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The effects of using digital texts on Chromebooks on the reading comprehension and academic engagement of elementary school students with learning disabilities in the inclusive classroom

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THE EFFECTS OF USING DIGITAL TEXTS ON CHROMEBOOKS ON THE READING COMPREHENSION AND ACADEMIC ENGAGEMENT OF ELEMENTARY SCHOOL STUDENTS WITH LEARNING DISABILITIES IN THE INCLUSIVE CLASSROOM

by
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Dedication

I would like to dedicate this thesis to my husband, Aidan, and my family.

Acknowledgments

I would like to express my greatest appreciation to Dr. Amy Accardo for her guidance, support, and encouragement throughout this research. The knowledge I have obtained through my work will remain with me throughout all endeavors in my professional future.

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Abstract

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Amy Accardo, Ed.D.
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The purpose of this study was to examine the effectiveness of digital texts on Chromebooks as an assistive technology to meet the needs of students with learning disabilities in an inclusive classroom. Specifically, the study examined (a) the effectiveness of using digital texts on Chromebooks on reading comprehension, (b) the effectiveness of digital texts on Chromebooks to improve engagement and on-task behavior of students with learning disabilities, and (c) student satisfaction using digital texts in the inclusive classroom. Students displayed variation in performance on comprehension and academic engagement throughout the intervention. Findings suggest that digital texts may hinder the comprehension and engagement of participants. Implications for teaching students with disabilities, including the recommendation to use both digital and printed texts to increase reading comprehension and engagement, are discussed.

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Chapter 1

Introduction

Technology in the classroom is evolving with the current generation. Digital texts are becoming increasingly popular, and educators are learning more about using interactive technology to help give today's students the optimum academic experience. Technology is exploding as a tool for educators to promote learning and to develop, monitor, and provide increased student access to interactive media (Behrmann, 1994). Ortlieb, Sargent, and Moreland (2014) state, "as technology continues to expand our definitions of what constitutes reading and literacy, interest in reading digital texts has skyrocketed as evidenced by retailers selling more digital books than printed books" (p. 397). Of the many types of technology, computer applications and programs are the most easily accessible, and are available for students to utilize on classroom computers, laptops, or Chromebooks in the classroom throughout the school day. Such computer applications and programs may be beneficial as instructional tools, especially for students with learning disabilities.

Digital literacies offer engaging and interactive learning environments for students to visualize, listen, and interact with text (Ortlieb et al., 2014). Instruction using digital texts has a number of potential benefits for improvement of students' reading comprehension, literacy, and engagement (Huang, 2012). Within the inclusive classroom, assistive technology and digital texts may also be practical for use with students with learning disabilities. Assistive technologies allow students with disabilities to independently function in the classroom (Quenneville, 2001). One of the advantages

assistive technology has is its potential for 'leveling the playing field' for students with learning disabilities (Bergen, 2002). Research shows that assistive technology is extensive and its uses are abundant, especially for students with learning disabilities (Quenneville, 2001).

Assistive Technology

The conception of one-to-one Chromebooks in the classroom as assistive technology to support in the learning process is still developing. Assistive technologies can be defined as devices that can help a person with a disability overcome challenges and increase learning outcomes. Assistive technologies can also be pieces of equipment or product systems that are modified and/or customized in order to increase, maintain, and improve overall functions of individuals with disabilities (Behrmann, 1994). Multimedia is defined as many types of media that work cohesively together, including: text, graphics, audio, and video (Ortlieb et al., 2014). These definitions can embrace an array of devices ranging from low technology to high technology, and certainly expands the interpretation of technology beyond just the computer (Maushak, 2001). The emergence of computer technologies has opened new doors for ways material can be presented (Ortlieb et al., 2014). Multimedia learning requires verbal and visual types of information processing (Ortlieb et al., 2014). When words and pictures communicate, and students can mentally merge verbal and visual representations together, understanding and comprehension occur (Ortlieb et al., 2014). Technology may allow learners to create a deeper understanding from corresponding words with pictures (Ortlieb et al., 2014).

Technology is an assistive tool that can replace missing or impaired abilities for people with disabilities (Quenneville, 2001). Assistive technologies can help people with disabilities fulfill tasks performed in everyday life, such as making a list for groceries or communicating with others using the phone or computer. Furthermore, interactive applications and digital textbooks may provide students with new and engaging learning experiences (Quenneville, 2001). For example, students are able to perform research on specific topics, listen to and watch educational audio and video clips, as well as create digital documents that are typed using the Chromebook. Moreover, word processing assists students with learning disabilities in promoting writing skills. Computers offer various contributions to encourage reluctant students to write by promoting motor skills, providing spelling support, assistance with revising and editing, as well as creating a document that is both neat and legible (Quenneville, 2001). Computer supports can also help to ease any anxiety students may have about the learning process. Research suggests that most students are satisfied with the use of assistive technology and are highly motivated to use it for various learning activities (Bergen, 2002). Assistive technologies are simple tools that are used to enhance the learning experience for all students (Maushak, 2001).

Needs of Students with Learning Disabilities

Students with learning disabilities have a need in the area of reading comprehension. Reading comprehension can be defined as the ability to incorporate information and have an understanding of the text that has been read (Horzum, 2013). Reading comprehension contains three elements: the comprehension of the reader, the

comprehension of the text, and the act of comprehending (Horzum, 2013). The nature of online reading comprehension among students of diverse academic levels varies as they read digital texts (Coiro, 2012). With digital media becoming popular through the development of technology, the functionality of traditional reading and writing experiences has evolved (Horzum, 2013). For example, digital instructional models can lead to individuals acquiring and improving online reading comprehension (Coiro, 2012). Of these reading and writing experiences, it is necessary to examine the effect reading has on the act of reading comprehension for students (Horzum, 2013). There is still much to be studied about how online reading comprehension affects students who read multiple digital texts, however advances in defining and measuring key elements of online reading comprehension are quickly becoming apparent (Coiro, 2012).

Students with learning disabilities may also have need in the area of academic engagement. Advances in digital technologies have led to increased academic engagement and interest in digital textbooks that deliver interactive material (Lim, 2011). Research suggests that reading digital texts from a screen may not only expand students' reading comprehension, but also increase motivation, enjoyment, and engagement due to the added visual and audio elements interactive text has to offer (Huang, 2012). The use of touch screens versus traditional keyboards could potentially improve the academic engagement and performance of students with and without disabilities (Merbler, 1999).

Students are more inclined to be motivated in the classroom when accessing interactive media. Computers and tablets such as iPads, are equipped with high-resolution color display, which is highly engaging for children of the digital era (Huang, 2012). In

addition, digital curricula feature built-in assessments to track individual student progress and help educators determine pacing of material, review past skills and concepts, and move forward in the program (Davis, 2013). Newer technologies offer tracking of student time spent on specific tasks and of learning from the student's perspective (Davis, 2013). Digital literacies not only entail greater flexibility and accessibility compared to traditional paper-based texts, but they also offer the multimedia-enriched visual attraction that engages students, along with the supportive materials to foster the most personalized learning experience (Huang, 2012).

Statement of the Problem

Students with learning disabilities frequently have needs in the areas of reading comprehension and academic engagement. Difficulties in these areas may produce achievement gaps when students have a lack of content knowledge, however multimedia resources may help promote information processing and comprehension for learners (Ortlieb et al., 2014). It appears that digital texts have the potential to not only facilitate a student's learning experience, but also to increase their motivation and engagement (Huang, 2012). It is essential that educators use a variety of instructional strategies, including digital resources in order to best meet the needs of all learners in the classroom. Numerous children who struggle to read may benefit from alternate approaches to learning, such as the use of assistive technology, as specific accommodations and modifications in the classroom.

Multiple studies indicate that technology and digital reading environments can positively affect reading comprehension, (Behrmann, 1994; Bergen, 2002; Horzum,

2013; Huang 2012; Maushak, 2001; Merbler, 1999; Ortlieb et al. 2014; Quenneville, 2001). Digital texts often consist of interactive images that support the learning process and allow struggling readers to utilize auditory and visual supports to effectively understand the content material (Ortlieb et al., 2014). Significant learning occurs when students actively engage with the new information and process it using applicable word and images (Ortlieb et al., 2014). Reading using assistive technology and digital interactive media helps students to build vocabulary, achieve reading fluency, improve comprehension, access various curriculum content, and strengthen connections between home and the classroom (Ortlieb et al., 2014). This is especially critical in English language arts subject areas. For example, educators can utilize aspects of technology, such as digital organizers, to assist students with note taking (Watson, 2007). A technology-rich environment also provides a digital learning experience not available using printed methods. The combination of audio and visual signals results in a greater depth of comprehension than either alone, which is beneficial for struggling readers who may rely heavily on images in order to read and comprehend the material (Ortlieb et al., 2014).

The demand for technology-literate teachers and educators has increased (Maushak, 2001). Educators need to be properly trained and need to know how to effectively incorporate technology into lessons within their classrooms. Assistive technology can also provide positive supports for teachers in the classroom (Merbler, 1999). In order to meet the needs of all learners in the classroom, teacher differentiation of lessons is key. Assistive technology and digital texts can be used to differentiate

instruction. For example, assistive technology can encourage writing for students with learning disabilities who often find the writing process frustrating. When given opportunities in learning using multimedia approaches to overcome their challenges, students with learning disabilities are more successful in the general education classroom (Quenneville, 2001).

Significance of the Study

This present study aims to investigate the impact of digital texts on Chromebooks on the reading comprehension and engagement of elementary school students with learning disabilities in the inclusive classroom. This research builds on the recommendation of Ortlieb et al. (2014) to determine if Chromebooks and digital texts promote increased academic achievement in reading comprehension, as well as elevated student engagement. This study explores the use of digital texts on Chromebooks in the inclusive classroom for students with learning disabilities. As many schools are beginning to initiate one-to-one technology for all students, many classrooms no longer employ the use of traditional printed textbooks. In the present study, the school's curriculum programs are all offered online with related digital resources. It is hypothesized that including technology in the learning process will impact academic achievement and engagement in the classroom.

Purpose of the Study

The purpose of this study is to examine the effectiveness of utilizing digital texts on Chromebooks as an assistive technology to improve reading comprehension scores and meet the needs of students with learning disabilities in the inclusive classroom.

Specifically, the study will examine (a) the effectiveness of using digital texts on Chromebooks on reading comprehension, (b) the effectiveness of digital texts on Chromebooks to improve engagement and on-task behavior of students with learning disabilities, and (c) evaluate the student satisfaction using digital texts during this intervention.

Research Questions

Research questions to be investigated are as follows:

1. Will the use of digital texts on Chromebooks as an assistive technology increase the reading comprehension of students with learning disabilities?
2. Will the use of digital texts on Chromebooks as an assistive technology increase the academic engagement of students with learning disabilities?
3. Will the students be satisfied with the use of digital texts on Chromebooks as assistive technology in the classroom?

Chapter 2

Review of the Literature

Numerous studies have shown that the use of digital texts can be beneficial in the classroom (Behrmann, 1994; Bergen, 2002; Huang et al., 2012; Maushak et al., 2001; Merbler et al., 1999; Ortlieb et al., 2014; Quenneville, 2001; Watson et al., 2007). Textbook publishing companies must alter their strategies quickly in order to provide schools with the interactive, digital content they are searching for (Davis, 2013). There is still much to learn about the effect of digital texts on assistive technology and the reading comprehension and engagement of students with learning disabilities in the inclusive classroom. As the vast uses of digital texts on assistive technologies increase, more research in exploring how students can interact with the digital components is necessary (Hoseth & McLure, 2012). While there has been research targeting many aspects of reading comprehension and engagement, the effect of digital texts on school-aged children is substantial (Huang, Liang, Su, & Chen, 2012). As students interact with texts in a digital reading environment, they engage in social, literary experiences (Ortlieb, Sargent, & Moreland, 2014).

Assistive Technology and Students with Learning Disabilities

Assistive Technologies are used by individuals with disabilities in order to compensate for lack of certain abilities (Gronlund, Lim, & Larsson, 2010). When Assistive technologies are combined with various instructional strategies, improvements occur in cognition and problem-solving skills (Watson, 2007). Computers are a common staple of technology in classrooms. Various types of tablet computers are often used,

including iPads and Android tablets. These individual, portable, digital devices can be used as digital textbooks to support learning (Huang et al., 2012). Huang et al. (2012) conducted a study to investigate the effect of using an Interactive E-book Learning System (IELS) with elementary school students. The study was targeted to provide data on the effectiveness of digital texts and to investigate student perceptions and reading accuracy (Huang et al., 2012). The interactive components were adopted to support students' personalized, learning experiences with digital texts (Huang et al., 2012). Individual learning functions, such as e-annotation, bookmarks, content searching, and learning process trackers were designed to support student learning (Huang et al., 2012).

Two investigations were conducted for evaluation of the IELS. The first investigation included 166 elementary school students. The goal was to evaluate the ability and function of the IELS system on student engagement and to obtain student feedback. It was found that the usability and function of the developed system were well-suited for the majority of students. The second investigation evaluated the learning effect of the developed system on reading comprehension (Huang et al., 2012). The results showed that using a digital text made no significant difference in students' reading accuracy; However, the learning tracker method of the IELS did provide detailed information about the actual learning processes (Huang et al., 2012). This information can be used to provide support and further assistance for the learner. Huang et al. suggest that a tailor-made digital learning system could achieve a better, personalized learning experience for elementary school students (2012).

Ortlieb and colleagues (2014) note that students are tech savvy, are comfortable using all types of technology with ease, and are able to communicate and express thoughts and feelings while using technology and related functions. Many schools have adopted computer-based reading programs to supplement English-Language Arts curriculums. These digital environments are formulated to allow students opportunities to improve reading skills (Ortlieb et al., 2014). Limited research has been conducted to investigate the effects digital environments have on improving student reading comprehension to reduce the achievement gap; However, in a study by Ortlieb et al. (2014), the effects of digital and printed texts were evaluated. Significant learning occurred when students were actively engaged and processed the words with images (Ortlieb et al., 2014). The study results suggest that technology and digital reading environments can positively affect reading comprehension in fifth and sixth graders. Moreover, the results provided further confirmation that digital reading environments can in fact promote reading comprehension of digital texts when utilized in similar computer-based environments (Ortlieb et al., 2014). It was also found that reading skills helped to guide students through the high-interest digital texts and increased reading comprehension and engagement (Ortlieb et al., 2014). Although these discoveries are consistent to show the prospective benefits of digital reading environments, its successful implementation in classrooms provides further insight about alternate options for effective methods of teaching reading (Ortlieb et al., 2014).

According to Bergen (2002), using technology in inclusive classrooms has many advantages, such as helping students with disabilities become more confident and reach

their potentials (Bergen, 2002). In a study investigating reading comprehension and student engagement conducted by Bergen (2002), all students in a sixth-grade classroom received handheld computers (Bergen, 2002). The children in this study had mild to moderate learning disabilities and were looking forward to having new devices, which they were able to use with ease (Bergen, 2002). Because the students in the study were using digital resources, all students were drawn into the exploration process and were all highly motivated in the classroom (Bergen, 2002). They also collaborated more with their peers. Although the original excitement dwindled as time passed, all of the students in the study found useful ways to enhance their learning with the computers and applications (Bergen, 2002). Some students who had more severe disabilities were also able to utilize the technology effectively to best support their learning. Students assisted their learning by using specific educational applications, such as text-to-speech (Bergen, 2002). Digital devices allowed all students to become actively engaged in class (Bergen, 2002). The results of this study suggest that computers and other technologies are helpful in promoting self-management skills of students with disabilities (Bergen, 2002). Teachers can also utilize beep or flash reminders when tasks need to be completed for students, or send detailed directions through the use of computer applications, while students can perform self-checks and chunk work into more manageable sections using various computer programs and applications (Bergen, 2002).

Assistive technologies are platforms in which ground-breaking technologies have been constructed with users and content both being equally important (Greenhow, Robelia, & Hughes, 2009). Internet access, Chromebook usage, as well as the nature of

the web have affected the context of learning (Greenhow et al., 2009). Students have options regarding how and where to learn, whether it is physically in a classroom, at home, or in an online setting (Greenhow et al., 2009). Greenhow et al. (2009) studied the conditions in which students utilize the internet and assistive technologies and how it influences their learning. It was found that assistive technology in the classroom would increase student engagement due to students being generally media-oriented and preferring communication via technology, such as cellphones, texting, instant messaging, and social network sites (Greenhow et al., 2009). Emerging web technologies in education include: Google drive, file sharing, voice recognition, video chats, and online conferencing. Students are able to access these in the classroom through the use of assistive technologies. These programs and applications assist in student learning, comprehension, and engagement. According to Greenhow et al. (2009), research on learners' online practices should continue in order to understand how they navigate, understand, and evaluate data from using the internet on assistive technologies (Greenhow et al., 2009). Greenhow et al. (2009) theorizes about how the internet and technologies will develop in future years to come and how further research in education will be influenced (Greenhow et al., 2009).

According to Dalton (2014), assistive technologies range from multimedia devices to interactive programs that support and engage all types of learners (Dalton, 2014). Bergen (2012) and Dalton (2014) both agree that the digital world now offers advantages and new experiences for those who struggle with printed text (Dalton, 2014). The opportunity to engage in texts with enhanced media is vast, yet conventional in

classrooms (Dalton, 2014). New possibilities in reading and technology have emerged from the shift of reading on paper to the screen (Dalton, 2014). Reading using assistive technologies helps to customize each student's learning experience and make learning conducive for all types of learners (Dalton, 2014). For example, digital texts on assistive technologies offer a variety of interactive features such as audio narration, clickable words that are broken down into syllables, text-to-speech, as well as decodable words linked to animation with accompanying pronunciation (Dalton, 2014). Changing the text from print to digitally interactive text while using technologies enhances student vocabulary, comprehension, and engagement (Dalton, 2014). Other assistive technology features may include programs that offer vocabulary support. Some digital texts may have a short explanation of word meanings when you hover the cursor over the word; More useful, the student may click on a word to access an online glossary, which can provide definitions, graphics, animation, audio/video clips, pronunciation, and possibly even language translation (Dalton, 2014). Moreover, assistive technologies and applications are developing rapidly to strengthen the students' learning and strike out the concept of 'struggling' readers (Dalton, 2014).

Reading Comprehension Needs of Students with Learning Disabilities

According to Horzum (2013), new concepts such as reading from screen, e-literacy, and digital texts with student comprehension and engagement have been investigated (Horzum, 2013). Horzum conducted a study to compare the reading comprehension levels of fifth grade elementary school students reading informative and narrative text passages from printed material, and from a computer screen (Horzum,

2013). In the study, sixty students were placed into pre-test and post-test control groups. A total of six reading passages were given to the participants. One group was assigned to read the printed text, while another group read the same material on a computer screen. Study results revealed the reading comprehension levels of students who read the informational texts from a screen were significantly higher than those reading from printed material (Horzum, 2013). Since informative texts tend to be harder to comprehend for most students, they may not fully comprehend all the material (Horzum, 2013). Students are generally more interested in narrative, fiction stories. Because of a lack of interest in informational passages, it can be more difficult for students to understand non-fiction texts. The significant increase in comprehension levels in the study conducted by Horzum (2013) may be due to the students interacting with the text through the use of technology. Students tend to become more engaged when there is access to technology in the classroom (Horzum, 2013). Furthermore, there was no significant difference in reading levels between the students who read narrative text passages from a screen versus printed material (Horzum, 2013).

According to Segal-Drori (2009), children regard technology as natural and as a major part of their life (Segal-Drori, 2009). Educators should take advantage of computers, as early as Kindergarten, in order to support and promote learning and comprehension, including early literacy (Segal-Drori, 2009). Electronic books and computer programs have emerged into classrooms over the past decade (Segal-Drori, 2009). Many e-books are digital versions of classic children's books and published in a printed format (Segal-Drori, 2009). In most e-books, the text and illustrations are

presented similarly as in the printed version, but incorporate multimedia features, such as animation, music, sound effects, and narration (Segal-Drori, 2009). This can be favorable for students who are just beginning to read to get them interested in literacy, as well as interacting with various texts.

Segal-Drori (2009) investigated the use of educational e-books that aimed to promote early literacy for young learners. The study evaluated the effects of electronic books versus printed books, focusing on reading comprehension levels both with and without adult instruction. Participants included one hundred twenty-eight 5- to 6-year-old kindergarten children from low socio-economic status families. The students were randomly assigned into groups (Segal-Drori, 2009). The following factors in the study were considered: (1) independently reading the e-book (EB - e-book); (2) reading the e-book with adult instruction (EBI - e-book with instruction); (3) reading the printed book with adult instruction (PBI - printed book with instruction); and (4) receiving the regular kindergarten program (C - control group), (Segal-Drori, 2009). The intervention groups included four reading sessions (Segal-Drori, 2009). Pre- and post-intervention early reading measures included concepts about print, word reading, comprehension, and phonological awareness (Segal-Drori, 2009). The results revealed that the group who read the e-book with adult instruction (EBI group) achieved greater success and progress in word reading and phonological awareness than the other control groups (Segal-Drori, 2009). As a result, not only did the students reading e-books with adult instruction benefit most in the study, but they also had and firmer grasp of the concepts about print, word reading, comprehension, and phonological awareness (Segal-Drori, 2009).

Reading proficiency can present challenges for individuals with intellectual disabilities (Coleman, Cherry, Moore, Park, & Cihak, 2015). A study conducted by Coleman et al. (2015) compared the effects of teaching sight words by teacher-directed prompting versus computer-assisted prompting to three elementary school students with disabilities. Sight word recognition is an essential factor to reading and academic achievement in school (Coleman et al., 2015). Sight words are words that appear often in text that a strong reader can instantly recognize without having to sound out (Coleman et al., 2015). This allows the reader to focus more on the meaning of the text, rather than sounding out each word. In turn, the student is able to comprehend what they read much better.

Along with sight-word recognition, Computer-Assisted Instruction (CAI) is another effective method of instruction for students with learning disabilities that is growing in popularity due to successful academic outcomes in students' self-esteem and literacy skills (Coleman et al., 2015). According to Coleman et al. (2015), the main reason CAI is beneficial for students with disabilities is because it provides many ways of presenting information using interactive, visual and audio components with colors, pictures, and sounds (Coleman et al., 2015). After using these methods in the study, the results were recorded. Acquisition of sight words prevailed in both conditions for the three participants in the study; However, each participant either (a) responded better with the teacher-directed method or (b) preferred the teacher-directed method when tasks were similar, with CAI being more effective (Coleman et al., 2015).

Not only can Computer-Assisted Instruction (CAI) encourage student comprehension according to Coleman (2015), but Internet Reciprocal Teaching (IRT) also has the potential to improve student comprehension according to Coiro (2012). Integrating e-texts and tasks into language arts curriculum can stimulate student achievement in the area of reading comprehension (Coiro, 2012). Progress has been made in evaluating key factors of online reading comprehension and utilizing many instructional tools, such as IRT (Coiro, 2012). For example, common teaching practices in elementary and middle school classrooms may include problem-based inquiries, peer-to-peer collaboration, as well as using specific strategies to overcome challenging tasks (Coiro, 2012). Gradually, teachers assist students in making progress to generate the ability to become more independent with vocabulary acquisition and reading comprehension. In a study conducted by Coiro (2012), IRT and digital texts significantly improved seventh graders' abilities to read and comprehend information online. During the study, teachers facilitated interactive group work and peer discussions, while students utilized laptops to actively engage with digital texts and other curriculum-based challenges (Coiro, 2012). Students were encouraged to investigate and collaboratively work with peers using the technology and internet to analyze and decipher the defined problems (Coiro, 2012). The students successfully gained proficiency with online reading comprehension over a period of time using the IRT instructional model.

Improvements and advances in digital text technology have become a mainstream occurrence (Tanner, 2014). The current reading platforms of printed texts and e-texts do affect and impact reading comprehension (Tanner, 2014). Although digital technologies

and e-texts will continue to enhance the reading experience, reading comprehension is the best indicator of which reading platform is more successful for learners (Tanner, 2014). According to Tanner (2014), readers still prefer printed text, especially when it comes to longer, challenging material. Reading on a screen can inhibit the cognitive process and efforts trying to relocate information previously read (Tanner, 2014). Those who read printed text are able to learn and understand content better and remember more, in contrast to readers of e-texts (Tanner, 2014).

The main obstacle to comprehension while reading e-texts is the distraction that colored, clickable, digital text can cause (Tanner, 2014). Furthermore, reading on the screen to understand versus reading for entertainment also affects reading comprehension (Tanner, 2014). The distraction of technology can interfere with cognitive retention. As specified by Tanner (2014), participants were able to comprehend and understand the content of the printed text, but were only able to remember and recall information from the digital text (Tanner, 2014). The cognitive variations between understanding and remembering is substantial. When a concept is actually understood and not just remembered, it becomes part of our long-term memory (Tanner, 2014). Without comprehension, new concepts learned will simply be stored in short-term memory and will not assist in building the foundation needed to comprehend more challenging concepts later (Tanner, 2014). In contrast to the studies conducted by Horzum (2013), Segal-Drori (2009), Coleman et. al. (2015), and Coiro (2012), printed texts promote reading comprehension best and meet the optical, cognitive, and metacognitive needs of the human brain (Tanner, 2014).

Academic Engagement of Students with Learning Disabilities

Academic engagement is an effective way to attain student achievement, and it consists of student motivation, cognitive strategies, comprehension, and social attitudes (Guthrie, 2004). Students who are generally more engaged during class are considered to be higher achievers, in contrast to less engaged students (Guthrie, 2004). Being an engaged learner has a lot to do with the child's values and social attitudes toward school, as well as his/her desire for learning (Guthrie, 2004). In a classroom, students who are academically engaged tend to look, behave, and interact in diverse ways, in contrast to disengaged students, and typically, teachers are able to identify who those students are (Guthrie, 2004).

In a study conducted by Guthrie (2004), student engagement was researched with a goal to promote academic engagement and reading comprehension by utilizing concepts, themes, interactive learning experiences, various text types, and classroom discussions (Guthrie, 2004). The results revealed that because too many children are disengaged in the classroom, there is only average comprehension being achieved (Guthrie, 2004). With academic engagement lacking, along with mediocre comprehension, students are not able to gain knowledge in specific subject matters and build background knowledge for future learning experiences (Guthrie, 2004). For example, engagement is not only paying attention in class, but it refers to thinking deeply and using strategies to better understand the concepts being taught (Guthrie, 2004). Guthrie (2004) states that, "Engagement and achievement are reciprocal," (p. 6). It is necessary for both to go hand-in-hand with one another. According to Guthrie (2004), the

following practices best assist in encouraging student engagement in the classroom: (a) utilizing concepts and themes to promote comprehension, (b) providing choices to students, (c) giving opportunities for hands-on learning activities related to the learning goals, (d) incorporating high-interest texts, and (e) providing opportunities for student collaboration (Guthrie, 2004).

Similarly, a study conducted by Wang et al. (2010) had comparable themes, concepts, and practices to promote engagement and achievement that were also present in the study conducted by Guthrie (2004). The more engaged students are in school, the more successful they are. Students who are present in class, concentrate on their studies, follow rules and directions, and evade disruptions and distractions typically obtain better grades and score better on standardized testing (Wang & Holcombe, 2010). Students who are not engaged in their studies have a higher chance of scoring lower on tests, making poor choices, and dropping out of school (Wang et al., 2010). Student engagement consists of three major elements: behaviors, emotions, and cognitions (Wang et al., 2010). Social, instructional, and organizational attitudes of school affect students' overall academic engagement and achievement (Wang et al., 2010).

In a study conducted by Wang & Holcombe (2010), one thousand, forty-six students were studied to investigate which school environment factors best help or hinder student academic engagement and achievement, from students' perspectives (Wang et al., 2010). The main school environment factors consisted of: goal performance, mastery goals, promotion of autonomy, peer discussion, and teacher supports (Wang et al., 2010). It was proven that some school environment factors assisted students more effectively

than others. So as a result, if the basic needs of the students were met, their engagement in school was elevated (Wang et al., 2010). It was found that these two concepts are significantly associated; The school's ability to foster student engagement is directly correlated to students' self-confidence to accomplish academic tasks (Wang et al., 2010). This study demonstrated the parallel between students' school experiences with their school engagement. This type of school atmosphere allows students to have more opportunities to be successful in the classroom (Wang et al., 2010).

The potential of using digital texts to encourage student engagement in the classroom is interesting and intriguing. Utilizing digital texts can strengthen academic engagement (Larson, 2010). In a study conducted by Larson (2010), the effects of e-book technologies and digital texts on student engagement was researched (Larson, 2010). Many students can easily become engrossed with multimedia experiences in the classroom (Larson, 2010). It is important to examine how students interact and respond to digital texts on assistive technologies, as well as how their academic engagement and achievement are impacted (Larson, 2010). Academic engagement was positively impacted and produced higher motivation in students with learning disabilities when using digital texts on assistive technologies (Larson, 2010). Many of the features provided on assistive technologies can benefit students with disabilities. Such features include: additional text tools, built-in dictionaries, phonetic spellings, and text-to-speech (Larson, 2010). Digital learning devices may provide both students and teachers with the tools needed to support learning in all ways (Larson, 2010). In contrast to Guthrie (2004) and Wang et al. (2010), it was discovered that although some multimedia features such

as, sound, video, and animation, can promote engagement, it can also be a distraction to students and produce lower levels of academic achievement (Larson, 2010). Moreover, Larson (2010) found that high levels of engagement don't always equal high levels of achievement.

Advances in assistive technologies have increased student interest and engagement in digital texts (Lim, 2011). Digital texts offer enhanced material using technology equipped with educational tools in order to best promote academic engagement (Lim, 2011). These tools benefit students and encourage them to explore, apply, share, and build upon their prior knowledge (Lim, 2011). Because digital texts on assistive technologies incorporate many student-supported learning features, students are highly-motivated to access them (Lim, 2011). Such features are similar to those examined in the study conducted by Larson (2010). They include: note-taking programs, highlighting tools, messaging services, bookmarking, search bars, and display options (Lim, 2011). If students are able to understand the content better, in turn, they will likely be more engaged. It is critical to understand the student engagement factor when developing interactive applications using technology for digital learning environments (Lim, 2011).

The way students are taught to read in schools is critical (Myrberg & Wiberg, 2015). In a study conducted by Myrberg and Wiberg (2015), it was found that students can indeed benefit from new technologies and inventions, however, the same new technologies and inventions can also cause struggles (Myrberg et al., 2015). Although many students are reading from a screen, the disadvantages of digital texts are apparent.

Examples of disadvantages include: headaches, fatigue, strained and dry eyes, and screen-related sleepiness (Myrberg et al., 2015). Because of these disadvantages, students may be less engaged in the classroom. The number of pixel densities on the screen can also affect engagement and reading comprehension (Myrberg et al., 2015). In contrast, some students may read more rapidly and with less effort due to the back lighting providing a better contrast (Myrberg et al., 2015). In a study conducted by Myrberg et al. (2015), a reading comprehension assessment was given. The students who read traditional, printed text scored at higher levels than those who read from the screen (Myrberg et al., 2015). Some students claimed it was easier to remember what they read due to physically having to turn the page (Myrberg et al., 2015). According to Myrberg et al. (2015), touching and turning pages gives students spatio-temporal indicators and aids in the memorization process, therefore making it easer to recall information (Myrberg et al., 2015). While scrolling through a computer screen can make recalling details more strenuous, this can also lead to student disengagement (Myrberg et al., 2015). The results of the study were found to be inconclusive, requiring more information and data to be collected on the effects of digital literacies on student engagement.

Conclusion

Assistive technology devices with access to online dictionaries, thesauruses, and other online references not only provide information, but also promote academic engagement and reading comprehension for students with disabilities (Watson, 2007). This study will investigate the use of digital texts by students in an elementary inclusive classroom setting. Students will use individual Chromebooks to access digital text

passages. The digital text passages provide students with an interactive learning experience. The purpose of this study is to examine the effectiveness of utilizing digital texts on Chromebooks as an assistive technology to improve the reading comprehension scores and academic engagement of students with learning disabilities in the inclusive classroom. Specifically, the study will examine (a) the effectiveness of using digital texts on Chromebooks on reading comprehension, (b) the effectiveness of digital texts on Chromebooks to improve engagement and on-task behavior of students with specific learning disabilities, and (c) student satisfaction using digital texts on Chromebooks.

Chapter 3

Methodology

Setting

This study was conducted in an elementary school of 635 students in a suburban New Jersey school district. The school district contains a total of eleven schools, eight of which are elementary schools and three are middle schools. There are approximately 9,925 total students in the school district. The elementary schools range from preschool through fifth grade, and the middle schools range from sixth through eighth grade. The typical school day in the elementary school runs for about six hours total. The amount of actual instructional time is four hours and thirty minutes.

The elementary school has a diverse student population. According to the New Jersey School Performance Report (New Jersey Department of Education, 2014), 55.0% of the students in the elementary school are white, 26.9% of students are black, 8.6% of students are Hispanic, 4.1% of students are Asian, 0.1% of students are American Indian, and 5.3% of students are two or more races. English is the primary language spoken in the school and community at 98.7%. While studying the elementary school population, 18% of the student population are students with disabilities, 41.8% of the student population are considered economically disadvantaged, and 0% of students are limited English proficient.

The study was conducted in one of the school's fifth grade classrooms. The classroom consists of an open floor plan with 23 student desks and chairs arranged in rows. There is a large, kidney-shaped table with 6 chairs in the back of the room, an over-

sized area rug, and the teacher's desk and chair. There are a total of 2 dry-erase boards and 6 bulletin boards that display subject content and student work. The class is fully equipped with a Chromebook cart with 25 Chromebooks, as well as a SMARTBoard in the front of the room. Students have access to the technology on a daily basis.

Participants

All of the students participating in this study are classified as receiving special education services. They all have diagnoses ranging from specific learning disabilities to communication impaired, including anxiety and depression. Teachers and administrators have recommended these students to receive the intervention due to their difficulties with independently completing grade-level work. All students have Individualized Education Plans for their specific disabilities. Table 1 represents the general information of the participants.

Table 1

General Information of Participants

Student	Age	Grade	Primary Classification
A	11	5	CI, with Depression
B	10	5	SLD, with Anxiety
C	11	5	SLD

Participant I. Student A is a fifth grade African-American male who is currently receiving special education and has an Individualized Education Plan. Student A is eligible for special education services under the category communication Impaired. He has documented depression and is working through his struggles. Student A receives instruction for English language arts and mathematics in a resource room setting and is part of the general education population for science and social studies. Within the small group setting, Student A does well overall, but struggles at times with behaving and acting appropriately in class. He can get off task quite easily and act silly. When he is present in a large group with the general education population, Student A has difficulty following social cues and facial expressions of others. His biggest struggle in all classroom settings is comprehension of what others are saying. He often asks, "What?" and "Can you show me?" when he does not understand.

Participant II. Student B is a fifth grade Caucasian male student who is currently receiving special education and has an Individualized Education Plan. Student B is

eligible for special education services under the category specific learning disability. He has documented anxiety and takes medication for it. Student B receives instruction for English language arts and mathematics in a resource room setting and is part of the general education population for science and social studies. Within the small group setting, Student B does well overall, but struggles at times with focusing on the task at hand. When he is present in a large group with the general education population, Student B has difficulty with the ability to socialize properly and effectively with his peers.

Participant III. Student C is a fifth grade African-American male who is currently receiving special education and has an Individualized Education Plan. Student C is eligible for special education services under the category specific learning disability. Student C receives instruction for English language arts and mathematics in a resource room setting and is part of the general education population for science and social studies. Within the small group setting, Student C does well overall, especially in mathematics, but struggles at times with behaving and acting appropriately in class. He can get off task quite easily and try to be funny to others in class. When he is present in a large group with the general education population, Student C has difficulty following rules and directions and often gets in trouble. Student C and his family were recently victims of a total house fire where they lost everything, including pets. Since then, Student C has acted out more frequently and has had struggles with following school rules. He has been involved in physical fights with peers at school. He is currently meeting with the school counselor to help assist him with handling stress in healthy ways.

Research Design

A single-subject design with ABAB phase format was used to collect data over a period of eight weeks. In the first phase A, baseline data was collected for two weeks over five sessions. The students were given a total of five texts to read and comprehension questions to answer on paper. Students were instructed to record their responses with a pencil on the paper after reading. An observational checklist was used each time by the instructor to record student engagement every three minutes. During the first phase B, the intervention was implemented for two weeks over three sessions. The students were given a total of three texts to read and comprehension questions to answer on the Chromebooks with digital texts. An observational checklist was used again each time by the instructor to record student engagement every three minutes. The second phase A and second phase B were conducted in a similar fashion to the first time. Students were again provided with three sessions of paper texts and comprehension questions during the baseline phase, and then with three sessions of digital texts and comprehension questions during the intervention phase. The observational checklist was used the entire time to record student engagement. Tallies were placed in the column to indicate how often the students were off-task during each time block (see Figure 1).

9:00-9:03 AM	9:03-9:06 AM	9:06-9:09 AM	9:09-9:11 AM	9:11-9:14 AM	9:14-9:17 AM	9:17-9:21 AM	9:21-9:24 AM	9:24-9:27 AM	9:27-9:30 AM
Reason	Reason	Reason	Reason	Reason	Reason	Reason	Reason	Reason	Reason

Figure 1. Student Engagement/On-Task Observational Checklist.

Procedure

The intervention was implemented over an eight-week period from February, 2017 through April, 2017. The teacher met with the group of students approximately twice a week from 9:00 a.m. to 9:30 a.m. The students worked with the classroom teacher during the intervention block that is built into the school day in the fifth grade classroom. The group consisted of the three male students and met on Tuesdays and Thursdays, unless there were scheduling conflicts or a student was absent. The meetings took place in classroom B-05 of the elementary school students attended. The intervention was delivered with the use of an online reading program with paper-based and online-based reading passages, along with comprehension questions. At the end of the study, students rated how they felt about each characteristic of the study by placing an "X" under a column for each category. The rating of "5" indicated strong agreement, and "1" indicated strong disagreement (see Figure 2). Students were asked to answer honestly by putting an "X" in the column of their choice based on their response to each statement.

	Strongly Agree 5	**Agree 4**	**Unsure 3**	**Disagree 2**	**Strongly Disagree 1**
1. I found using the Chromebook to be easy.					
2. The digital texts kept me on-task.					
3. I would rather read text on a screen than on paper.					
4. I feel I understand what I read from the screen.					
5. I dislike reading texts on a computer screen.					
6. I like using technology in the classroom.					
7. I would like to read all text passages in class using digital texts.					
8. I could not understand what I read on the computer screen.					
9. I feel prepared to answer comprehension questions after reading a text on the Chromebook.					
10. I would like to share this technology with friends and other students.					

Figure 2. Student Satisfaction Survey.

Materials

Three Chromebooks, each with a set of headphones and a mouse were available for the students to access during the intervention. Eight paper-based reading passages with comprehension questions, three pencils, six online reading passages with comprehension questions, the checklists and surveys, and a timer were also used during the baseline and intervention phases. Students were directed to complete the paper-based reading passages and comprehension questions during the baseline collection of phase A. They were then asked to complete the digital-based reading passages and comprehension questions during the intervention of phase B. At the end of the study, the students completed the satisfaction survey.

Chapter 4

Findings

This study was conducted using a single-subject ABAB design to evaluate the effects of digital texts on Chromebooks on the reading comprehension and academic engagement of students with learning disabilities in an inclusive classroom. The study included three students with learning disabilities and took place in a fifth-grade inclusion classroom. The research questions to be answered follow:

1. Will the use of digital texts on Chromebooks as an assistive technology increase the reading comprehension of students with learning disabilities?
2. Will the use of digital texts on Chromebooks as an assistive technology increase the academic engagement of students with learning disabilities?
3. Will the students be satisfied with the use of digital texts on Chromebooks as assistive technology in the classroom?

Student comprehension scores were obtained from assessments on paper and online. Student baseline 1 comprehension data include preexisting comprehension scores along with assessments given during baseline. Student engagement data was obtained through the use of daily task checklists.

Group Results

Figure 3 displays the group comprehension results for the three participants across all sessions. Figure 4 shows the mean group comprehension scores across all phases. In the area of comprehension, the overall group mean at baseline 1 was 66.88%, the overall group mean at intervention 1 was 44.44%, the overall group mean at baseline 2 was

44.33%, and the overall group mean at intervention 2 was 44.44%. The students scored better in the area of reading comprehension using the paper assessments during the baseline 1 phase, than when using digital texts during the intervention phases (See Figure 3 and Figure 4).

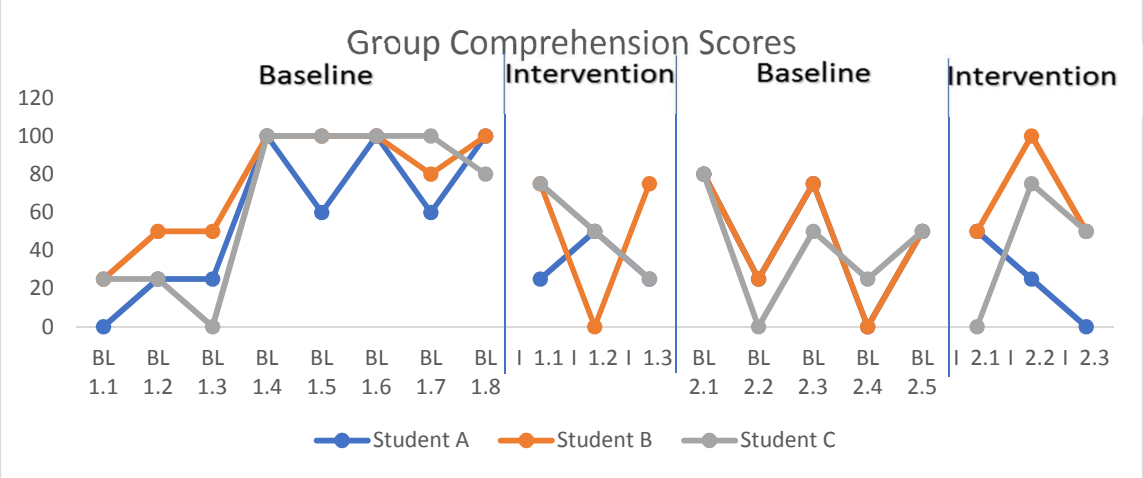

Figure 3. Group Comprehension Scores Across All Sessions

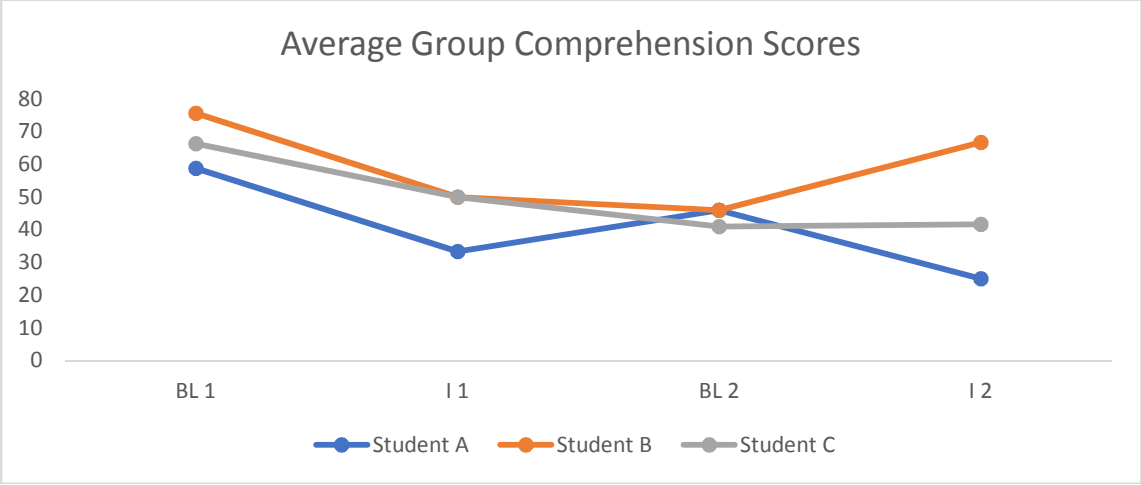

Figure 4. Mean Group Comprehension Scores

Figure 5 displays the group engagement results for the three participants across all sessions. Figure 6 shows the mean group engagement scores across all phases. Student B was the most engaged during the study in comparison to Student A and Student C. In the area of engagement, the overall group mean at baseline 1 was 96.66% on task, the overall group mean at intervention 1 was 70% on task, the overall group mean at baseline 2 was 83.33% on task, and the overall group mean at intervention 2 was 76.66% on task. The students were more on task in the area of academic engagement using the paper assessments, than when using digital texts during the intervention phases.

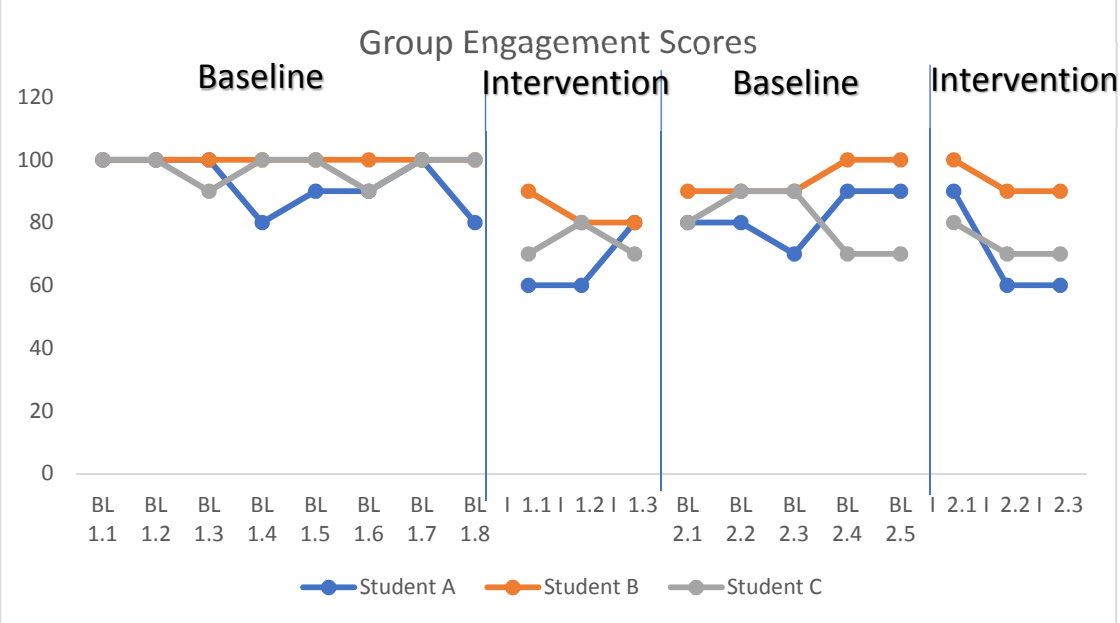

Figure 5. Group Engagement Scores Across All Sessions

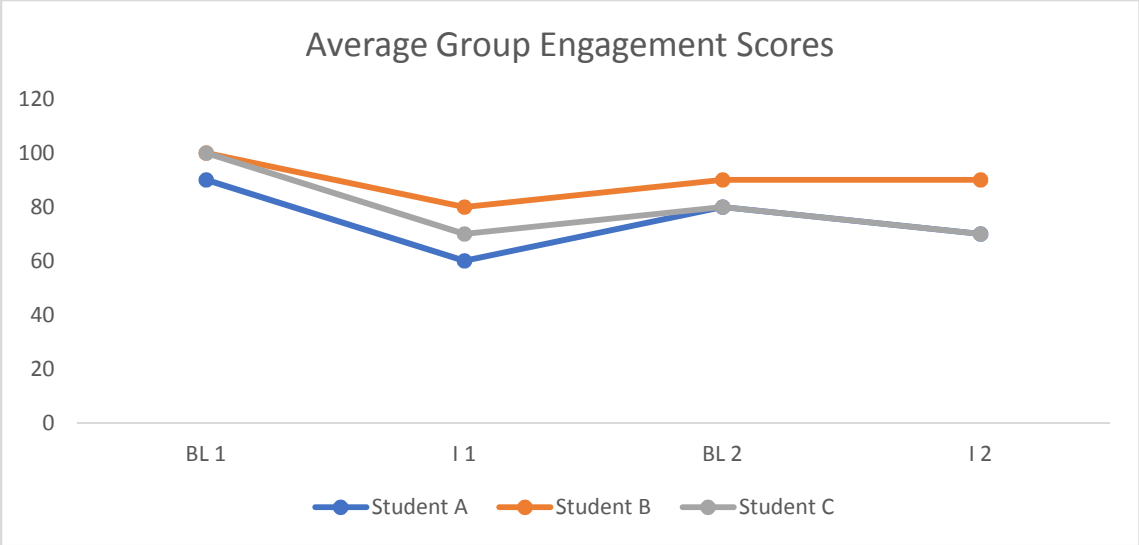

Figure 6. Mean Group Engagement Scores

Individual Results

Figure 7 displays the comprehension scores for Student A throughout the ABAB phases. The initial baseline comprehension mean score for Student A was 58.75%. During the first intervention phase, the score decreased to 33.33%. The weekly score obtained during the second baseline phase was 46%. His weekly average for the final intervention phase dropped to 25%. The mean comprehension score for Student A was 40.77%.

Figure 8 displays the comprehension scores for Student B throughout the ABAB phases. The initial baseline comprehension mean score for Student B was 75.63%. During the first intervention phase, the score decreased to 50%. The weekly score obtained during the second baseline phase was 46%. His weekly average for the final intervention phase increased to 66.66%. The mean comprehension score for Student A was 59.57%.

Figure 9 displays the comprehension scores for Student C throughout the ABAB phases. The initial baseline comprehension mean score for Student C was 66.25%. During the first intervention phase, the score decreased to 50%. The weekly score obtained during the second baseline phase was 41%. His weekly average for the final intervention phase increased slightly to 41.66%. The mean comprehension score for Student C was 49.73%.

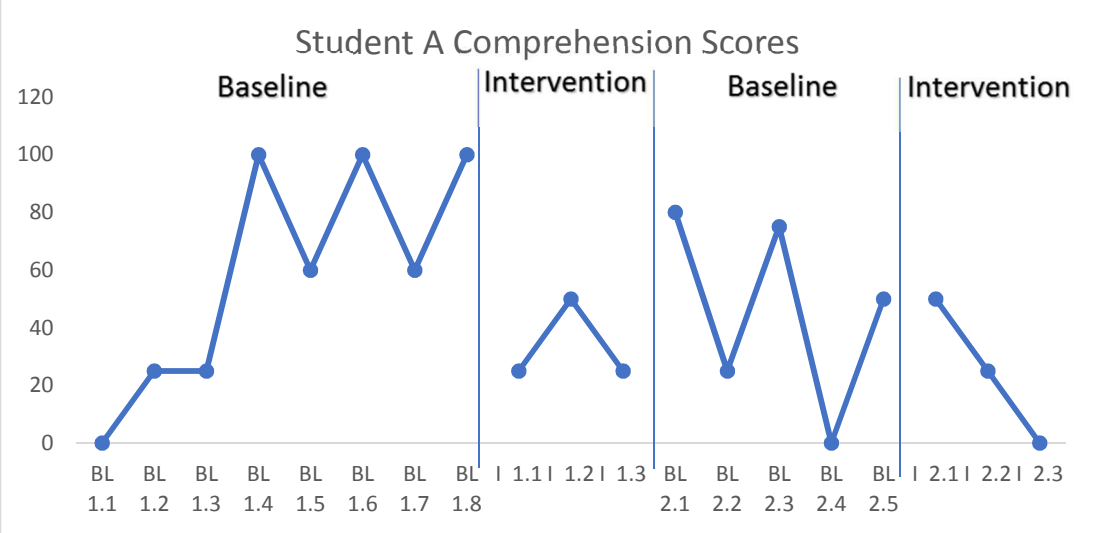

Figure 7. Student A Comprehension Scores

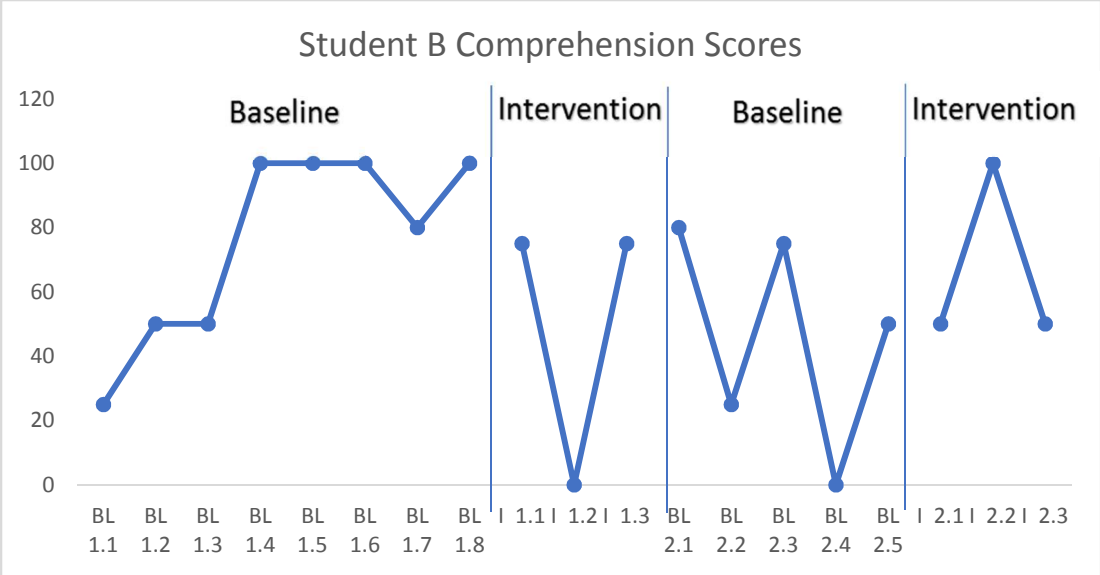

Figure 8. Student B Comprehension Scores

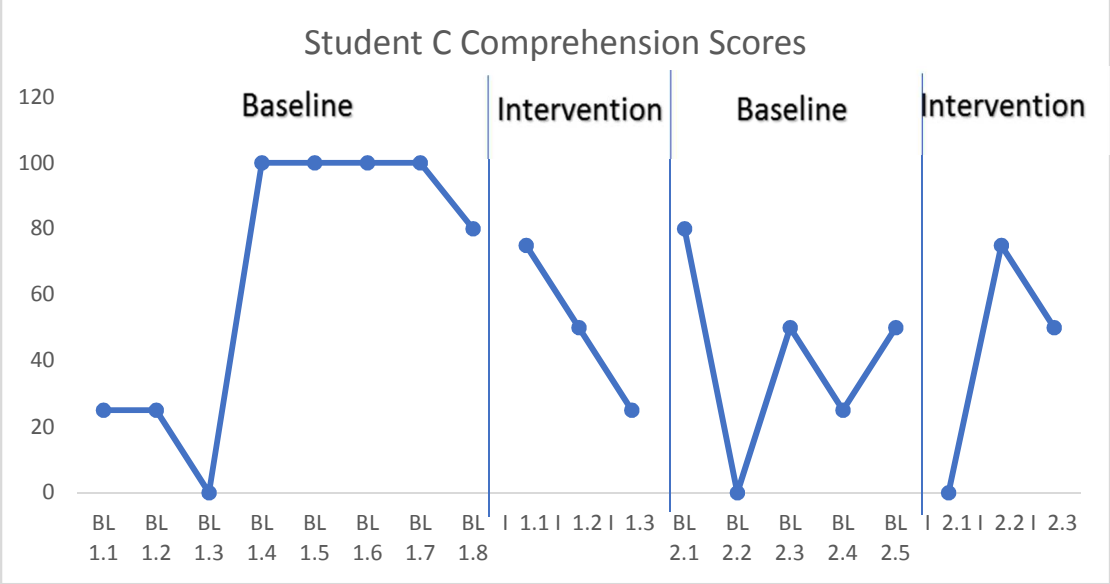

Figure 9. Student C Comprehension Scores

On-Task Behaviors

Student engagement was measured using the student engagement/on-task observation checklist. Behaviors were observed and recorded every 3 minutes per the checklist (See Figure 1). If students were distracted or off-task, it was noted in the specific 3-minute time block and overall on-task percentages were calculated.

Figure 10 illustrates academic engagement scores for Student A throughout all phases of data collection. Student A displayed on-task behavior during the initial baseline phase 93% of the time. The academic engagement of Student A decreased to 67% of the time during the first intervention phase. During the second baseline data collection, Student A increased on-task behavior to 82%. In the final intervention phase, Student A remained on-task 70% of the time.

Figure 11 illustrates academic engagement scores for Student B throughout all phases of data collection. Student B displayed on-task behavior during the initial baseline phase 100% of the time. The academic engagement of Student B decreased to 83% of the time during the first intervention phase. During the second baseline data collection, Student B increased on-task behavior to 94%. In the final intervention phase, Student B remained on-task 93% of the time.

Figure 12 illustrates academic engagement scores for Student C throughout all phases of data collection. Student C displayed on-task behavior during the initial baseline phase 98% of the time. The academic engagement of Student C decreased to 73% of the time during the first intervention phase. During the second baseline data collection,

Student C increased on-task behavior to 80%. In the final intervention phase, Student C remained on-task 73% of the time.

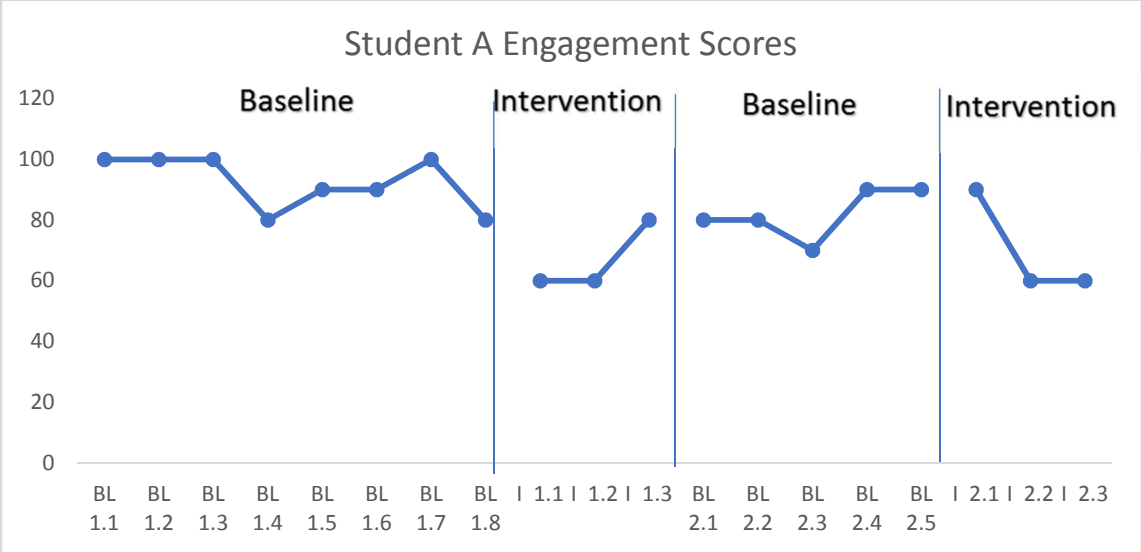

Figure 10. Student A Engagement Scores

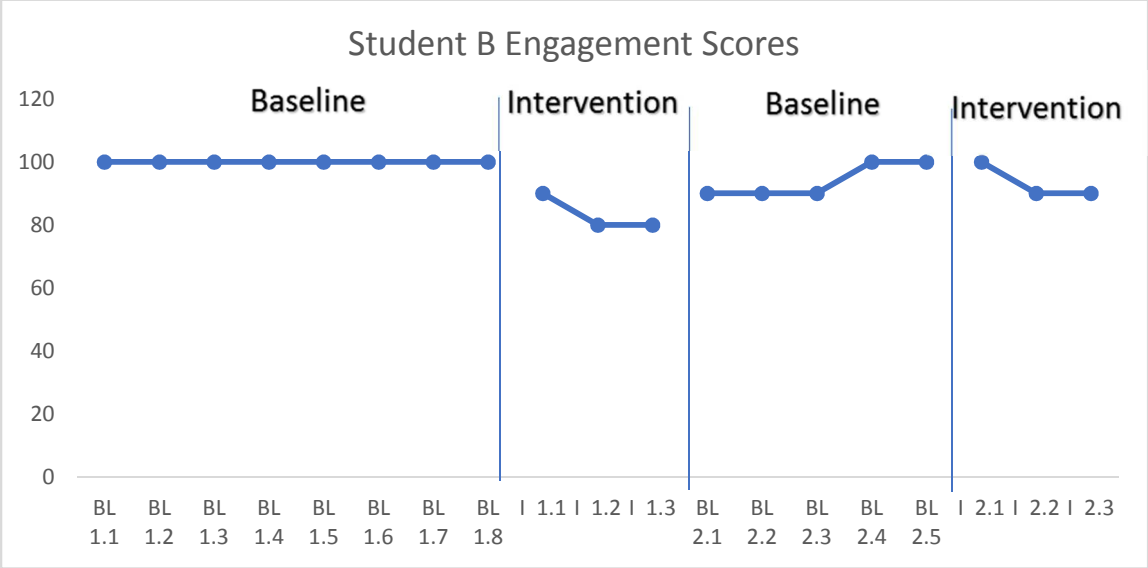

Figure 11. Student B Engagement Scores

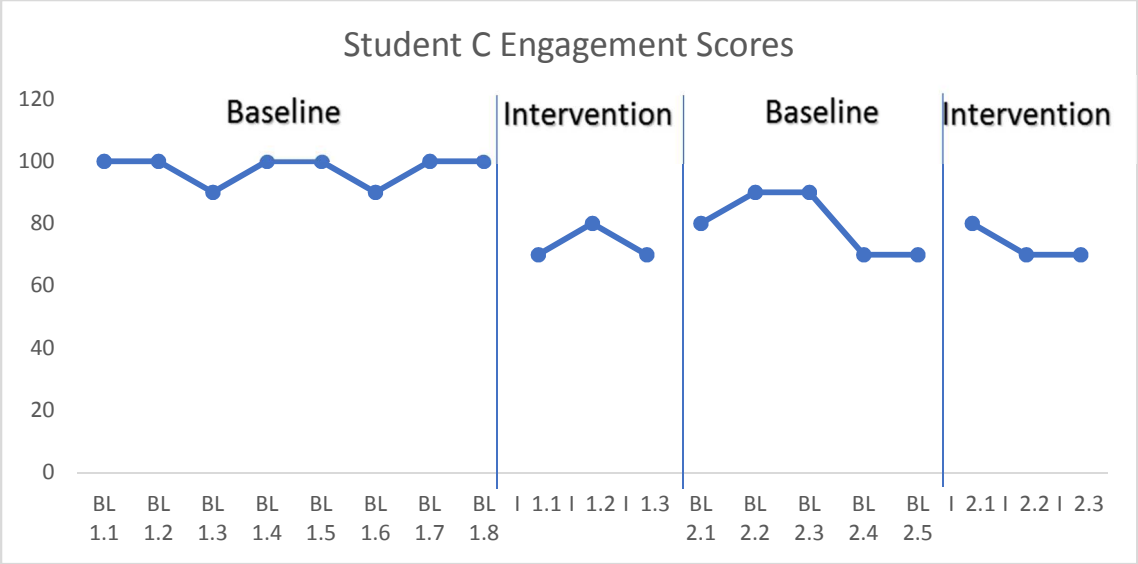

Figure 12. Student C Engagement Scores

Survey Results

At the end of the study, the students completed a Likert scale style satisfaction survey. A choice of five pre-coded responses were offered starting at "Strongly Agree - 5" through "Strongly Disagree - 1." Student could also select "Agree - 4," Unsure - 3," or "Disagree - 2." The answers were calculated and the mean group percentage scores are shown in Table 2, along with a percentage breakdown of scores in Table 3.

Table 2

Group Satisfaction Scores

	Statement	Mean
1.	I found using the Chromebook to be easy.	4.3
2.	The digital texts kept me on-task.	4.3
3.	I would rather read text on a screen than on paper.	3.3
4.	I feel I understand what I read from the screen.	3.3
5.	I dislike reading texts on a computer screen.	3.3
6.	I like using technology in the classroom.	5.0
7.	I would like to read all text passages in class using digital texts.	3.0
8.	I could not understand what I read on the computer screen.	2.3
9.	I feel prepared to answer comprehension questions after reading a text on the Chromebook.	4.0
10.	I would like to share this technology with friends and other students.	5.0

Table 3

Student Satisfaction Survey

Statement	**5 Strongly Agree (%)**	**4 Agree (%)**	**3 Undecided (%)**	**2 Disagree (%)**	**1 Strongly Disagree (%)**
1. I found using the Chromebook to be easy.	33.3	66.6	0	0	0
2. The digital texts kept me on-task.	66.6	0	33.3	0	0
3. I would rather read text on a screen than on paper.	33.3	0	33.3	33.3	0
4. I feel I understand what I read from the screen.	0	33.3	66.6	0	0
5. I dislike reading texts on a computer screen.	0	66.6	0	33.3	0
6. I like using technology in the classroom.	100	0	0	0	0
7. I would like to read all text passages in class using digital texts.	0	33.3	33.3	33.3	0

Table 3 (continued)

Statement	5 Strongly Agree (%)	4 Agree (%)	3 Undecided (%)	2 Disagree (%)	1 Strongly Disagree (%)
8. I could not understand what I read on the computer screen.	0	0	33.3	66.6	0
9. I feel prepared to answer comprehension questions after reading a text on the Chromebook.	0	100	0	0	0
10. I would like to share this technology with friends and other students.	100	0	0	0	0

All three students participated in the satisfaction survey. All students indicated enjoyment using the digital text technology in the classroom, 100% of students indicated agreement that they felt prepared to answer comprehension questions after reading text on Chromebooks, and 100% of students strongly agreed they would like to share the technology with other students. Results reveal differences, however, -between student preferences of reading on a screen compared to on paper, with one student indicating a preference for reading on screen text, one student preferring printed text, and one student remaining undecided.

Chapter 5

Discussion

The purpose of this study was to investigate the effects of digital texts on Chromebooks on the reading comprehension and engagement of special education students in an inclusive classroom. The results indicate that all participants performed better using the paper texts, in contrast to using the digital texts during the intervention.

Summary

In the area of comprehension, the overall mean during the first baseline phase was 66.88%, while the overall mean for the first intervention phase was 44.44%. The overall mean for the second baseline phase was 44.33%, while the overall mean for the final intervention phase was 44.44%. Student A scored an average of 58.75% during baseline 1, 33.33% during intervention 1, 46% during baseline 2, and 25% during intervention 2. Student B scored an average of 75.63% during baseline 1, 50% during intervention 1, 46% during baseline 2, and 66.66% during intervention 2. Student C scored an average of 66.25% during baseline 1, 50% during intervention 1, 41% during baseline 2, and 41.66% during intervention 2. While surprising, study results corroborate the findings of Tanner (2014) in which the use of digital texts on the screen did not improve reading comprehension of student participants. Tanner (2014) suggests that digital texts are a distraction and only keep information in short-term memory, whereas printed texts keep students focused and help them store information in long-term memory (Tanner, 2014). Results of the present study may also suggest that digital texts were a distraction for students in the area of comprehension.

Furthermore, in the area of engagement and on-task behavior, the results showed that students were the most actively engaged during the initial baseline phase of the study with printed text. During the initial baseline collection, Student A was engaged 93% of the time, Student B was engaged 100% of the time, and Student C was engaged 98% of the time. In subsequent phases of baseline and intervention, students' engagement decreased. Overall, Student A was engaged 78% of the time during the duration of the study, while Student B was engaged 93% of the time, and Student C was engaged 81% of the time. The group mean for academic engagement was 84% on-task during the entire study. As mentioned above, the digital texts seem to have been a distraction for this group in general. This could have been due to the digital pictures, videos, online glossaries, or other clickable items. These findings align with claims from Myrberg et al. (2015). Myrberg et al. (2015) suggest that there are many disadvantages of reading text on a screen for students. Students can become less engaged due to headaches, fatigue, and eye problems from reading on a screen for a prolonged period of time (Myrberg et al., 2015). These indications may have lead to disengagement for students in the present study.

In terms of social validity, students were surveyed at the end of the study to elicit their opinions about reading digital texts on Chromebooks. One hundred percent of the participants indicated that they enjoyed using the digital texts and technology in the classroom, and would like to share it with others. There were vast differences in responses when it came to preferring to read printed texts versus digital texts. Overall, 33.3% of the students felt they would rather read texts on a computer screen than on

paper, while 33.3% of students disagreed, and 33.3% of students were undecided. Furthermore, 66% of students felt they weren't sure that they understood what they read from the digital texts on the screen, while 33.3% of students felt they did comprehend what they read on the screen. These findings align to those of Bergen (2012). The participants in the study conducted by Bergen (2012) were also excited and looking forward to utilizing new technology devices in the classroom. The students were highly motivated in the beginning, but as time passed on, their engagement declined (Bergen, 2012). Although engagement decreased in the present study, all students still agreed that they enjoyed using the Chromebooks in the classroom.

Limitations

One limitation of this study was timing. This master's thesis study was conducted during the 2017 spring semester. Due to Rowan's IRB approval process and the end of the school year fast approaching, the intervention time was limited. Data collection took place over a time period of eight weeks. As a result, each phase was two weeks long. Because of this limited time, there was limited data collected. The results may have been different if there was more time available for students to have additional practice from reading on a screen. Additionally, another limitation of the study may have been the small number of participants and limited grade level investigated. The single-subject research design was conducted with three fifth-grade students. Data from this study does not reflect all fifth-grade students.

An additional limitation of this study was unexpectedly high comprehension scores at the initial baseline. Several students scored 100% on multiple baseline

assessments creating an unexpected ceiling effect. All students in this study generally have low comprehension scores, however, the high scores on the baseline assessment could be due to high-interest text passages. As a result, baseline data reflects preexisting comprehension assessment scores, along with baseline A1 scores, in an attempt to establish a clear trend for each participant.

Implications

Study findings suggest further research with larger groups is needed to continue to understand the effects digital texts have on learning. Moreover, follow-up single-subject design studies that have increased time and duration are recommended, along with varied student groups and additional interventions that may help to portray more accurate results of the effects of digital texts on Chromebooks with reading comprehension and academic engagement. For example, a follow-up study may include examining the effects of digital texts on Chromebooks with reading comprehension and academic engagement for students who are gifted. The present study investigated reading comprehension and engagement with digital texts of students with disabilities, and was unsuccessful in fostering elevated scores. Exploring diverse student groupings may lead to different results than the present study.

In order to raise student scores in reading comprehension and academic engagement, teachers and other educators can provide specific interventions to foster these areas of learning. Providing assistive technology features in the classrooms, along with modifications and accommodations may also benefit students with disabilities to do well academically. It is critical to grasp that not all students learn the same way;

therefore, not all students will increase scores with the use of technology, as evidence by results of the present study.

Conclusion

The results of the present study were surprising. Two out of three participants showed decreases in reading comprehension when using digital texts, which was unexpected. Although students were initially engaged at the start, continued engagement and increased comprehension learning, and information retention using digital texts on Chromebooks for this group of students was not maintained. It was also interesting to learn that some students preferred to read from printed text, versus digital texts. Findings suggest the digital texts were a distraction to participants. Many digital texts offer assistive technology features such as text-to-speech and interactive glossaries. These features seemingly caused a hindrance to reading comprehension for participants. Although the students were generally engaged while using the digital texts on Chromebooks, the results indicate that it caused more of an interruption in the learning processes than a support. Study findings suggests further research investigating the effects of digital texts on the reading comprehension of students with learning disabilities is warranted.

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