EFFECTS OF EBOOKS IN ADOLESCENT STRUGGLING READERS

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Abstract

The purpose of this review of literature is to describe the effects of eBooks in struggling adolescent readers. Due to the scarcity of research on this specific area, several related subjects were reviewed for this paper. Studies of overall reading achievement in kindergarten through third grade students, as it relates to eBooks were reviewed. Research on adolescents were limited in regard to eBooks, however, several studies of adolescents provide evidence in the areas of motivation and effective interventions. Studies of college level students offer evidence for eBooks, mostly through survey-based research. Results and conclusions from the studies indicated a lack of statistically significant improvement in decoding or comprehension with eBooks, as opposed to printed text. However, some students may suffer from distraction. Recommendations for improving the effectiveness of eBooks in struggling adolescent readers include the use of eBooks as part of an overall intervention program, supported by instructional strategy support.
Chapter I: Introduction

In 1965, the federal government signed the Elementary and Secondary Education Act (ESEA), outlining the federal function in K-12 education. The No Child Left Behind Act of 2001 (NCLB) represented a major transformation to the ESEA, serving to more adequately meet the needs of underprivileged students. In doing so, public education would encourage all students to meet the same standards, regardless of background or ability. While NCLB legislation has led to increases in achievement, technology has advanced rapidly and influenced public education in the classroom. This paper will present some of those technologies and the effects on reading achievement.

Background

Project Gutenberg developed the first digitized books in the 1970’s and access to digital literacy has advanced rapidly since that time. Today’s public schools increasingly access digital media and in fact 34% of teens own an iPhone (Maisto, 2012). With technology availability, students also have access to reading materials in a digital format. However, research on the impacts of eReaders has been limited (Williams, 2010). Digital media offers comprehension through several modes, including visual and auditory, which may not be available through traditional literacy approaches (Roswell & Burke, 2009).

Educators can utilize rapidly advancing technology, as many students are at least as competent as teachers are. Teachers must challenge capable readers and support struggling readers. Competition with the electronic environment dictates that educators embrace the novel approaches offered by new literacy for improving reading achievement. However, do new technologies have the ability to capture the minds of
students in the classroom? More importantly, to what extent will technology go beyond supplementing traditional literacy and, improve struggling readers’ reading achievement?

**Statement of the problem**

NAEP data suggest that up to 71% of eighth graders may be struggling readers (Lenski & Lewis, 2008). Ensuring that students can read at grade level by the end of third grade is an important goal of the NCLB Act. Reading First is a federal program directly tied to the early literacy goals set forth by NCLB. Reading First offers scientific, research-based guidelines for the acquisition of early literacy skills. However, young struggling readers often do not make gains at the rate of non-struggling peers, even when engaged in reading intervention (Denton, Vaughn, & Fletcher, 2003). In fact, each year often represents falling further behind grade level benchmarks for struggling readers. In 2006, the Reading Next report (Biancarosa & Snow) offered fifteen strategies to address the issues beyond the needs of word recognition in struggling readers in the middle and high school grade levels. Among these elements were motivation, explicit instruction, and a technology-based component. These three elements will be discussed further in this paper.

Technology advances at an ever-increasing rate. Teaching methodologies must advance along with technology to help students increase achievement. For example, digital reading requires different skills than reading printed texts (Roswell & Burke, 2009). Students must separate fact from opinion, manipulate search engines, and skim content to locate useful information on the internet (Coiro, 2003).

Additionally, enjoyment of reading influences reading quantity, as well as reading skill (Maynard, 2010). If technology can increase the pleasure associated with reading,
struggling readers will have a greater chance to advance their skills. Technology’s effect on reading achievement has yielded mixed results (Reed, 2010). Additionally, eReaders have greatly increased the accessibility of eBooks for students. In fact, eBook sales rose from approximately $0 in 2002 to over $900 million in 2011, approaching 17% of the market share (Chao, Hegarty, & Stefanidis, 2012). Apple’s iPad has become a common technology tool in many classrooms, offering eBook capabilities. Increasing usage of such technology will have implications for the reading habits of students. A survey distributed to 40,000 library patrons indicated that 54% of patrons would use eBooks and eAudiobooks if supplied by the library (Duncan, 2011). Thus, even if students are not exposed to eBooks in the classroom, eBooks are becoming increasingly more accepted by the general population.

**Definition of terms**

Important terms used in the literature allow greater understanding of the research problem. Below is a list of terms pertinent in the impacts of eBooks and reading achievement.

**Educational Software.** Computer programs with an educational focus or which presents educational material or skills (Reed, 2010).

**Electronic books (eBooks).** Books read on an electronic device (Maynard, 2010).

**eReader device.** Device utilized to read e-books, including: Amazon Kindle, Nintendo DS-lite, Apple iPod Touch, Apple iPad (Maynard, 2010).

**Literacy.** The ability to read and/or write (Reed, 2010).

**Reading Achievement.** Level of reading performance, usually described by performance on an assessment.
Theoretical Model

To evaluate the effects of technology on reading achievement, consideration must be given to learners. Constructivism is a view of learning widely held that considers past experiences of students in how they learn. Constructivism is a:

"view of learning in which learners use their own experiences to construct understandings that make sense to them, rather than having understanding delivered to them in already organized form….Learning activities based on constructivism put learners in the context of what they already know, and apply their understanding to authentic situations" (Kauchak & Eggen, 1998, p. 283).

Students possess knowledge of technology outside the classroom, which teachers can utilize for learning in the classroom. Knowledge built through technology is an authentic medium that is meaningful to students. Constructivist theories suggest a close relationship between the ability of students to construct learning through technology and meaningful learning. From this association, several questions follow.

Research questions

This paper seeks to answer questions that are critical to the current state of utilizing eBooks in classrooms. First, what effects do eBooks have on reading achievement in early readers? In addition, how does the use of eBooks by college students affect outcomes of text analysis and navigation? Next, how is the motivation of struggling readers affected by the use of eBooks? Finally, what are current effective practices with struggling adolescent readers? The preceding questions will be used to draw conclusions regarding the effects of eBooks in struggling adolescent readers.

Summary

Technology and literacy instruction have advanced in today’s classroom. Assessment will demonstrate the effectiveness of technology in the classroom. Additionally, student motivation through technology is an important aspect, which will
be examined. Finally, effects of eBooks on struggling readers are a final important piece. In the literature review that follows, each of these aspects will be examined.
Chapter II: Literature Review

In the literature review that follows, current research will be examined. The effects that technology has on reading achievement, including reading comprehension will be presented. Additionally, the research will be reviewed regarding technology’s ability to motivate students, along with current practices of effective intervention for struggling adolescent readers.

Ebooks and reading achievement

Technology provides an important opportunity to enhance learning for today’s students. Specifically, reading achievement is a critical area in which technology has the potential to assist students in achieving greater proficiency.

The differences in traditional and digital reading are important areas for researchers to understand how digital reading might improve comprehension. Digital reading differs from printed reading through a non-linear reading path (Roswell & Burke, 2009). While printed reading is linear, as a left to right movement, digital reading takes on whatever path the reader chooses. As shown through constructivist theory, readers engage more fully in digital reading, choosing the path with the most meaning for them. Both passionate and struggling readers alike benefit from the multiple layers of interaction, which are available.

EBooks have become available through a number of devices. Books can be downloaded to iPods, iPads, phones, tablet computers, laptops, and desktop computers. These devices are collectively eReaders, which are devices allowing reading in a digital format. EReaders have the ability to utilize a broad range of eBooks. Children’s books, with interactive graphics capable of reading a story to students are one format.
Additionally, many young adult and adult books are available in a format similar to a PDF, with dictionary, bookmarking, and highlighting available. Download is instant, and often less expensive than print versions. Not all books published are available in digital format, but the list continues to grow. Many eBook services allow downloads on multiple devices and current page bookmarking is kept track of through wi-fi or cellular networks. From a practical standpoint, if a student has access to a device, they are carrying a list of downloadable books with them. EBook access is not yet universal, but continues to expand. This access is important, as positive effects on reading achievement have been seen.

**Ebook effects in elementary students.**

The effects of eBooks on elementary students have been studied for quite some time. EBooks represent text available in digital content. Thus, interactive content, hyperlinks, and vocabulary support provide the most significant aspects of the digital reading experience. Therefore, eBooks differ significantly from print text.

Researchers designed an Interactive eBook Learning System (IELS) to create a personalized learning experience for students (Huang, Liang, Su, & Chen, 2012). One hundred sixty-six elementary students participated in order to determine the functionality of the researchers’ developed system. Twelve students then participated in a second phase of the study, reading both an eBook and a different printed text of general science reports. Students were instructed to read the samples at 120 words per minute, so reading fluency was not a consideration. Researchers measured word recognition accuracy in both forms of text, which were compared by $t$-test, with no significant differences found. In both instances, students read within the 95-98% accuracy range, representing an
independent level of accuracy. Students reported that the eBook system was convenient and easy to use. Conversely, a number of students were concerned with eyestrain and distraction because of the eBook. While eBook interaction did not result in an increase in word recognition, students found enjoyment while using the system. However, some students expressed concerns about distraction, raising questions of a possible apprehension. Interestingly, additional layers and hyperlinks were not present in the design of the eBook. Distraction may have been more prevalent if additional layers of content were available. However, student interest in this study suggests that word recognition may not be the only significant factor affecting reading achievement in eBooks.

A small study of three-second grade students suggests no difference between reading comprehension with an eBook versus a paper source (Wright, Fugett, & Caputa, 2013). Students in this study read an eBook formatted story and another story, from a printed source. Students participated for three weeks. Students completed comprehension quizzes following the reading of each story. While comprehension quiz results were higher in the paper format versus digital, the $\chi^2$ McNemar Test for significance of change did not indicate statistical significance. Students did utilize more resources while accessing the eBooks, including dictionary, thesaurus, and word features. Additionally, students required more time to read stories in the electronic versus the paper format. The researcher suggested distraction as a possible explanation for the decreased fluency. Conversely, students may have been more engaged in the high definition images and text, resulting in a longer reading time. Feedback from students indicated higher levels of enjoyment, including ease of use and ease of story understanding in the eBook format.
While comprehension levels did not increase with eBooks, the researchers felt that the eBooks provided more positive aspects than print. Additionally, comprehension was not decreased with eBooks. Again, while the measure of reading comprehension did not change, students received eBooks well. A positive reading experience for struggling readers can be as important as the associated achievement. Since the research is based on a group of three students, the results found in this study warrant further research.

DeJong and Bus (2002) assessed the effects of adults reading to kindergartners versus electronic book reading in kindergartners. Students assessed at Sulzby’s Level 3, indicating proficient pre-reading skills, were recruited for this study. Forty-eight children were chosen from classrooms in the same school and divided into three groups based on emergent reading level. From each group, students were assigned to standard book group, which was read by the researcher, a computer book group with access to games, a computer group without access to games, and a control group in which students listened to an audiotape of the book. Each group participated in six training sessions during a three-week period. The number of pages accessed in each session were measured in students in the computer book groups (restricted and unrestricted,) across reading level groups and learning sessions using MANOVA. Students in the restricted (no games) condition explored nearly two times as many pages as those in the unrestricted (games) condition. While number of pages explored increased throughout the training period in the restricted group, pages read remained constant for the unrestricted group.

Additionally, the percent of time playing games in the computer book with access to games condition was examined with MANOVA. Analyses of clicks on Hot Buttons for text lines, entire text page and illustrations were performed. Children with access to
games clicked less on Hot Button features and chose to have pages read less frequently by the program. When games were not available, children with higher reading levels chose to have the text read, while children with lower emergent skills chose more commonly to investigate illustrations. However, researchers suggested that access to games nullified differences across emergent reading levels, distracting students from other available activities. Students in the group, which was read to by an adult, illustrated the greatest numbers of internalizations, including storing meaning, verbal text, and text features. While DeJong and Bus’s work represents an eBook on a computer, rather than the current eReader devices, strong evidence shows the effects of added media content on young readers. Though interactive games may increase student engagement, the engagement does not occur in the form of text interaction.

One hundred twenty-eight kindergarten students, from low socioeconomic backgrounds participated in a study of four book reading sessions (Segal-Drori, Korat, Shamir, & Klein, 2009). Students were randomly assigned to one of four groups to examine the effects of electronic books and adult instruction. Groups included: an eBook, an eBook with adult instruction, a printed book with adult instruction, and a control group. Electronic books were designed by researchers to mirror the printed book, but with animations and “hotspots” to provide connections to the storyline. Researchers assessed concepts about print, word reading and phonological awareness. Pre and post study emergent reading scores in an a-priori contrast of the four groups demonstrated significance on the level of improvement in the electronic book with adult instruction group. Results in this study are significant because they compare adult instruction in both an eBook and paper book format. While the eBook did produce greater achievement
results, adult instruction was also an important component for the improved group. Findings suggest an important connection between adult guidance and the use of eBook technology with a strong interactive component.

**Ebook effects in adolescent students.**

Digital text effects on sense-making behaviors of 6th and 7th graders were examined (Davis & Neitzel, 2011). Sixty-two female and thirty male students chose to participate in the study after all students in sixth and seventh grade, from two schools, were invited. Randomly grouped students from the same classroom participated in pairs, providing a proper mix of gender and ability groupings. Each pair read an identical expository text article; one student read a print text and one student a digital format. The digital text was identical in words to the print text, but had hyperlinks to additional text images, and captions. The digital version also had three layers of print, in which hyperlinks would take the reader from the first layer to additional text and images, then to a third layer of text and print, if chosen by the reader. Due to the layers, the digital version did not follow a linear path, had interactive graphic features, advertisements and links to additional articles. Researchers observed the pairs via video, coding behaviors during time intervals. Students utilizing the print and digital condition both spent most of their time reading the main body text. When using the digital mode students used the second and third layers of digital text 19.5% and 1%, respectively. Additionally, students accessed hyperlinks used during 17% of the coded time intervals. With regard to strategic negotiation of the text and planning strategies, students were more active in the digital environment, carrying out a more specific reading plan. Researchers observed no differences in comprehension between the print and digital conditions. Thus, the
increased engagement observed in the students in the digital environment is significant. The greatest differences were in strategy use. Even though other resources were available, comprehension was not affected and students were not distracted. These results are significant since they represent positive outcomes for eBooks in a limited amount of research on adolescent readers.

**Ebook effects in college level students.**

College level students represent an important demographic for investigating the impacts of eBooks. College students are older than adolescents and motivated by educational goals, but demonstrate important issues related to practicality and usability in eBooks. Studies of young students represent aspects of interest and achievement in eReaders. However, research of college students using eBooks is directed toward the concepts of convenience and personal preferences.

A 2011 survey (Richardson & Mahmood) of 81 graduate information studies students identified the most critical aspects of usability and user satisfaction in eBook readers. Researchers compiled a 42% response rate on surveys out of the total population available in the information studies program. Fifty-nine percent of survey respondents reported not owning an eReader device. Researchers asked questions about eBook readers in general, followed by questions regarding preferences specific to: Kindle, iPad, Nook, Sony eReader, Kindle for Blackberry, and Kobo reader. Respondents appreciated the portability and multiple title usage available on the eBook readers. Additionally, respondents praised the ability to find the meaning of words and create bookmarks, as well as the ability to listen to audio books without a separate player. On the other hand, students became frustrated with the challenging aspects of taking notes and highlighting.
Finally, college students typically perform significant research, requiring repeated page turning and referencing. Conducting this type of research was challenging due to the cumbersome nature of page turning on an eReader device. Thus, convenience factors influence users significantly. While graduate level college students did appreciate aspects of eReaders, challenges were also found. For less motivated students, these issues could have an effect on engagement and performance.

A two-year longitudinal study of all members of an undergraduate management strategy class determined the effects of digital textbooks (Weisberg, 2011). Students were randomly assigned to eReader teams. Each student in the team was loaned: an Amazon Kindle, Sony eReader Touch, Apple iPad, Entourage eDGe, CourseSmart, or a traditional textbook. Following the research period, students reported the desire to choose an eReader as a primary textbook (26%) or a secondary textbook (65%) for course-required readings. Students reported that an eReader would be most useful for research, observations, and learning assessments. Fifty-four percent of students noted they would choose the eTextbook over a paper textbook, due to portability, note taking ability, and ability to share notes. Students’ comprehension of material was also unaffected by eTextbook use, determined through post-reading quizzes. Thus, students indicated a preference for use of eBooks when used in place of textbooks. Though not statistically considered, some students did consider paper text as a preferred method, due to fewer distractions associated with paper text.

Five graduate students in information networks and computer science were asked to participate in a study, which examined eBook reader usability in the academic environment (Aaltonen, Mannonen, Nieminen, & Nieminen, 2011). Four students
completed the study, keeping a diary of experiences with the eReader used. Each student, from Aalto University, Finland used an eReader for two months in place of a conventional textbook. Participants completed a diary of experiences during the study. Additionally, researchers interviewed and had the participants complete surveys following the conclusion of the study. Results reported were qualitative in nature, due to the small study sample and survey/interview data reporting. Researchers found students’ opinions varied significantly from pre-study expectations. Students found the eReader devices cumbersome and slow, unlike computers with which they were familiar. Referencing pages by quickly flipping was reportedly difficult. Additionally, note-taking and underlining proved cumbersome. While students expressed a desire to use an eReader for leisure reading, use in an academic, research driven field was difficult. Interestingly, the students in this study used their computers as a comparison, rather than a paper text, representing a different control than typically seen in many studies on eBooks.

EBook sales rose from near $0 in 2002 to over $900 million in 2011, approaching 17% of the market share (Chao, Hegarty, Stefanidis, 2012). Questionnaires were distributed to over 600 college students and some professors on a large university campus. Respondents were asked to respond to several questions regarding opinions about eBooks. A positive response was indicated in the areas of: ease of obtaining, low cost of possession, easy to carry, easy to share. However, respondents preferred a printed book to an eBook. EBooks were not considered as easy to read as a printed book, resulting in a preference to printed books. Struggling readers require an easy to use mode of text delivery, indicating some negative aspects of eBooks.
Twenty-three males and sixty-seven females, ages 18 to 25 took part in a study of eBooks and reading comprehension (Margolin, Driscoll, Toland, & Kegler, 2013). Subjects read the same five expository and five narrative texts in a paper, computer, and the Kindle eReader format. Participants were randomly assigned to one of the three groups and were given the passages to read, followed by a multiple choice comprehension test. Analysis of variance did not reveal significant differences in comprehension across the three conditions. Additionally, self-reported reading behaviors were examined with MANOVA. No difference was indicated across formats with regard to following text with finger or mouse, highlighting text, re-reading, taking notes, saying words silently, and saying words aloud. However, participants utilizing the eReader reported significantly lower amounts of skipping around the text, which may have been influenced by the lack of hypertext and pdf format of the text. Many college students are accustomed to added content when reading in a digital format.

Research of eBooks in college students represent a significant volume as compared to research of adolescents in the area. College students often prefered eBooks and eReaders due to portability and ease of transport. However, college students had lower satisfaction with eBooks when completing research, due to page turning, highlighting, and note-taking challenges. Finally, though preference existed in some cases, college readers did not achieve higher levels of comprehension when utilizing eBooks.

**Impact of eBooks on motivation**

Adolescent struggling readers often lack motivation due to previous experience as struggling readers. Additionally, whether for pleasure or learning, students’ motivation
and interest in reading decrease with advancement through school (Robb, 2000). Significant challenges exist when teaching struggling readers because of these issues, which influence student motivation. While research specific to struggling adolescent readers utilizing technology is important, examining motivation is an important facet.

Background knowledge plays an important factor in student interest level. When teachers activate previously held knowledge by inspiring curiosity, students respond eagerly. In fact, previous knowledge causes students to consider a particular text interesting. Critical strategies for activating background knowledge include discussion, prior reading, or a lead-up activity (O’Connor & Vadasy, 2013). Through engagement, students experience confidence and connectedness to both text and instructional activities. Conversely, struggling adolescent readers can experience lack of motivation when they have difficulty accessing instruction and materials.

An important time of transition occurs from elementary school into middle school, considered the beginning of adolescence. The motivational beliefs of middle school during the transition from elementary school were studied (Anderman, Maehr, & Midgley, 1999). Two hundred seventy-eight students from two schools completed surveys in the 5th grade year, then again in 6th and 7th grades. Schools in the study differed significantly in instructional practices. One emphasized competition and ability grouping, while the other was more task oriented. Students’ motivational beliefs exhibited little difference in the 5th grade year. However, upon the transition, students attending the competitive environment school shifted toward performance-based and extrinsic goal setting. Conversely, students in the task-oriented environment continued to adhere to the previously established motivational beliefs. Specifically, researchers
described students in the task-oriented group as having fewer negative shifts in motivational beliefs.

EBooks are increasingly used, but still relatively new, and research has been limited in regards to motivation. In fact, a pilot study (Maynard, 2010) of three families, each with two students ages 7-12, examined several eBook formats (Amazon Kindle, Nintendo DS-lite, and Apple iPod Touch). According to self-reports, four students were ‘enthusiastic’ readers, one ‘average’ and one ‘reluctant.’ Results were qualitative in nature and sampled for both students and parents. Participants adapted well to the devices, preferring the Kindle for the size and portability. Students reported reading and interacting with graphics in eBooks. Additionally, the ‘reluctant’ reader asked his parents if he could read, rather than watch television, for the first time ever. The reluctant reader was excited to move through the text and access the interactive portions of the eBooks. These findings were significant, as the reluctant student had previously considered reading too difficult without this support.

Kramarski and Feldman (2000) analyzed the effects of eBooks in eighth graders. Fifty-two students were randomly assigned to an internet-reading group and a control group. Researchers utilized questionnaires to assess reading comprehension, motivation, and metacognitive awareness. A t-test revealed no significant differences in reading comprehension between the control and internet reading conditions. Additionally, t-test analysis did not note significant differences in motivation and metacognitive awareness between the internet and control groups. Students were more enthusiastic and willing to become engaged in the lesson in the internet reading group. Conversely, metacognitive strategy use was less effective when used in the internet reading group. Some evidence
suggested technical problems as a contributing factor. Additionally, some students used a social media function available in the internet reading condition. The above results provide significance because, although motivation was increased, a corresponding increase in comprehension and metacognitive awareness was not observed. While eReading may provide enhanced motivation, the results of the study may suggest that motivation may only provide a superficial aspect, rather than an increase in reading achievement.

Putman (2005) assessed 4th grade students’ comprehension and motivation using Accelerated Reader, an external reward based reading program. Sixty-eight students from five classrooms in one elementary school participated in the study. Students completed a Motivation to Read Profile during the first week, and at the conclusion of the fourteen-week investigation. Students were placed in three groups, based on the number of points earned in the Accelerated Reader program over the 14 weeks. Self-efficacy and reading score differences were determined between these two periods via ANOVA analysis. The group with the highest number of accumulated points illustrated an increase in self-efficacy, with a decrease in reading score. The groups with the lowest point total and the median point total both demonstrated decreases in both of these scores. The median group showed a greater significance in self-efficacy decrease, as revealed by Tukey’s HSD test. The highest point accumulating group also demonstrated higher reading score significance than the lowest point group, based on post-test measures. Results indicate a significant negative relationship between external motivators and motivation to read. Only those students who achieved the greatest gains experienced increases in the value of
reading. Students with average or low motivation to read experienced a decrease in value of reading when engaged in an external motivation program.

**Effective practice for struggling readers**

Struggling readers and higher-achieving students both succeed under research based reading instruction. However, when struggling readers only receive an hour worth of intervention, reading skills fall further behind. Mismatched texts do not allow struggling readers to read successfully during the remaining four to five hours of the school day (Allington, 2007). Unfortunately, research about intervention in the middle grades is limited (Allington, 2011).

A curriculum designed specifically to support struggling adolescent readers was evaluated in 365 sixth and ninth grade students (Cantrell, Almasi, Carter, Rintamaa, & Madden, 2010). An additional 290 students served as a control group, receiving no intervention instruction. Chosen randomly from 23 schools, students were mostly Caucasian and high percentages were living in poverty. Students in the intervention, called Learning Strategies Curriculum, were given reading comprehension strategy instruction in the areas of acquisition, storage, and expression. Strategies included were word identification, imagery, questioning, paraphrasing and writing. Students in the 6th grade sample showed statistically significant improvement in reading comprehension, as compared to the control group. Alternatively, the 9th grade student group did not exhibit any differences in reading comprehension. Researchers suggest the difference between the two age groups resulted from younger students’ large reliance on text. Conversely, older students typically utilize higher-level processes and background knowledge to create meaning.
Effects of a reading program, Reading Achievement Multi-Component Program (RAMP-UP), were examined in 155 struggling 6th-8th grade readers (Calhoon & Petscher, 2013). Students were selected by school personnel, based on the presence of an Individualized Education Program goal in reading, a history of reading difficulties, and a reading grade level below 3.5, according to Woodcock Johnson tests of word attack and letter word identification and the Gray Silent Reading Test of comprehension. Readers ranged from 3-7 years behind in reading as compared to peers at a given grade level. Three groups were formed, each with a different combination of phonological decoding, spelling, fluency, and comprehension. The three protocols included alternating, integrated and additive procedures. The alternating mode switched between fluency and comprehension instruction. The integrated mode focused on comprehension, then added decoding, fluency and spelling. The additive protocol consisted of a sequential addition of decoding, then spelling, subsequently, fluency, and finally comprehension instruction. Researchers examined results based on “gainers,” which were students who gained at least a year of reading level. Students in the additive condition saw the highest percentages of gainers, based on assessment in five of the Woodcock Johnson reading subtests and the Gray Silent Reading test. In this manner, researchers concluded that the mode of instruction could have an effect on all areas of reading achievement (decoding, spelling, fluency, and comprehension.) The most successful mode of instruction in the study utilized sequential addition of strategy instruction. Results are significant in that the building of strategies occurs successfully in a group of students typical of adolescent struggling readers. Additionally, the process of learning in the additive condition closely
mirrors the theory of constructivism, in which knowledge is built upon existing information.

An evaluation of reading programs for middle and high school students evaluated 33 studies of various reading programs (Slavin, Cheung, Groff, & Lake, 2008). Researchers examined studies based on four approaches to reading, including reading curricula, group instruction mixed with computer activities, computer-aided instruction, and instructional methods. All studies lasted at least 12 weeks. Results of the studies were measured by assessments that were independent of experimental design, testing reading achievement. No studies of reading curricula met the criteria for inclusion in the analysis. Nine studies met the criteria for the mixed-method model. Together, these studies indicated an overall effect size of +0.23. The majority of the studies in the mixed-method model focused on the Read 180 intervention program. Read 180 utilizes 90 minutes of instruction daily, including shared reading and strategy instruction, computer-assisted reading, modeled reading, and small group instruction. The results compiled on the Read 180 program are significant to this paper, as they indicate utility of digital reading as one part of an intervention. Also important to note is Read 180’s use as a stand-alone intervention and reading program. Computer aided instruction models were examined, representing programs, which might be viewed as “add-ons” to the conventional reading program. Eight studies were evaluated, producing a mean effect size of +0.10. These results are important, as technology continues to be used as an add-on in classroom learning. Sixteen studies of instructional-process models were examined, collectively yielding an overall effect size of +0.28. This overall effect size was positively affected by studies that included cooperative learning as a major component. Studies of instructional
design related to strategy instruction produced a small effect size of +0.09. Slavin concluded that the most positive effects in reading programs were seen in “approaches that fundamentally change what teachers and students do every day” (pg. 309). For example, Slavin suggested that both cooperative learning and mixed-method approaches would provide the most robust improvement in reading achievement for students. Struggling adolescent readers experienced success in a number of different study conditions. The Reading Strategies Curriculum increased comprehension using specific strategy instruction in sixth graders, though the results were unchanged in 9th grade students. Additionally, researchers found the addition and sequence of instruction to have a positive effect on students’ reading achievement. The sequential addition of decoding, spelling, fluency, and comprehension instruction produced positive achievement. Finally, students enrolled in mixed method programs and cooperative learning produced the most significant effects in middle school students.
Chapter III-Results and Analysis Relative to Problem

Technology may offer benefit to reading achievement in students. Not only does technology positively affect reading comprehension, but also produces greater motivation among students. Digital reading provides students with the opportunity to choose their own reading path through the text. While digital reading requires different skills than traditional texts, authentic learning occurs as students negotiate multiple levels of interaction.

As demands for student achievement continue to increase, so does the importance of reading performance. The further students advance in school, the greater the need for students to comprehend content. To prevent students from falling behind, students need every opportunity to succeed. Research has suggested that technology holds the potential to increase achievement and motivation. Due to the rapidly advancing devices and technologies, research must continue to address popular devices, which are becoming more widespread throughout school.

Effects of eReaders

eReaders have little effect on word recognition and comprehension as compared to traditional text (Huang, Liang, Su, & Chen, 2012; Margolin, Driscoll, Toland, & Kegler, 2013; Wright, Fugett, & Caputta, 2013). Such results can suggest that eReaders provide no added benefit to student achievement; therefore, print books are superior in this area. However, while eReaders do not help increase decoding and comprehension, achievement is also not decreased. If achievement were unaffected, the mode of reading would seem to be similar in digital and print text. As previously stated, however, digital text is often a non-linear task, as opposed to printed text. The non-linear nature of digital
text allows the reader to become more involved with the text. Increased interaction with the text may suggest a deeper level of comprehension, which may not be measured by superficial assessments of comprehension.

Part of the non-linear nature of digital results from availability of additional resources. When additional resources are available within an eBook, younger students access these resources regularly (DeJong & Bus, 2002; Huang, Liang, Su, & Chen, 2012; Wright, Fugett & Caputta, 2013). Utilization of resources may lead to increased engagement in digital text. Additional engagement may provide students with a mode to offset decreased fluency (Wright, Fugett, & Caputta, 2013). However, adolescent students tend to utilize auxiliary resources much less frequently (Davis & Neitzel, 2011). Perhaps novelty provides a significant portion of the increased engagement observed in younger students. Students of adolescent age have often engaged with educational technology and may not be as rapt by external resources. Adolescent readers can also draw on greater background knowledge; therefore, they may require less supplementary resources.

Conversely, elementary students have experienced distraction and decreased fluency while using eBook materials. Accessing games available within eBooks have a significant impact on student focus and productivity (DeJong & Bus, 2002; Wright, Fugett, & Caputa, 2013). Since students face many challenges, additional media available on eBooks should not distract from the story, but enhance it (MacWilliam, 2013). Supplementary content would seem most useful when directly related to the digital text. Games may offer skill development, though not directly related to the text. While eBooks offer engagement opportunities, which may support comprehension, reduced fluency can
accompany added media interactions (Kramarski & Feldman, 2000). However, some studies indicate that distraction is not a concern when adolescent subjects are considered (Davis & Neitzel, 2011). This is an important consideration since this paper seeks to answer questions specific to struggling adolescent readers. However, students with lower levels of emergent reading skills became more distracted by games and supplementary content than higher-level readers (DeJong & Bus, 2002). Thus, distractibility may be more closely related to reading achievement than student age.

Although the methods used in each study varied, the greatest effects were seen in groups that included adult reading, as well as eBook interaction (Segal-Drori, Korat, Shamir, & Klein, 2009; DeJong & Bus, 2002). The cumulative effect of fluent adults and eBooks may be one of the more important aspects found in the research. However, younger struggling readers tend to have difficulty with decoding, while adolescents do not need the same level of decoding support (Allington, 2011). Adolescent students may also benefit from eBook reading, when an adult supplements with comprehension support.

College level students represent a large population of digital reading consumers. The volume of reading required by college level students can be substantially high. As a result, study outcomes in college students represent an important area, since these consumers often have a choice for reading, including laptops, desktops, textbooks, eReader devices, and printed text.

Given a choice of reading modality, many college students prefer eReaders due to the portability of the device (Richardson & Mahmood, 2011; Weisberg, 2011; Chao, Hegarty, & Stefandis, 2012). With an eReader device, a student does not have to plan to
read a book. The decision of what to read can be spontaneous. Struggling adolescent readers may appreciate some of the portability of eReader devices as a means to access eBooks, since reading is often cumbersome for them. Additionally, greater choice in reading can be available.

EBooks provide a positive experience for some college readers due to the ability to look up words quickly (Richardson & Mahmood, 2011). Struggling adolescent readers may find a significant advantage in the ability to look up words, as vocabulary skills are often underdeveloped (Allington, 2011). Conversely, taking notes and/or highlighting passages can be a difficult task when using an eReader (Aaltonen, Mannonen, Nieminen, & Nieminen, 2011; Richardson & Mahmood, 2011). While struggling readers should focus on reading for enjoyment, research sources are also important to consider. The ability to locate and store important information is critical. Struggling adolescent readers may find more success in utilizing paper text for note taking and highlighting.

**Motivation**

Reading skill correlates positively with reading enjoyment (Maynard, 2010). When students experience positive emotions, reading achievement often follows. Additionally, positive emotions will increase the level of motivation in students. Though comprehension may remain unaffected, eReading significantly increases motivation, (Kramarski & Feldman, 2000; Maynard, 2010). Thus, reading research on eBooks cannot be one dimensional, as motivation can also have a significant impact on student behaviors.

External motivators correlate negatively with increasing motivation, in both reading, and school, in general (Anderman, Maehr, & Midgley, 1999; Putman, 2005).
Conventional wisdom may suggest that struggling adolescent readers are unmotivated and would benefit from external motivation. When external reward utilization, however, struggling readers using computerized programs do not always experience positive results (Putman, 2005). Technology can serve as a motivator or a tool for students. However, if the purpose of technology is to motivate students, rather than solve a specific problem, students may be disadvantaged. Technology as a tool empowers students to understand the purpose, and increased motivation and achievement are more likely to follow.

Increased reading motivation may not necessarily accompany increased reading achievement (Kramarski & Feldman, 2010; Maynard, 2010). While a primary goal of this paper is to examine the effects of eBooks on achievement, increased motivation is also an important finding. Increased motivation expands the volume of books read by struggling adolescent readers and is crucial in a successful intervention (Allington, 2011). Students are much more likely to increase reading achievement when greater amounts of reading take place.

**Effective intervention**

Results of effective intervention practices for struggling adolescent readers appear mixed. Students in the middle school grades experience increased achievement when comprehension strategies are used (Cantrell, Almasi, Carter, Rintamaa, & Madden, 2010; Calhoon & Petscher, 2013). These results agree with Allington’s assertion (2011) that students in the middle grades do not need decoding instruction, but rather, emphasis on comprehension strategy support. Additionally, adolescent struggling readers are most adequately supported when comprehension instruction is part of an overall intervention program (Calhoon & Petscher, 2013; Slavin, Cheung, Groff, & Lake, 2008), rather than
Timing is also an important aspect of an adolescent intervention program, as diminishing returns appear as students pass beyond middle school (Cantrell, Almasi, Carter, Rintamaa, & Madden, 2010). Additionally, effective instruction combined with appropriate sequencing and prior skills achieve the greatest level of success (Calhoon & Petscher, 2013). Finally, intervention for struggling adolescents needs the instructional support of competent teachers, who are able to provide students with appropriate reading materials (Allington, 2011; Slavin, Cheung, Groff, & Lake, 2008). Skilled teachers can assist in the greatest gains when the knowledge of both students and instruction are combined.

Summary

This paper sought to answer questions related to the utilization of eBooks in classrooms. The broad question posed what effects eBooks have on reading achievement of struggling adolescent readers. In order to answer these questions, the effects of eBooks were examined in elementary, adolescent and college level populations. Little effect on comprehension was found, though students at each level interacted positively with the additional digital features of eBooks. Some issues, such as distraction and difficulty with note taking exist. Studies of adolescents utilizing eBooks were very limited. Additionally, technology may provide motivation for students when not used as a reward, while extrinsic motivation may yield negative results. Finally, adolescent struggling readers appear to need greater instruction in the area of comprehension, as opposed to decoding strategies. These strategies yield effectiveness when applied as part of an overall intervention plan.
Chapter IV-Recommendations and Conclusion

Recommendations

While studies indicate a 97% success rate for struggling readers who receive intervention in primary grades, adolescent struggling readers do not experience such profound success (Allington, 2009). Adolescent struggling readers are often more than one year behind in reading achievement. Therefore, research on interventions that track the improvement of such readers would need to last several years to document continued improvement. While interventions may exist that meet this criteria, studies documenting the outcome of such interventions are limited. Further, research documenting the effects of eBooks as one of those types of interventions has just begun.

EBooks represent an excellent tool for use in the classroom. When eReader devices are already available, eBooks can be quickly acquired for student use. When considering the importance of matching readers with appropriate reading materials, the ability to download books cannot be underestimated. EBooks provide opportunities to assist motivational efforts of struggling adolescent readers. EReader devices for use by struggling readers should be considered as a technology tool for purchase. However, the purchase of eReaders and eBooks is not a stand-alone solution for supporting struggling adolescent readers.

To justify and maximize the use of funds for eBooks, appropriate use and support should also be present. Allowing a struggling adolescent reader to have access to a number of matched texts provides a number of benefits. First, fluency development occurs through reading text multiple times. Struggling readers read below grade level, which can be a significant issue with peers for adolescents. Thus, the next benefit for
utilizing eBooks on an eReader is that students are not seen carrying books that may be several grades levels below peers. Finally, the motivational aspect, which has been discussed in the review of literature, is present.

Additionally, the eBooks must be used as a part and a tool of a comprehensive literacy program to realize an achievement benefit. Beyond the eBooks themselves, adolescent struggling readers need comprehension strategy instruction, decoding support and vocabulary and/or spelling instruction. In order to be most effective, these components must be part of an overall program, not simply added together. Thus, each of these components should build upon and connect to the other components.

**Areas for Further Research**

In considering, the research reviewed, the quantity of research presented on adolescent struggling readers warrants significant attention. The evidence on struggling adolescent readers is scarce, compared to the abundance at elementary grade levels. Clearly, the majority of research focuses on K-3rd grade readers, in response to NCLB guidelines. More research is warranted in the area of adolescent readers. Students in the middle grades receive limited reading instruction. Content receives a greater focus as students advance in their schooling. For students who struggle, intervention must not be overlooked.

An effective research study to examine the impacts of eBooks should include a number of aspects. The recent work of Calhoon and Petscher (2013) provides an excellent model for effective reading intervention in middle school students. However, the use of eBooks as part of the RAMP-UP program is a necessary modification. First, in order to assess the effects of eBooks in adolescent struggling readers, students should be
chosen from 6th and 7th grades. Since results have been shown to differ as students reach older grades, these represent appropriate ages. Subjects should be chosen on the basis of an Individualized Education Plan for reading. Additionally, students should be at least one grade level behind, and have an IQ of at least 75. Students will be assessed with a pre-study test using the Woodcock Johnson Tests of Achievement including the following subtests: Letter Word Identification, Word Attack, Spelling, and Passage Comprehension. Additionally, fluency should be measured using the AIMSweb Oral Reading Fluency grade level passages.

The study should last 28 weeks, divided into 4-seven week periods. The modality used should follow Calhoon and Petscher’s (2013) additive format. In this modality students will engage in decoding for the 1st seven weeks, followed by decoding with spelling added for the 2nd seven weeks, decoding plus spelling plus fluency for the 3rd seven weeks, and comprehension instruction plus spelling plus fluency practice for the 4th seven weeks.

The decoding should utilize an explicit, sequenced program of instruction, such as Reading Horizons, or a similar program. Decoding instruction will continue through the 1st and 2nd seven weeks for 15 minutes/day, with spelling instruction given through the Words Their Way program. Students will be placed on the appropriate level using the Words Their Way Upper Level Spelling Inventory. With the continuance of the previous two elements, fluency support will be added, introducing the eReader in the 3rd seven weeks. Students will read to an adult utilizing a matched text eBook for 10 minutes. The adult will provide corrective feedback during each session. Students will continue to utilize the same reading passage until an instructional level of fluency is achieved, based
on grade level (Appendix). The final 7 weeks of the study should include fluency and spelling (decoding will be dropped), with the addition of 15 minutes/day of comprehension instruction, with the students utilizing eBooks.

Upon completion of the four seven-week session, participants should again be assessed by the Woodcock Johnson reading subtests and the AIMSweb fluency measure. In an ideal research situation, the group completing the above protocol should be compared to a similar group of students in a control group. The two groups should be analyzed using Multivariate Analysis of Variance (MANOVA). Additionally, consideration should be given to the changes in pre and post-test among the higher and lower achieving readers of the group.

While eReaders vary across brands, the Apple iPad seems to have acquired a great share of the educational market. Many schools have begun to supply each student with an iPad for use. Apple’s technology has many purported benefits, but most go largely untested. A primary question for research relates to the prevalence of eBooks. Do the multimedia, interactive modes of presentation increase reading achievement for adolescent students? Young learners are often distracted by game-type learning activities; do older students become more engaged, or more distracted by such learning activities?

Finally, effective intervention seems to be most successful when part of an overall program. To assess the effectiveness of eBooks, research must evaluate them as part of a well organized, sequenced program, which pre and post-tests students against a control group. In order to be valid for adolescent struggling readers, strategy instruction and assessment of comprehension must be included.


Summary and Conclusion

EBooks offer benefits for some students. While increased reading achievement would be an excellent effect, students’ ease of use and increased motivation represent current effects of eBook technology. Motivation for adolescents will be most effective when student-centered, rather than based on external factors. Additionally, appropriate instruction for struggling adolescent readers cannot continue to focus on decoding strategies, but rather, comprehension.

Technology advances at an ever-increasing rate. Educational entities can do little to keep up to the pace of development. However, since technology is currently in the classroom, research must catch up. Educators need valid research, in order to effectively advocate for students. Availability of research specific to eBooks, versus printed text will supply teachers with important information toward utilizing technology effectively.
References


EFFECTS OF eBOOKS


EFFECTS OF eBooks


Appendix

Fluency Standards for Oral Reading
(words per minute)

State of Utah Fluency Benchmark Standards

<table>
<thead>
<tr>
<th>Grade</th>
<th>First Grade</th>
<th>Second Grade</th>
<th>Third Grade</th>
<th>Fourth Grade</th>
<th>Fifth Grade</th>
<th>Sixth Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read grade level text at a rate of approximately 60 wpm</td>
<td>Read grade level text at a rate of approximately 80 wpm</td>
<td>Read grade level text at a rate of approximately 100 wpm</td>
<td>Read grade level text at a rate of approximately 120-150 wpm</td>
<td>Read grade level text at a rate of approximately 120-150 wpm</td>
<td>Read grade level text at a rate of approximately 120-150 wpm</td>
<td></td>
</tr>
<tr>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td>Read grade level text with an accuracy rate of 95-100%</td>
<td></td>
</tr>
</tbody>
</table>

Alpine School District Elementary Fluency Standards

<table>
<thead>
<tr>
<th>Grade Level Text (Levels)</th>
<th>Intervention</th>
<th>Instructional</th>
<th>Independent</th>
<th>Advanced</th>
</tr>
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<tbody>
<tr>
<td>K</td>
<td>1 - 3</td>
<td>39 or less</td>
<td>55-79</td>
<td>80-95</td>
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<tr>
<td>1</td>
<td>4 - 16</td>
<td>40-59</td>
<td>60-70</td>
<td>71+</td>
</tr>
<tr>
<td>2</td>
<td>18 - 28</td>
<td>54 or less</td>
<td>75-99</td>
<td>100-119</td>
</tr>
<tr>
<td>3</td>
<td>30 - 38</td>
<td>74 or less</td>
<td>95-119</td>
<td>120-135</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>94 or less</td>
<td>110-129</td>
<td>130-145</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
<td>109 or less</td>
<td>120-139</td>
<td>140-155</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>119 or less</td>
<td>130-149</td>
<td>150-165</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>129 or less</td>
<td>140-159</td>
<td>160-175</td>
</tr>
<tr>
<td>8</td>
<td>80</td>
<td>139 or less</td>
<td>150</td>
<td></td>
</tr>
</tbody>
</table>

*You will notice that the Alpine rubric states Grade Level Text instead of Grade Level. This is an important modification for students who may be starting out behind in their achievement for words per minute. We would expect them to be fluent at each increasing text level and to incrementally increase WPM as the text gets harder, instead of expecting them to achieve a higher level immediately.*

NAEP (National Assessment of Educational Progress) Oral Reading Rate

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Words Per Minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
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<tr>
<td>3</td>
<td>124</td>
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<tr>
<td>4</td>
<td>140</td>
</tr>
<tr>
<td>5</td>
<td>150</td>
</tr>
<tr>
<td>Higher text</td>
<td>170</td>
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