies that he/she brings to school from his/her home culture and that those individuals are affected by the literacy event that is occurring helps determine the use of different manipulatives in the classroom. This idea arises from Gee (1991) who identifies those literacies as "Discourses": "a socially accepted association among ways of using language, of thinking, and of acting that can be used to identify oneself as a member of a socially meaningful group or 'social network'" (p.3). This relates to the research question for this study because the use of instructional technology brings a component of social media literacy into the classroom literacy of Standard English. Gee (1991) states that "learning to read is always learning some aspect of some discourse" (p.6). The use of instructional technology in the classroom could enhance instruction to help diverse students in the classroom learn that new discourse of reading in Standard English by bringing in the aspect of technology from their own social media out-of-school Discourse.

Rationale

Today, technology is being used in schools to enhance instruction and address individual learning styles of students. According to a review by Wendt (2013), many recent research studies have shown that implementing instructional technology into the classroom can increase the academic performance of students with disabilities and general education students. Since schools are required by state laws to follow Common Core State Standards (CCSS) but they are choosing to adapt or adopt to the modules provided by the CCSS, technology is becoming an important component or tool used in working with the CCSS (engageNY.org). For example, Grade three English Language Arts (ELA) CCSS Module 1, Unit 2 lesson 10 and Grade three ELA Module 1 Unit 3 lesson 16 both have technology incorporated into the lessons (engageNY, 2014). Carroll (2011) states that "the students we now teach are the first generation to have grown up immersed in technology" (p.27). Since the U.S. had spent 66 billion dollars on technology for schools in the past ten years (as cited in Lei, 2003), teachers and administrators should consider which technologies are going to be more beneficial to their students and school districts. Being aware of the different technologies that are becoming outdated and the new technologies that are becoming popular is important for educators and those purchasing the technologies. The question, "what is the impact of instructional technology on the literacy development of elementary students" is an important one to study because teachers and administrators may want to acquire knowledge on past and present technologies to help determine which could best be used as instructional technology in their classroom to benefit students and reach different learning styles today. Providing the research findings of this research study as professional development for fellow educators and administrators will bring about an awareness of the current technologies and how they could be used for instruction in the classroom.

Chapter 2: Literature Review

Introduction to the Review

To answer the research question of how instructional technology impacts literacy development of elementary students, the method is to conduct an extensive literature review and synthesis. A search of leading educational databases has found many related studies. These studies are organized below according to categories which emerge from the research question: instructional technology with computer software, instructional technology with interactive whiteboards (IWB), instructional technology with digital story booking/podcasting, instructional technology with mobile devices, and how teacher attitude impacts instructional technology.

Instructional Technology with Computer Software

The most prominent instructional technology used inside classrooms to impact student performance appears to be computer software. The following studies examine computer software generally. In the Schmid, Miodrag and Francesco (2008) study, researchers were looking for a clearer understanding of how a computer program could support tutoring instruction. The study was an evaluation research with a grounded theory analysis. In their study, the researchers analyzed the complex interactions that had taken place between the tutor and student using a computer during the tutoring sessions. The literacy software, a beta version was designed to guide the tutors while working one-on-one with the students that fall into the lower 30% of reading achievement. The participants in this study included eight, five year old daycare students. The participants were grouped by gender: four girls and four boys. Each group had both pre and early readers. Participants participated in 20 minute tutoring sessions each day for the duration of two weeks. The data for this study included parent surveys on demographics, age, gender and language use at home, as well as, observational notes and observational

anecdotal notes the tutor composed. One limitation of this study was the short period of time during which the study took place. Two weeks is not a long enough to obtain reliable outcomes. Another limitation was the small pool of participants used for the study. For this reason the generalizability of the results may be unreliable. However, the findings of this study do show that the interactive computer software used by the students motivated and supported student learning and that "participants become active participants rather than passive observers in the process" (p.78).

A similar study that relates to kindergarten students was conducted by Mitchell and Fox (2001). In this quantitative study, the researchers examined two computer programs that were designed to increase phonological awareness in kindergarten students. The purpose of the study was to "investigate the effects of computer-administered instruction and teacher delivered instruction on the phonological awareness of at-risk kindergarten and first grade students" (p.316). The researchers guided the study by asking three research questions, "Can phonological awareness be enhanced through computer-administered instruction? How effective is computer-administered phonological awareness instruction as compared with teacher-delivered instruction?" and "Is the effectiveness of these instructional methods of influenced by children's grade level?" (p.316). There were 36 kindergarten students and 36 first grade students from six different classrooms; the elementary school was located in the southeastern part of the North Carolina. The students consisted of 40 males and 32 females. The student participants ranged in age from five years old to eight years old. Each was classified as "at-risk" based on teacher observations and the results of the *Peabody Picture Vocabulary Test-Third Edition* (PPVT-III), and *Literacy Initiative for Everyone* (LIFE) assessment. The students were given pre- and post-tests that included the LIFE assessment and Phonological Awareness Test (PAT). The students were randomly assigned and divided into three different treatment groups; each group contained 24 students with an equal number of kindergarteners and first graders. The groups were called Group A, B, and C and each received different instruction. Group A received computer-administered instruction in phonological awareness, Group B received teacher-delivered instruction in phonological awareness, and Group C explored mathematics and drawing software. Throughout the four week study, the students were given practice time following 20

minutes of instruction. The results of this study indicated that there were "no significant differences between age, PPVT-III score, and pre-treatment measures" (p.324). The results also indicated that there were "no significant differences in the PAT post-test scores of kindergarten and first grade students" (p.325). Mitchell and Fox (2001) determined that "phonological awareness of at-risk kindergarten and first grade children can be enhanced by using computer-administered instruction, as well as by using teacher-delivered instruction" (p.326).

Another study using kindergarten students as participants was conducted by Coyne, Pisha, Dalton, Zeph, and Smith (2012). This study was conducted to determine a concrete approach to teaching students with significant intellectual disabilities. The researchers hoped to demonstrate how a research-based, balanced literacy approach, with the integration of the Universal Design and technology-based computer software, could create more supportive and accessible learning environments for students with disabilities. This quantitative study examined nine teachers of kindergarten through second grade and their students. Each classroom included students with significant intellectual disabilities in both inclusive classrooms and "substantially separate classrooms" (p.164). A total of 23 students were selected from the observed classrooms using two criteria: the participants were "reported to have shown significantly below average intellectual functioning and deficits in two or more areas, and they received reading instruction in one of the identified classrooms" (p.164). The researchers administered the Woodcock-Johnson Test of Achievement III which is used to determine reading growth through Listening Comprehension and Basic Reading Assessments. There are many limitations with this study because some observations were not recorded during the study. However, findings from this study indicate that the students involved showed "significantly greater gains in the Woodcock-Johnson Test of Achievement III passage comprehension subtest" (p.162) as a result of being taught with the Universal Design and technology software approach to literacy instruction.

In another study, Heimann, Nelson, Tjus and Gillberg (1995) conducted a quantitative study using an "interactive and child-initiated microcomputer program called Alpha" (p.459) on children with autism and mixed handicaps where the mental age of the students varied. The Alpha program was

"constructed to facilitate language learning through multichannel feedback that includes voice, animation, video and sign language" (p.465). In this study there were 30 children that were divided into three different groups: Children with Autism Group A, Children with Mixed Handicaps Group MH, and Normal Preschool Children Group NP. The participants in the study used the Alpha program and participated in training sessions for the duration of three to four months. Before the study began, the children were given the opportunity to become familiar with the Alpha program; at that time, the researchers made observations to determine if the children were motivated and interested in the program. This training also allowed the children to learn the basic functions of the software program and the researchers to determine what level the children were at to determine a starting point for the measurement. The children were given pre-tests, post-tests during the last week of the study, and a follow-up assessment one semester after the post-tests. Several tests were used to assess the children's language and communication skills throughout the study. Those tests include reading, sentence imitation, phonological awareness, communication, and level of Autism. The results of this study showed that the "three groups made considerable and significant progress within the Alpha program from the onset to the end of the training" (p.468). The study also indicated that the "children's performance on Alpha's built in test modes showed that the three groups learned both words and sentences through the program" (p.468). Therefore, the study indicates that there appears to be a "strong positive change for verbal expression, enjoyment, and seeks help" (p.472) as a result of using computer software as part of instructional technology.

Similarly, Blachowicz, Bates, Berne, Bridgman, Chaney and Perney (2009) explored whether or not technology-based literacy instruction with certain software in urban "at-risk" schools had a positive impact on student achievement and learning among elementary school aged students. The participants in this quantitative study consisted of 18 first-grade classroom teachers and their students in 11 high-risk schools located in a major mid-western city. Data were collected using environmental scans where the researchers looked at the classrooms' physical setting "to gain a sense of the classroom" (p.393). They did so by using "structured observation rubrics, and measurements of student performance" (p.394). Student

performances were measured by Dynamic Indicators of Early Literacy Skills (DIBELS) and Illinois Snapshot of Early Literacy. After the computer assisted instruction had been implemented for seven months, the observations were made. The 18 first-grade teachers were then visited for two hours and the interviewing process took place with the teachers and students, along with the environmental scan and analysis. Some limitations for this research include the fact that many of the first grade teachers were new to teaching or new to the first grade classroom. Another limitation of this study is that some of the teachers were not familiar with the instructional technology and were using it for the first time. Blachowicz et al. (2009) found, through "the analyses of classroom and pupil observational data and of student performance data, that literacy technology has positive implications on classroom instruction and student literacy achievement rates" (p.387).

Similar to the Blachowicz et al., (2009) study, Butzin (2001) conducted a quantitative study that compared standardized test scores in reading and mathematics for second and fifth grade students in a technology rich elementary school. The schools examined in the Butzin study were located in Miami-Dade County, Florida. One school implemented project CHILD (Computers Helping Instruction and Learning Development), while the other school did not implement the project. The participants of this study included three teachers from "cross grade clusters" (p.369). Each teacher focused on a basic subject area of reading, writing or mathematics. The study participants included 110 students in second grade and 94 students in fifth grade. Data were collected from students' standardized test scores, and the results indicate that the third year project CHILD students scored higher on all standardized tests compared to the non-project CHILD group. The results also indicate that "Project CHILD has positive effects on student learning" (p.371) and that this instructional technology computer software appeared to be "successful" (p.371). at transforming learning classrooms and impacting student learning.

Another study that examined elementary students as participants was conducted by Suhr, Hernandez, Grims, and Warschauer (2010). The researchers examined the impact of computer software instructional technology on learning because they found "very little qualitative research" was available that "systematically investigated the impact of laptop use on test outcomes" (p.4). Not only that, the

researchers found that research with students at the fourth to fifth grade levels was limited. Their study investigated how one to one laptop programs could help improve ELA test scores of upper elementary students, a group that normally faces a decrease of Literacy Development during the transition period from learning to reading to reading to learn. This is a time commonly referred to as "the fourth grade slump" (p.6). The participants included students from the Estrella School District where the average class size of fourth and fifth grade classrooms was 31 students. The school district was organized into two middle schools and two elementary schools. The control group and treatment group both had 54 students in them. This was a quasi-experimental design that analyzed the effects of a laptop program conducted by the researchers on California Standardized Test (CST) English Language Arts (ELA) scores for students in fourth and fifth grade classrooms. Data were collected from criterion-referenced tests, teacher and students surveys, interviews, observations, and teacher and student artifacts. Teacher and student artifacts were collected to supplement the test score analysis with information about the laptops. The limitations of this study were that the study "ruled out general school effects by examining the CST score of each individual school for characteristics" (p.37). Also, there was an insufficient representation of ethnic groups to compare student performance differences. Lastly, due to the "large population of participants in this study it increased the likelihood that differences from each group would cancel each other out and lead to more stable parameter estimates" (p.38). The findings of this study indicated "that after two years of participation, laptop students outperformed non-laptop students on changes in ELA total score and in the two subtests that correspond closely to frequent laptop use: writing strategies and literacy response and analysis" (p.36).

Middleton and Murray (1999) also examined fourth and fifth grade students and the instructional technology of computer software. They hoped to determine the relationship between the levels of technology implementation used in the classroom and student standardized test scores in Reading and Mathematics. This quantitative study focused on fourth and fifth grade students from 15 elementary or intermediate schools in South Carolina. There were 1,466 fourth graders and 1,108 fifth graders for a total of 2,572 students. Throughout the study, surveys were conducted through "Levels of Technology

Implementation" (LoTi) (p.111) and compared to the standardized test results of the "Metropolitan Achievement test: Seventh Edition" (MAT7) (p.112). The findings show no significant change in the scores of fourth grade students, but the fifth grade students show a positive effect between the relationship of technology implementation and student standardized test scores. The fifth grade students demonstrate that using the instructional technology of computer software increased standardized test scores in Reading and Mathematics.

Lowther, Ross, and Morrison (2003) conducted a quantitative study that "examined the educational effect of providing fifth, sixth and seventh grade students with 24 hour access to laptop computers" (p.23) and how the computer software can impact student learning. The participants included 21 different classrooms with approximately 391 students from six fifth grade classrooms, nine sixth grade classrooms, and six seventh grade classrooms participating in the study. Parents and teachers of those students participating also participated in the study. Observations, surveys, writing assessments, interviews and a focus group were used to collect and analyzed data in this study. The findings indicate that "writing assessment results showed substantial and significant advantages for laptop over control students" (p.23) when instructional technology as computer software was used. The results also indicate that when instructional technology with computer software was used there were "significant advantages for the laptop group on five of the seven components of the problem-solving task" (p.23).

Lei (2010) examined the use of instructional technology by looking at the relationship between technology use and student outcomes for seventh and eighth grade students in Northwestern, Ohio. Lei (2010) conducted a qualitative study that utilized surveys and interviews to collect data. Student GPA's were also collected and analyzed. In this study, each student had access to a laptop computer while at school and used those computers to collect data on quantity and quality of the laptop uses. The students utilized the laptops for general purposes, subject specific, social communication, exploration, and entertainment purposes throughout the study. The findings of this study indicate that by "only examining how much time was spent on computers, no significant relationship was found between technology use and any student outcomes; however, when how technology was used was examined, significant

association was identified between technology use and most student outcomes" (p.466-467). There were a total of five different uses of the technology that include "subject specific, social communication, construction technology, exploration/entertainment, and general technology" (p.463). The five different instructional technologies that were utilized that dealt with laptops and the results indicate that student GPA's were not impacted by type of technology used for instructional purposes.

Means (2010) focused on two questions that related to instructional technology with computer software they are as follows: "what could be done at the classroom level to be associated with student higher achievement gains by using reading and math software and what could be done at the school level to be associated with student higher achievement gains using reading and math software?" (p. 286). The study began with 14 schools and ended with 13 schools because one school dropped from the study. Each school was determined to be a high gain school or a low gain school in reading and mathematics student achievement. Data were collected through site visits where each teacher was observed twice, interviews of principals and other school leaders were conducted, teachers' interviews were also conducted to determine the use of the software in the classroom, and observations of students learning and engagement were made. Some schools, which were not visited in person, took part in phone interviews. Once all the data were collected the researchers entered it into qualitative analysis software to determine differences between the "high-gain" schools in achievement and the "low-gain" (p.290) schools in achievement. Some limitations of this study were that specific grades were not specified nor were breakdowns of female to male ratios provided. The findings of this study examining instructional technology with computer software indicate that with "principal support and teacher collaboration and familiarity with technology used showed improved student performance" (p.302).

Muir-Herzig (2003) looked at the same idea of instructional technology with computer software and at-risk students as Means (2010). The researchers wanted to "determine the effect that the level of computer technology use in the classroom has on at-risk students' grades and attendance" (p.111). This quantitative study included participants from a Northwestern Ohio High school; four part surveys were conducted to gather information on how both teachers and students used computers during a specific

timeframe. The first part of the survey asked the teacher about the current proficiency of the technology being used and the second part of the survey asked the teacher to answer six items about frequency of administrative tasks completed on the computer. Parts three and four of the survey included 17 different questions the teachers were asked to indicate the frequency with which the tools and applications were used by both the teacher and students. The "results of the study indicate that teachers' technology use, students' technology use, and overall technology use have no significant positive effect on the grades and attendance of at- risk students" (p.111).

Lastly due to the fact that it is the only study that has participants of college age, Debevec, Shih, and Kashyap (2006) conducted a quantitative study on college students and the impact of the use of instructional technology within the college classroom. Students used instructional technology to review and practice for tests and quizzes. The participants include 79 undergraduate students that represented 95% of the students enrolled in one of two sections of a "Promotional Strategy" (p.295) course. Data were collected from the students at the end of the semester via online surveys and exam scores. The online surveys determine student participation in class and the use of the online website outside of the classroom to increase their knowledge. Provided on the online website was practice quizzes, PowerPoints, and homework assignments. One limitation of this study is that students that participated in the study were given extra course credit which could alter student response and participation. The results of this study indicate that most college students appear to take advantage of the computer software that use being used as instructional technology that their professor provides them.

Specific computer software programs.

The previous section looks at research studies into instructional technology with computer software generally. However, several research studies were found that examine the use of specific computer software programs. Tracey and Young (2007) conducted a quantitative study based on the specific computer software program called the Waterford Early Reading Software program. They wanted

to determine the program's impact on the literacy development of kindergarten students. The Waterford Early Reading Program is a "software-based, interactive, early reading instructional program designed to help kindergarten students' develop the emergent literacy skills they need to enter first grade, ready to become successful readers" (p.451). In this study there were two research questions being considered: "did the Waterford Early Reading Program, Level I, have a positive effect on children's literacy learning in the intervention classrooms, and how can the results of this research extend the current knowledge base regarding the role of technology in young children's literacy education" (p.448). The participants in this study included 301 kindergarten students from a northeast urban school district in the United States. That region was "marked by many risk factors" (p.450) for early literacy development including "high rates of poverty, unemployment, teen-and-single parent families, crime, and drug usage" (p.450). There were 15 different kindergarten classes from eight different schools that were included in this study. The classrooms were randomly selected and one class from each school became the "experimental classroom" (p.450) and one became the "nonintervention classroom" (p.450) for that school. The eight experimental classrooms received the "software, hardware, and related print materials necessary for the study" (p.452). All participants were pre-tested to determine their reading levels: 150 students took the TERA-2 and the Lindamood Auditory Conceptualization Test and 151 students took the Waterford Reading Instrument. The Waterford Early Reading Program, Level I was then implemented as instructional technology in the experimental classrooms for 15 minutes a day for a ten-month period. After the ten-months, post-testing was administered in the same way the pretests were given. Results show that "when comparing student gains scores, the evaluation showed significant results favoring students in the experimental classrooms using the TERA-2 and the Waterford Reading Inventory and no significant differences favoring the experimental students using the Lindamood Auditory Conceptualization Test" (p.459). The Waterford Early Reading Program also "revealed strong, positive, statistically significant results associated with its use" (p.461) as computer software being used for instructional technology.

In a study conducted by Cviko, McKenney and Voogy (2011), the researchers wanted to examine how teachers' perceptions of teaching/learning technology and innovation impacted implementation of a

technology-rich curriculum for emergent literacy. They also wanted to show how teacher technology integration into curriculum impacts student learning. Cviko, McKenney, and Voogy (2011) conducted a case study to investigate technology integration within the PictoPal curriculum. They also used a mixed method data collection approach for this study using both quantitative and qualitative methods. The data were collected and grouped into four areas: "teachers' perceptions, pupils' engagement in activities, teacher integration of on-and-off computer activities, and pupils' emergent literacy proficiency" (p.38). The participants for this study were four kindergarten teachers from one primary school in the Netherlands. Data was compiled by conducting interviews, utilizing observation checklists, and using emergent literacy tests. The four kindergarten teachers used their students to represent the class and then compared them to other classes. This study lasted eight weeks, but the findings indicate "that significant learning gain was found for the group of students that represented the four teachers chosen to use the PictoPal" (p.31) as the computer software of choice for instruction.

Rasinski, Samuels, Hiebert, Petscher, and Feller (2011) explained the effectiveness of a computer-based silent reading fluency instructional system called Reading Plus. The Reading Plus program works on reading comprehension. The researchers looked at the overall reading achievement rate of a large group of students in an urban school setting. The participants in this study consisted of 16,143 students from grades four through ten. It examined 23 schools in which 11 were elementary schools and 12 middle/high schools in the Dade County School System in Miami, Florida. The control group consisted of 10,385 students and the treatment group consisted of 5,758 students. In this quantitative study, data were collected from the Florida Comprehensive Assessment Test (FCAT) which consists of two types of tests: criterion-reference and norm-reference. A pretest was given in spring 2006 and a post test was given in spring 2007. Some limitations were present in this study because some schools only placed students in the reading plus program who scored "non-proficient" (p.79) on the 2006 reading portion of the FCAT, while other schools used specific grades to assign students to the Reading Plus program. Although there were some limitations, the findings of this study show that students participating in the program for a minimum of 40 lessons (20 hours of instruction), over approximately 6 months made

significantly greater gains on both the criterion-reference and norm-referenced reading tests of the FCAT than students who did not participate in the computer software program.

Another study on computer software involves the widely used Accelerated Reader software program. Accelerated Reader is computer software which provides tests to students and records data. The goal of this software is to increase literature-based reading practice. The study was conducted by Paul, VanderZee, Rue, & Swanson (1996). The researchers examined the impact Accelerated Reader had on attendance and standardized test scores. This quantitative study was completed in the state of Texas where the demographics are large and diverse. The participants included were 2,500 students from elementary, middle, and high schools who were compared to 3,500 different schools with the same demographics. The researchers collected data on academic achievement using the "Texas Assessment of Academic Skills" (TAAS) (p. 2).The researchers compared the results of the TAAS to school that do not have Accelerated Reader. The researchers also collected data through "Advantage Learning Systems, Inc. which are the publishers of Accelerated Reader, Quality Education Data, Inc., and the state educational agency statistics" (p.1). The results show "statistically significant differences for reading comprehension, writing, math, science, and social studies; all results favored the Accelerated Reader schools over the non-Accelerated Reader schools" (p.2). The results also show that "Accelerated Reader schools were likely to have higher attendance rates than their non-Accelerated Rates socioeconomic peers" (p.2).

Instructional Technology with Interactive Whiteboards (IWB)

Another approach to instructional technology is the use of Interactive Whiteboards or IWB's. Lopez (2010) used three research questions to help guide the project's evaluation of IWB's. This was a quasi-experimental evaluation that used benchmark tests in math and reading from the Fall of 2006 and also the Texas Assessment of Knowledge and Skills (TAKS) test scores for mathematics and reading from Spring 2007. The participants included three English Language Learners Elementary Schools, seven teachers, three from third grade classrooms and four from fifth grade classrooms, along with their school

principals of those three English Language Schools. This study hoped to determine the extent to which interactive whiteboard (IWB) technology could foster student performance achievement between English Language Learners and mainstream students. The study also hoped to determine if the use of IWB could reduce the achievement gap between two third and fifth grade classrooms in math and reading. Some limitations for this study were that the principals selected the participating teachers' which means that they could have selected higher performing teachers rather than low performing teachers'. For this reason, the teachers may not have been the most appropriate participants for this study. The findings of this study indicate that the "third grade English Language Learners in a Digital Learning Classroom had a higher TAKS pass rate in reading than a traditional classroom" (p.908). Lopez also demonstrated that "the Digital Learning Classroom prepared proportionally more third grade ELL students at the higher performance standard that indicates a student has mastered the entire 3rd grade reading curriculum" (p.908).

Another study that used instructional technology with interactive whiteboards is by Swan, Kratcoski, Schenker, and van't Hooft (2010). The study used interactive whiteboards to explore the possible effects that interactive whiteboards have on students' reading/language arts and mathematics performance. The researchers conduct this study to determine answers to the following research questions, "do students whose teachers use interactive whiteboards to support instruction perform better on standardized tests of mathematics and reading/language arts than those who do not? and among classes where interactive whiteboards are used, are there differences in the ways in which teachers use whiteboards between classes whose average test scores are above grade level means and those whose aren't?" (p.3). This study took place in a small city school district located in Northern Ohio. The school had approximately 7,500 students between grades kindergarten and twelve. The school district's population contained twenty one percent African American students and eight percent of the students lived at or below the poverty level. The participants include students from grades three through eight, which were included in 11 elementary schools, three junior high schools, and one alternative school. The students Ohio Achievement Scores (OAT) (p.3) were compared to determine the impact IWB's had on

instruction and student performance. The teachers' that participated were chosen by the school principal. There were a total of 72 teachers involved in this quantitative study. The researcher's compared the OAT scores using an analysis of variance (ANOVA). Data were collected using online surveys, self-reports, and test scores. Along with collecting data to determine the impact that IWB's had on student performance, the researchers also "conducted two focus groups with participating teachers to obtain additional data regarding instructional use of the interactive whiteboard and teachers' perception regarding the impact of this technology on teaching and learning" (p.4). The results indicate that the "interactive whiteboard group performed slightly better on the Ohio Achievement Reading Test than the group that did not use interactive whiteboards across all grades" (p.6). The results also show that "students in reading/language arts classes with interactive whiteboards outperformed students in classes without them on the Ohio Achievement Test of reading/language arts in all grades except grades three and seven" (p.6).

In a study performed by Smith, Hardman, and Higgins (2006), the researchers "investigated the impact of IWBs had on teacher-pupil interaction" (p.443). For this study, IWBs were installed in 15 schools throughout the local area. Data were collected through structured observations, interviews with teacher and students, weekly records that the teachers recorded, and through student performance on national "Stage Key 2 tests" (p.446). The study took place across a two year time period from 2003 through 2004. In 2003, the sample size consisted of 30 teachers: 18 female and 12 male. The sample size in the year 2004 was 20 teachers: 14 female and 6 male. Total sample size produced 184 lessons in those two years. The lessons were observed four different times throughout the study: "one observation was to use the IWB to teach numeracy, and once without; once using an IWB for teaching literacy, and once without" (p.447). To determine significant differences, a "one-way ANOVA was used in analyses" (p.447). In the analyses "the observations were carried out using a computerized observation schedule developed by the research team known as the "Classroom Interaction System" (p.448) and also a continuous sampling method was used to make those observations. There was no subject area differences

found between numeracy and literacy: “in those lessons which used an IWB there were significantly more open questions, repeat questions, probes, evaluation, answers from pupils, and general talk” (p.450).

Beeland (2002) also conducted a study to determine if interactive whiteboards (IWB) could promote student engagement. Beeland (2002) stated that “student engagement is one of the most important factors that affect teaching and students’ motivation to learn” (p.1). The participants in this study included ten teachers who volunteered to participate. Students completed surveys and questionnaires. The researchers collected 197 surveys and 20 questionnaires and the Data were measured by two measurements; “survey based on modified version of the Computer Attitude Questionnaire and questionnaires” (p.2). The researchers stated that the dependent variable in this study was student engagement. To the question “does the use of an interactive whiteboard as an instructional tool affect student engagement, the answer based on the results of both the surveys and questionnaire, is yes” (p. 5). Results also indicate “that interactive whiteboards can be used in classrooms to increase student engagement during the learning process” (p.5).

Another study that showed positive effects using interactive whiteboards is by Dhindsa and Emran (2006). In this study the researchers examined how interactive whiteboards increased student achievement in chemistry at a government school in Brunei. There were four classes involved; two were the classes receiving instruction by the interactive whiteboard which was called “constructivist teaching approach” (p.180), and the other two classes did not, so they were called the “traditional group” (p.180). In the two classes receiving the technology, there were 23 boys and 34 girls and in the classrooms not receiving the technology there were 25 boys and 33 girls. Data were collected in three stages. The first stage was completed using a pre-test. In stage two, 60 chemistry lessons were conducted over six weeks and in the third stage a post-test was given. The findings indicate that the use of interactive whiteboards increased student performance in chemistry by increasing their performance on the post-test. Dhindsa and Emram (2006) stated that“ when the mean gain in the achievement scores were compared, the constructivist teaching approach managed to produce a statistically significant higher mean gain score

than the traditional approach group" (p.184). These findings indicate that using IWB's in classrooms can increase student achievement when used correctly in different subject areas other than reading.

Instructional Technology with Digital Story Booking/Podcasting

Another approach to instructional technology is the use of Digital Story Booking/ Podcasting. Korat and Shamir (2008) conducted a study to determine the effects of "educational electronic book (e-book)" (p.110) on kindergarteners' emergent literacy. The participating students were separated by socioeconomic status of middle and low. The research posed three different questions:

> will there be a significant improvement in the children's emergent literacy scores from pre-test to post-test across SES groups after using the educational e-book, will there be any difference in the degree of improvement in the children's' levels of emergent literacy as a function of their SES group, and will there be any difference in the degree of improvement in the children's emergent literacy levels as a function of the mode of their e-book activity (p.113).

The participants in this study consist of 149 children from eight different kindergarten classrooms: four of low socioeconomic status and four from middle socioeconomic communities in Tel-Aviv. The students in Israel were five to six years old and began formal instruction in reading and writing when the students entered elementary school. The book that was chosen for the study was called *The Tractor in the Sand Box* by Mel Shalev. The digital book software used had four different modes: "read story only", "read story with dictionary", "read story and play", and "printing" (p.114). The students were placed into three groups, and data were collected before and after the study using several measures that included word meaning, word recognition, and phonological awareness. The researchers gave the tests to the young students in two test sessions within five days. Each test was divided up between sessions. The first session included word meaning and word recognition assessments and the second session included phonological awareness assessments. After the study, the post-test assessments were administered comparable to the

pre-tests assessments. The results of this study show that the students in the "read story and play" group improved in their word meaning skills as well as in the "read story with dictionary" group. The study also indicates "significant improvement in word recognition in all four groups" (p.119). The results also indicate that there was a "significant difference between low socioeconomic status and middle socioeconomic emergent literacy improvement scores" (p. 120). Overall, the study demonstrates that student's emergent literacy skills improved with e-book activities.

Another study that used electronic books as the instructional technology was conducted by Burnett, Dickson, Myers, and Merchant (2006). This case study took place in two primary schools in Northern England. The researchers "examine the possibilities of transformation through an electronically mediated partnership between the two primary schools" (p.11). The students communicated through e-mail to make a PowerPoint presentation. The researchers guide the study with the following research questions:

> How can the use of peer-to-peer digital communication transform classroom practice what processes characterize children's onscreen communication?, how do children use the affordances of digital media in peer-to-peer communication?, and what are the children's views about the use of digital communication in the classroom? (p.14).

The participants in this study included two very different primary schools, the students were of a "mixed Year 3 and Year 4 class in a rural school in Derbyshire and were twinned with Year 5 students attending an urban school in Sheffield" (p.14-15). Burnett, Dickinson, Myers, and Merchant (2006) state that "although the focus was on students' use of digital literacy, there was a strong feeling from the class teachers that the social benefits in terms of breaking down stereotypes and widening horizons were likely to be positive by-products of this study" (p.15). The participants included three boys and three girls. Each were randomly selected and partnered up with a student from the other participating school. The students partnered together were of the same gender. The students' shared emails throughout the study and had two work sessions that were face-to-face, prior to the production of the final PowerPoint presentation.

Qualitative data were collected using the artifacts the students brought in, writing samples from students which included emails, observation schedules, and student perceptions of digital writing. The researcher's analysis shows "how technology can both transform the way children write as well as the kinds of texts they produce" (p.25). The findings also suggest that "using email not only encourages children to communicate, by providing an authentic and responsive audience, but also actively engages them in the use and exploration of a mode of communication in which focused exchanges of information, playfulness, and experimentation are essential features" (p.25). The findings also indicate that students demonstrate increased motivation and potential for further development in the language skills as a result of the e-book usage. The research also show "that children reported that as a result of working on the project they became more confident with the new technology and learned how to use the computer better and claimed they could now type faster" (p.25)

Another form of instructional technology that has been used to determine the impact that technology has on student performance is the technology of digital story booking/podcasting. Also, electronic books (e-books) are included in this section due to the similarities between e-books and digital story books. Vasinda and McLeod (2011) explained how podcasting could enhance readers' theatre by having the students perform and record their work as a way to reach all learning styles, actively engage students and show increase in their student performance. Vasinda and Mcleod (2011) stressed the importance of maintaining the effective research-based elements of the Literacy strategy while the students were creating their podcasts, readers' theatre. The participants in this study include three elementary schools in Northern Texas; two of the schools served as significant bilingual populations. One second grade and one third grade class was chosen from each school for a total of six classes that consist of approximately 100 students and 35 of those students were identified as struggling readers. This study was a mixed-method study that quantitatively examined reading fluency and comprehension scores of the 35 struggling readers using Developmental Reading Assessment (DRA) and Comprehensive Reading Inventory (CRI). Qualitatively, the researchers conduct focus groups, interviews and asked the teachers to complete open ended questionnaires. One limitation of the study is that one teacher participant dropped

out three weeks into the study which changed the numbers from the beginning of the study and numbers may not be accurate. The findings of this study indicate that "the grade-level equivalency gain for the struggling readers as a group was 1.13 years after this 10-week intervention" (p.492).

Sadik (2008) study collected data from Egyptian teachers to determine if digital storytelling would be beneficial for students' and teachers'. The study looked at three different research questions: "(1) to what extent can students be engaged in authentic learning tasks with digital storytelling, (2) how effective is a digital storytelling approach in supporting teachers to effectively integrate technology into learning, and (3) what are the teachers' concerns and views regarding the implementation and integration of digital storytelling into learning" (p.491). Data were collected through a scaling rubric instrument (to determine student engagement), observations and interviews. The participants include two private Basic Education schools in Egypt from which eight teachers were chosen to participate. The selected eight teachers then chose one class of 35-45 students between the ages of 13 and 15 to participate in the study. The findings indicate "that students' were encouraged to think more deeply about the meaning of the topic or story and personalize their experience and also clarify what they know about the topic before and during the process of developing and communicating their stories" (p.502).

Prior to the Sadik (2008) study that used e-books, Higgins and Hess (2000) examined how electronic books or e-books impacted student vocabulary. Higgins and Hess (2000) designed the study to "determine the effectiveness of selected vocabulary-building activities on the learning and retention of unfamiliar words when used in conjunction with the animation features found in electronic books" (p.425). The participants include a class of 22 third grade students that consisted of ten boys and twelve girls, which were randomly assigned to either the control group or the experimental group. The students attended a middle-class suburban elementary school. The control group contained: six boys and five girls, and the experimental group: contained four boys and seven girls. None of the students were familiar with the electronic book called *The New Kid on the Block: Poems* by Jack Prelutsky (1993). The control group "listened as the computer read a page from the poem, the student then found two target words and watched the animations associated with each word" (p.427). The students in the experimental group

"listened as the computer read a page from the poem, they then found the target words on each page and viewed the animation associated with each word" (p.427). The difference between the control group and the experimental group is that "three days after the session the students were tested to determine if they could define the six target words" (p.427). The findings of this study show "very little difference in the number of times children in either group selected the target words in their search for word meanings" (p.428). Throughout the study it was indicated that the "Children who received supplement vocabulary instruction in conjunction with the animations in an electronic book performed slightly better than children who used an electronic book without supplementary instruction" (p.429).

Instructional Technology with Mobile Devices

The following section presents studies into instructional technology with the use of mobile devices in the classroom. Kim, Hagashi, Carillo, Gonzales, Makany, Lee, and Garate (2011) study discuss the different ways of using a mobile learning technology-based learning model in the classroom. This was a comparative analysis that collected data from achievement tests which included pre- and post-tests, observations, surveys, and interviews. The pre-test was given in September of 2008 and the post-test in December of 2008. The participants include 160 students; 80 were from a rural location and 80 were from an urban location. The breakdowns for the schools were 19 urban students and 14 were rural students. In the rural communities, 33 parents were interviewed using self-report surveys. The schools that were studied were located near the United States-Mexican border using a mixed method analysis with one experimental group and one control. The study lasted 16 weeks and the teachers were trained for just one week before the study began. The findings indicate an "increased phonemic awareness skill of the participants at multiple levels and the technology offered opportunities to practice reading through interesting content and entertaining activities" (p.478).

In examining the effects of instructional technology on literacy development, Crichton, Pegler and Duncan (2012) conducted a study on instructional technology that utilized the mobile devices iPads

and iPod Touches in the classroom. The study was conducted to gain understanding of the infrastructure required to support handheld devices in classrooms, the opportunities, and challenges teachers may face as they begin to use the handheld mobile devices for teaching and learning. This study also looked at the challenges, opportunities and temptations the students may face when having access to these instructional devices. The participants include five schools from a large school district in Canada. A mixed method approached was used to collect data included online surveys, monthly professional development activities for the teachers, analysis of lesson plans and student work, and classroom observations. The study was divided into two phases. Phase one included the use of an iPod touch for a two month period and phase two included the use of iPads for a two month period. The findings indicate that schools need to be synced together to create common iTUNES accounts, network access, student emails and many more to make information readily accessible. The findings in phase two indicate that there was a significant shift in the roles and responsibilities of all individuals involved (p.27). There were many advantages of using the iDevices in the school environment that included the ready access to the internet and other resources, longer battery life, size and short learning curve (p.29). The study indicated that the devices, with successful corporation from all individuals involved, would be beneficial to use in classrooms to support learning and engagement.

How Teacher Attitude Impacts Instructional Technology

This section presents studies that focus on explaining how the attitude of the teachers using instructional technology impacts what and how students learn. Howley, Wood and Hough (2011) conducted a qualitative study that addressed questions relating to technology integration and its impact in rural elementary schools. This study provided a random sample survey to third grade teachers in Ohio. Approximately 500 teachers responded to the given survey, which then led to the researchers creating their own instrument of 56 primarily close-ended questions that were broken down into scales that consisted of a number of different, but related variables. The participants that responded to the survey and

were useable responses were then broken down into 157 rural teachers and 357 non-rural teachers. The findings showed that rural teachers had more positive attitudes toward technology integration than non-rural teachers. Not only that, the study showed that students in rural schools were better positioned to benefit from technology integration in their schools, which supported the idea that teacher attitude toward technology influences the attitudes of their students.

O'Donnell, Enrico, and Spear (2005) conducted a statewide survey in Maine that replicated a study previously conducted there in 1994. The survey was given to teachers of grades one, three and five. The survey was intended to identify possible changes in literacy instruction in the last decade. The participants included three groups of teachers with 125 teachers in each group. Teachers were randomly selected with a total of 260 teachers. Data collected from the survey were analyzed and classified into five different categories that included; background, information, organizing for instruction, instructional approaches and changes in literacy instruction over the decade. The limitations of this study include the areas covered by the survey, the interpretation of the survey, and the calculations of the percentages. These are limitations because of small sample size and location of the study is not varied and may affect the findings. The findings of the survey show that Literacy instruction had not changed in the last decade as had been hypothesized. This leads to the conclusion that teacher attitudes also may not have in the last decade.

Similarly, Christensen (2002) in her quantitative study, wanted to collect data on the effects that instructional technology has on teachers' and students' attitudes towards reading. The instructional technology used in this study was identified as computers. The participants of Christensen's study included 60 teachers between the grades of prekindergarten and grade five, which involved approximately 900 students in Northern Texas. The study did not focus on one particular school subject. Instead was focused on all subjects that were relevant to the teachers involved. The primary instrument used to collect data was "The Teachers' Attitude Toward Computers Questionnaire (TAC)" (p.415). This instrument collected data on teachers' attitudes of both the treatment group and comparison group. Another

instrument utilized was a "Computer Attitude Survey (CAS)" (p.415). Three hypotheses were explored throughout the study:

> Hypothesis 1: Needs-based technology-integration education fosters positive attitudes toward technology among elementary school classroom teachers (p.416),
> Hypothesis 2: Teacher education in needs-based technology integration, combined with significant classroom use, fosters positive attitudes toward information technology, and
> Hypothesis 3: Positive teacher attitudes toward information technology foster positive attitudes in their students (p.417).

The findings for hypothesis number one were that teachers who received training on the technology exhibited positive attitudes toward the technology. The findings for hypothesis number two were that teacher instruction on the needs-based technology combined with significant use in the classroom fostered positive attitudes for the students and in return technology was accepted by students. The findings for hypothesis number three demonstrate that teachers showing enjoyment and enthusiasm about instructional technology positively impacted how students viewed technology.

Summary of the Review

To answer the research question, how instructional technology impacts literacy development of elementary students, an extensive literature review was conducted. There were a total of 33 studies found. These studies were then grouped into five categories related to instructional technology: with computer software, with interactive whiteboards (IWB), with digital story booking/podcasting, with mobile devices, and impact of teacher attitude on instructional technology. The next chapter analyzes and synthesizes the findings of these studies.

Chapter 3: Methodology

Data Collection

The research studies collected for this literature review were collected using different search engines on the internet. Using leading education databases and Google Scholar, the search was conducted with the keywords "instructional technology", "interactive whiteboard", "literacy development", "elementary school", "high school", and "middle school". To address the research question of how instructional technology impacts literacy development in elementary students, the resulting data consist of a total of 33 studies which were then grouped into five categories related to instructional technology: with computer software, with interactive whiteboards (IWB), with digital story booking/podcasting, with mobile devices, and impact of teacher attitude on instructional technology. Once the studies were sorted and grouped, data analysis began.

Data Analysis

Data analysis consisted of closely examining the data collected for each of the five categories related to instructional technology. After carefully reading each study and deliberating on its contribution to the category, I was able to determine patterns in the contributions. These patterns produced a number of findings related to the research question of this study. Of the 33 total studies found, overall the majority of the studies used participants in kindergarten through grade three (Blachowicz, Bates, Berne, Bridgman, Chaney, & Perney, 2009; Butzin, 2001; Christensen, 2002; Coyne, Pisha, Dalton, Zeph, & Smith, 2012; Cviko, McKenney, & Voogy, 2011; Heiman, Nelson, Tjus, & Gillberg, 1995; Higgins & Hess, 2000; Howley, Wood, & Hough, 2011; Korat & Shamir, 2008; Lopez, 2010; Mitchell & Fox, 2001; Schmid, Miodrag, & Francesco, 2008; Tracey & Young, 2007; Vasinda & Mcleod 2011). There were nine studies that used participants in grades four through six (Blachowicz et al., 2009; Burnett, Dickinson, Myers, & Merchant, 2006; Lopez, 2010; Christensen, 2002; Lowther, Ross, & Morrison, 2003; Middleton

& Murray, 1999; Rasinski, Samuels, Hiebert, Petscher, & Feller, 2011; Swan, Kratcoski, & van't Hooft, 2010; Suhr, Hernandez, Grims, & Warschauer, 2010). Six of the studies did not specify the age or grade range of the participants involved (Beeland, 2002; Crichton, Pegler, & Duncan, 2012; Kim, Hagashi, Carillo, Makany, Lee, & Garate, 2011; Means, 2010; O'Donnell, Enrico, & Spear, 2005; Smith, Hardman, & Higgins, 2006). Five of the total studies used participants that were in middle school (Lei, 2010; Lowther, Ross, & Morrison, 2003; Rasinski, Samuels, Hiebert, Petscher, & Feller, 2011; Sadik, 2008; Swan, Kratcoski, & van't Hooft,2010), three studies used participants that were of high school age (Dhindsa & Emran, 2006; Muir-Herzig, 2003; Sadik, 2008); one study used college aged participants (Debevec, Smith, & Kashyap, 2006); and one study used participants of elementary, middle, and high school age (Paul, VanderZee, Rue, & Swanson, 1996). The majority of the studies collected and analyzed in the literature review used participants that ranged from kindergarten to sixth grade; this indicates that instructional technology has been implemented at the elementary school level, and researchers appear to be very interested in determining the impact of instructional technology on literacy development of all students in that age range.

The first findings on the actual impact of instructional technology on literacy development emerge from the review category of instructional technology with computer software. This category was chosen as the first group of data because is contains the majority of the found studies. The categories that follow were sequenced according to the number of studies they contain. The studies range from preschool age students using computer software for tutoring sessions (Schmid, Miodrag, & Francesco, 2008) to college students using a different form of computer software to communicate with professors (Debevec, Shih, & Kashyap, 2006). All of the studies included in the literature review suggest that instructional technology in the form of computer software affected literacy development of students all ages in a positive way, but impacting in different areas. One area of impact is motivation and support (Schmid, Miodrag, & Francesco, 2008). Another area of impact is increased student participation (Schmid, Miodrag, & Francesco, 2008). A third area is increased student performance on standardized tests for reading (Butzin, 2001). One study indicated that instructional technology with computer software

increased elementary student performance in writing (Suhr, Hernandez, Grims, & Warschauer, 2010), and one qualitative study showed a significant increase in elementary student performance overall when using instructional technology with computer software (Lei, 2010). In contrast both studies that involved participants at the high school and college level were conducted quantitatively and produced results that were not significant to the literacy development of the participants (Debevec, Shih, & Kashyap, 2006; Muir-Herzig, 2003). From the analysis, findings emerge that suggest instructional technology with computer software produces the greatest impact on the literacy development of elementary students, and in the areas of reading and writing performance, standardized test scores, and student participation. In addition, review of studies on specific software programs indicate the Waterford Early Reading Program produces positive impact on the emergent reading skills of Kindergarten students (Tracey & Young, 2007); and the Accelerated Reader Software program produces a positive impact on the literacy skills of high school students (Paul, VanderZee, Rue, & Swansons, 1996). The different areas of literacy development that were impacted by computer software were increased performance on criterion-referenced and norm-referenced reading test (Rasinski, Samuels, Hiebert, Petscher, & Feller, 2011), increased reading comprehension in all content areas (Paul, Vanderzee, Rue, & Swanson, 1996), and significant learning gains in emergent literacy (Cviko, McKenney, & Coogy, 2011; Tracey & Young, 2007). Overall, findings indicate that using specific computer software indicates increased student performance on standardized test, increased performance across curriculum, and improved emergent literacy development.

The next groups of findings on the actual impact of instructional technology on literacy development emerge from the review category of instructional technology with the Interactive Whiteboard (IWB). The studies collected and analyzed for the literature review involved participants between grades three through high school; two studies were not specific on grade level. Four studies collected quantitative data to show the impact interactive whiteboards had on literacy development generally (Dhindsa & Emran, 2006; Lopez, 2010; Smith, Harman, & Higgins, 2006; Swan, Kratcoski, Schenker, & van't Hooft, 2010); one study collected qualitative data to show that interactive whiteboards

had a positive impact on literacy development generally (Beeland, 2002). Specific areas of literacy development include increased student engagement (Beeland, 2002), increased student participation (Smith, Hardman, & Higgins, 2006), increased skills for English Language Learners (Lopez, 2010), and increased standardized test scores (Dhindsa & Emran, 2006; Swan, Kratcoski, Schenker, & van't Hooft, 2010).

From the review category of instructional technology with Podcasting, Digital Story Booking, and Electronic Books (e-books), findings indicate that with participants between the grades of kindergarten and grade three two quantitative studies show positive student performance in literacy development including increased vocabulary when using electronic books (Korat & Shamir, 2008; Vasinda & Mcleod, 2011). The qualitative study involving participants in grades three, four, and five also shows increased student performance in literacy development including increased motivation when using electronic books, podcasting and digital story books (Burnett, Dickson, Myers & Merchant, 2006). From the other review category of instructional technology with mobile devices, findings from the only two studies reviewed indicate that instructional technology in the form of mobile devices increases phonemic awareness skills at multiple levels, shows shifts in roles and responsibilities of all involved, and provides ready access to materials to increase literacy development (Crichton, Pegler, & Duncan, 2012; Kim et al., 2011).

From the review category of the teacher attitude, the three studies found involved two with elementary school teachers (Christensen, 2005; Howley, Wood, & Hough, 2011) and one with teachers from unspecified grades (O'Donnell, Enrico, & Spear, 2005). Findings from the review indicate indicate that when teachers have a positive attitude towards instructional technology, students also have positive attitudes and significant learning gains in literacy development.

In summary, findings show that in all instances researched, the impact of instructional technology has been positive. A few specific instructional devices have been found to produce positive impacts in specific literacy areas, but overall, the existing research appears to be of a more general nature than specific.

Chapter 4: Results and Interpretation

Results of the Review

This literature review has produced a number of findings related to the impact of instructional technology on literacy performance. In the area of instructional technology with computer software, findings show that computer software in general has a positive impact on literacy development, especially in the areas of student participation and standardized test scores. In the area of instructional technology with interactive whiteboards (IWB), findings show that interactive whiteboards increase student performance in literacy development, especially in the areas of student participation, and engagement in the classroom. In the area of instructional technology with digital story booking/ podcasting, findings show a positive impact on student performance and literacy development. In the area of instructional technology with mobile devices, findings show increased phonemic awareness skills and student responsibility. In the area of how teacher attitude impacts instructional technology, findings show that when teachers have a positive attitude towards instructional technology, students have positive attitudes and significant learning gains in literacy development.

Application of Results to a Professional Development Project

The findings from this study have significance to classroom teachers. They can assist teachers in knowing about instructional technology and assist them in developing their curriculum to increase impact on student literacy development. Sharing the findings from this research with teachers is a professional development, and the most appropriate form of professional development for sharing this new knowledge is through a brochure to expand their knowledge on instructional technology and its impact on literacy development to help make decisions on future curriculum.

Design of Professional Development Project

To share the findings of this research synthesis, the most appropriate form of professional development is a brochure where teachers and teaching professionals will be provided with the findings of the research synthesis on instructional technology to expand their knowledge of instructional technology and its impact on literacy development. The brochure with the findings will be mailed out to different schools in the area, as well as presented at a local conference on instructional technology. This professional development is intended for teachers at all grade levels and subject areas as well as other teaching professionals interested in expanding their knowledge and learning about instructional technology. Upon receiving the brochure or attending the local conference, the participants will then be asked to complete a survey on Survey monkey. The survey will be conducted as an evaluation of the professional development where the participants will express their thoughts, comments, and new knowledge they have gained from the brochure. Upon completion of the survey, the participants will be entered into a drawing to win a set of five iPads for their classroom to be used as instructional technology to benefit the literacy development of their students.

Literacy coaching brochure goals and objectives.

The goal of this brochure is to provide the findings on instructional technology and how it impacts literacy development, to teachers and teaching professionals to expand their knowledge for future curriculum decisions. The objectives to the professional development are to have participating teachers learn current research and information on different instructional technology that could be used in the classroom to benefit student learning. The participants will receive the brochure and provide feedback on the new knowledge they learned. The participants will also be able to communicate how instructional technology effects literacy development and the skills gained from the instructional technology used in the classroom.

Proposed audience and location.

The proposed audience would be teachers, administration and graduate students that would like to expand their knowledge on instructional technology and the benefits it may bring to their classroom across the curriculum. The brochure will be mailed to local schools to be shared with the teaching professionals of those schools. The brochure will also be presented at the local conference on instructional technology.

Proposed brochure and activities.

The proposed brochure will be sent out to local school districts and will include the findings from the research synthesis on instructional technology and the impact on literacy development. The brochure will include the literacy skills instructional technology increased or has a positive impact on. It will also include current research on instructional technologies to expand the knowledge of teaching professionals and help make future curriculum decisions. In the brochure engaging activities will be listed for the participants to evaluate. Included in the brochure will be websites that will supplement information for a more engaging experience.

Proposed resources for brochure.

Teacher will not require any additional resources when they read the brochure. They may want an electronic device with internet access to explore the included websites, but that would occur after reading the brochure. Teachers who choose to provide an evaluation of the brochure and its function of professional development will require internet access to complete the online survey on SurveyMonkey.com.

Proposed evaluation of brochure.

After receiving the brochure, the readers will be asked to complete a survey that has been created on Survey Monkey. The survey (see Appendix) will be used as an evaluation of the professional development and will provide feedback to help develop more successful brochures to meet the needs of professionals. The survey will include questions to determine the impact of the professional development, including whether the brochure met the needs of the reader, provided new information the reader did not previously know, and presented the information in visually attractive way. The readers will be able to write comments and ideas for future professional developments on the survey. All feedback will remain confidential and will be taken into consideration for the future.

Professional Development Ties to Professional Standards

The professional development of this proposed brochure addresses several of the professional standards for classroom teachers as provided in the International Reading Association *Standards for Reading Professionals* (IRA, 2010).

> **Standard 1: Foundational Knowledge:**
> Candidates understand the theoretical and evidence-based foundations of reading and writing processes and instruction.

The brochure helps teachers meet standard 1 because it provides research-based knowledge to the readers about how instructional technology impacts the learning environment and students. It also provides multiple sources of information to the readers to help guide instructional planning to improve the reading performance of their students.

> **Standard 5: Literate Environment:**
> Candidates create a literate environment that fosters reading and writing by integrating foundational knowledge, instructional practices, approaches and methods, curriculum materials, and the appropriate use of assessments.

The professional development of a brochure shows the readers different ways instructional technology could be incorporated into the classroom to improve the literate environment. The findings of this research synthesis show how instructional technology fosters reading and writing. Providing the findings to the teacher-reader can help the teacher determine how he/she may want to set up and what to include in the classroom to create a literate environment for all students.

> **Standard 6: Professional Learning and Leadership:**
> *Candidates recognize the importance of, demonstrate, and facilitate professional learning and leadership as a career-long effort and responsibility.*

Professional development in the form of a brochure supports this Standard because teachers make a choice to read the brochure, and that shows recognition of professional learning as a personal responsibility. The reader is taking the responsibility to increase this/her knowledge in the literacy field and recognizing that professional learning is a career-long effort.

Chapter 5: Discussion and Conclusion

Overview of Study and Findings

Technology use in schools appears to be growing rapidly in many school districts, so this researcher wanted to determine if the instructional technologies being purchased by schools were in fact beneficial to the students. This thesis was completed to address the research question of how instructional technology impacts literacy development in students. To answer that question, the researcher conducted an extensive literature review and research synthesis. The collected studies were organized into five categories: instructional technology with computer software, with interactive whiteboards (IWB), with digital story booking/podcasting, with mobile devices, and impact of teacher attitude on instructional technology. Analysis of the studies in each category produced the following findings: that instructional technology impacts literacy development in a positive way, specifically by improving reading and writing skills, increasing student participation and engagement, increasing standardized test scores, and increasing reading comprehension across content areas. Instructional technology with digital story booking/podcasting increases in emergent literacy skills, student performance, and vocabulary. Instructional technology with mobile devices increases phonemic awareness skills and student responsibility. Findings also show that teacher positive attitudes towards instructional technology influence student positive attitudes towards instructional technology, which in turn improves student literacy development. The findings of this literature review are applicable to all teachers in all content areas because instructional technology is used in all content areas at all grade levels.

Significance of the Findings

The findings from this research synthesis are significant in two areas. Findings show that instructional technology impacts literacy development in a positive way. These findings are significant to

the field of literacy because knowing this new knowledge adds to the existing knowledge about instructional technology related to literacy. It helps build the schema of literacy professionals. The findings also are significant for classroom teachers. They can assist the teaching practice and knowledge base of teachers. The findings especially about teacher attitude provide knowledge that may help teachers establish a technology friendly climate in their classrooms. Therefore, taking these findings and creating a professional development for teachers has significance for the professional growth of teachers.

Limitations of the Findings

Although a synthesis of the research collected has indicated that instructional technology has a positive impact on literacy development in many different ways including student participation and engagement, increased literacy skills, increased scores on standardized test, and increased responsibility, there are still some limitations to this research. First, in some of the categories there were a limited number of studies to be found. Studies on mobile devices and podcasting/ digital story booking are fewer in number than studies of computer software and interactive whiteboards. Another limitation is that several of the studies do not specify the age or grade levels of the participants. This omission makes comparative analysis difficult.

Conclusion: Answer to the Research Question

The question for this research study is, how does instructional technology impact student literacy development? To answer the research question, an extensive review of the literature was conducted. A synthesis of these studies reveals that findings from all studies indicate that instructional technology has a positive impact on literacy development. In addition, studies regarding teacher attitudes towards technology show that teacher attitude has a direct impact on the attitudes of the students towards instructional technology. Therefore, in answer to the research question, it can be said that instructional

technology impacts student literacy development in a positive way, with specific technology providing positive impact in specific areas of literacy, and overall on student participation and motivation.

Recommendations for Future Research

The research conducted for this study has provided findings to show that instructional technology positively impacts literacy development and student performance across the content areas. Although the synthesized studies provide findings across a spectrum of technologies, there appears to have been little research conducted on mobile devices as instructional technology. For future studies, I would recommend research into the use of mobile devices in the classroom and their resulting impact on certain aspects of literacy. Another recommendation for future research is to conduct more studies with college students. Throughout my research only one study was found that looked at instructional technology at the college level. Students in college struggle to learn and read too, sometimes even more so given the heavy reading load of many college courses

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Appendix: Evaluation of Professional Development Brochure

To be completed on SurveyMonkey.com

Evaluation of Professional Development Brochure

1. Did the brochure meet your needs?

2. Did the brochure meet the intended learning outcomes?

3. Did the findings presented to you increase your knowledge?

4. How might you use the new knowledge in your classroom?

5. What could be done to improve this brochure?

6. What are some suggestions to improve this professional development?