The Effects of Reading Modality and Student Choice on Reading Comprehension in Fifth Grade Students

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Abstract

The purpose of this study was to determine if giving students a choice in reading modality had an impact on their reading comprehension. The measurement tool for this study was a Storyworks comprehension quiz created by Scholastic, along with an extra short answer question created by this researcher. This study employed a pre-experimental one-group, three conditions design with a convenience sample of a group of on grade level fifth graders. The results showed that there were no significant differences in reading comprehension in any of the three conditions, teacher assigned print (Mean = 14.67, SD = 1.36), teacher assigned computer (Mean = 14.44, SD = 1.83), and student choice conditions (Mean = 15.11, SD = 1.67). Implications for future research and recommendations for future research are discussed throughout the study.

CHAPTER I

INTRODUCTION

Overview

Reading comprehension is the understanding and interpretation of what someone has read. Reading comprehension is something that is important for students as well as adults, it is a skill that is important in life-long success. Understanding or comprehending a text allows a child to answer questions about a text as well as think deeper about the content that they have read.

Within the education community, research has been done to determine if there are any external factors that can aid students in their comprehension of a text, technology being one of those factors (Agee & Altarriba, 2009; Rodrigues & Martins, 2008). Technology has come so far in recent years and is extremely prevalent in student's home lives as well as their school lives. This has led to student learning opportunities that have not existed in the past. Researching and understanding how to use technology tools in the classroom to help students is extremely important for current day and the future of the classroom.

Reading comprehension is a skill that all teachers focus on during their reading instruction, along with other skills. If a student cannot comprehend a text, he/she will have difficulty understanding and accurately completing other assignments related to a text. For example, if a student does not understand the content of a narrative story, he or she would not be able to write a summary of that story.

Difficulty with reading comprehension is a problem in most elementary classrooms, depending on the group of the students that are being taught. Most students with a reading IEP, or Individualized Education Program, have reading comprehension as something they struggle with. Even in classrooms where the students do not have IEPs, students still struggle to

comprehend grade level texts. This lack of comprehension shows when students are asked to complete assignments in which they must answer multiple choice or short answer questions about the text.

This researcher became interested in reading comprehension, reading modality, and student choice when she noticed that her students responded well when given a choice in how to present learned information in science class. Students were all taught the same content but were able to share their knowledge of that content in various ways. Students put forth more effort and seemed to go back into the content and reread when they were given a choice on how to present their knowledge. With the increased prevalence of technology in schools, students in this researcher's class all have one to one technology. Most of the texts used in class are available in print and online, this researcher was curious to see if giving students a choice in reading modality would affect their comprehension of that text.

Statement of Problem

The purpose of this study was to determine if giving fifth grade students that were reading on grade level a choice of reading modality, print or computer screen, of a grade level text would affect their reading comprehension of that text.

Hypothesis

The null hypothesis was that there will be no significant differences in reading comprehension under three different text assignment conditions—teacher assigned computer, teacher assigned print, and student choice.

Operational Definitions

Reading Comprehension: In this study, reading comprehension was defined as the student's ability to answer eight multiple choice and short answer questions that relate to explicit and inferred information from a non-fiction Storyworks text. The multiple-choice questions came from the test provided with the Storyworks Magazine. Two of the short answer questions also came from the test, and there was one extra short answer question added by the researcher. The correct answers to these questions show that the students understand the text and can therefore think deeper about the text and the questions that were asked.

Print Text: Print text was defined as an on -grade level, non-fiction Storyworks magazine article that was printed on paper with color text features. These magazines are consumable, so students can write in them, highlight in them or add sticky notes to the pages.

Computer Text: Computer text was defined as an on-grade level, non-fiction Storyworks magazine article that was the exact same as the printed article but was viewed by students on a computer screen. The computer text does have a few interactive features: sticky note, draw and highlight. As well as being able to zoom in and make the screen bigger.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review seeks to explore the effect of reading modality on student comprehension of a grade appropriate text. Section one provides an overview of the problem statement. Section two discusses motivation regarding reading comprehension. Section three attempts to answer the question: What can help student reading comprehension? Section four compares screen and print text regarding reading comprehension. Section five discusses different learning styles and reading comprehension.

Problem Statement

The problem statement for this literature review is "Does giving students a choice in reading modality affect their reading comprehension?" The two different reading modalities that will be explored in this study are reading in print and reading on a computer screen. Reading a text in print is the way most students read in school but with the increase in whole school and one-to-one technology, students will have the option of reading certain texts on their computer screen. This study will seek to determine if giving students a choice in the way that they read a text, will increase their comprehension and understanding of the text.

Reading Comprehension and Motivation

Motivation is what influences or drives students to work and work hard on something. If a student is motivated, they are more likely to have the drive to read and reread a text in order to comprehend it. Enriching reading comprehension and motivation levels of those placed in a developmental reading course may require educators to seek an alternate approach to teaching, such as including multimedia in the curriculum in order to improve a student's reading comprehension and motivation level (Rodrigues & Martins, 2008). Research has revealed that

finding alternate ways of instructing students in reading is a good way for reading professors to assist remedial students. One method that has been revealed in research is through the addition of eBooks in the classroom (Wheeler, 2014). In this study, the use of e-books will not be necessary due to the one-to-one laptop situation in the classroom where the study will take place, students will be able to read a text on their computer screen.

What Can Help Student Reading Comprehension?

There are many interventions that can help improve the reading comprehension of students that are reading below their grade level. This study is focusing on students who are reading on grade level but may not be consistently successful in showing their comprehension of these grade level texts. In the United States verbal literacy and the ability to read and to comprehend what is read are valued skills and often seen as an entree to personal success (MacDonald, 2008).

Advances in technology and communications in recent decades have opened doors for teachers and students to create learning opportunities not available in prior generations. Understanding how to effectively and appropriately apply these tools in the learning environment is critical to providing state of the art educational opportunities for all students (MacDonald, 2008).

Finding the strategy or method that works for a student may take some time, students may need to try multiple strategies before they find something that works for them. Using and incorporating technology into daily classroom lessons and activities is something that will continue to be utilized and will become more prevalent as technology in schools increase. Technology use has tremendous power to help students obtain, organize, manipulate, and display information in real-time (MacDonald, 2008).

Instruction developed and presented based upon sound instructional strategies, couched in the philosophy that learners learn with technology and not from technology will help to advance learning mediated by technology (MacDonald, 2008). It is therefore conceivable that a richer experience in the learning process could take the reader into a concrete experience (doing) mode instead of the reflective (observation) mode. Such enhancement of print material is available through digital links embedded in traditional print (Damon, 2014).

The Effect of Screen vs. Print Regarding Reading Comprehension

Determining if there is a relationship between comprehension and reading modality is the focus of this study. Reading comprehension in general remains a current interest for researchers because reading achievement in the United States is falling short of the goals set by Congress in the reauthorization of the Elementary and Secondary Education Act, more commonly known as the No Child Left Behind Act (U.S. Department of Education, 2012). Reading is important not only to students' success in school but is also critical to success throughout their careers and adult lives (Agee & Altarriba, 2009).

Technology, in the form of e-books, is now being explored to see if it can make the necessary improvement in reading achievement. Part of the solution to improving reading comprehension is to get students to read more (Stevens, 2014). According to various studies and various results, the difference between reading a text in print and online is still unclear. Several researchers found no difference in reading comprehension between the two types of books in two different studies (Wright, S., Fugett, A., & Caputa, F. (2013); Proctor, C. P., Dalton, B., & Grisham, D. L. (2007)). One example found no difference in reading comprehension with 30 struggling fourth graders from two California classes (Proctor et al., 2007). The baseline data was taken using a Gates-MacGinitie reading test. Then, these students read eight different online

texts. However, there was no growth shown on the posttest using a Gates-MacGinitie reading test again.

Another study investigated the effects of multimedia story reading and questioning on preschoolers' vocabulary learning, story comprehension and reading engagement. The participants were randomly assigned to one of four conditions: multimedia story reading, multimedia story reading with questioning, paper story reading, and paper story reading with questioning. Each participant had two reading sessions. All the reading sessions were video-taped for engagement analysis. At the end of the second reading session, children took a target vocabulary test and a comprehension test. The results showed a significant main effect for condition on target vocabulary scores and engagement level, but not on comprehension scores (Zhou, 2014).

Previous research has demonstrated that traditional story reading benefits children's literacy development in vocabulary learning, reading comprehension, and engagement. More recently, advancement in technology, particularly touch-based devices, such as the iPad, has proliferated multimedia stories in the early literacy environment (Zhou, 2014).

In a different study, a group of students with autism, consisting of 30 students from sixth grade to 22 years of age, were asked to read two e-books and two print books (Price, 2011). All of the students did significantly better statistically or scored 100% on reading comprehension tests with e-books. The middle school students improved 21% on average. The high school students improved 25% on average. The post-high school students improved 21% on average. The students also reported that they preferred e-books with sounds and pictures instead of print alone. These examples all support the premise that using what students prefer helps them

perform better (Price, 2011). What students often prefer over traditional print materials is using technology in the classroom (E-Reading comprehension Versus).

Learning Styles and Reading Comprehension

Different students learn to their best ability in different ways. Some students are visual learners and need to see visual representations of what they are learning. Some students are kinesthetic learners and need to add movement to their new learning in order to remember and connect their thinking. Giving students a choice in their reading modality can help them learn in a way that works for them. Reading a text on a screen and reading a text in a book are similar but for some students, one style will be more beneficial than the other. Information simultaneously presented in both modalities (dual-modality input) seemed to benefit both types of learners, irrespective of differences in their preferred learning styles (Liu & Todd, 2014).

Despite the lack of unequivocal evidence to determine whether style-based instruction or dual-modality instruction leads to better outcomes, Other studies argued in favor of the latter, using the rationale that content presented in auditory and visual modalities simultaneously will necessarily appeal to both auditory and visual learners (Liu & Todd, 2014).

Summary

Reading comprehension is a critical skill in a student's school life and everyday life. Reading comprehension is the main reason we have children read a text and it's the reason students choose to read a text on their own. The link between reading comprehension scores and reading modality is unclear. Some studies have found that reading on a screen is not beneficial to students and others have found that reading on a screen is helpful for students. Giving students a choice in reading modality may change the results of these studies. More research is needed on

this subject to fully understand if there is a correlation between comprehension and reading modality.

CHAPTER III

METHODS

The purpose of this study was to determine if giving students the choice of reading modality would have an impact on their comprehension of an assigned text. The students are on grade level in reading and are reading grade level texts. The comprehension of students was assessed using a quiz that included multiple choice and short answer comprehension questions.

Design

This study employed a pre-experimental one-group, three conditions design with a convenience sample of a group of fifth graders. The students were instructed during three weeks of reading class. Each week students received the same quality of instruction, the only difference was the reading modality, print or computer screen, of the given text. Each week students read a different non-fiction Storyworks article that had an on-grade Lexile for fifth grade (830-1010). The independent variable was the text assignment condition- teacher assigned computer, teacher assigned print and student choice. The dependent variable was the students' performance on the assigned Storyworks comprehension check at the end of the week. The comprehension quizzes at the end of each week were pre-designed by Storyworks, eight multiple choice and two short answer, but this researcher created one other short answer question to add to each quiz.

Participants

The participants of this study were fifth grade students from an elementary school in a suburban city in the mid-Atlantic region. The socioeconomic status of most of these families would be classified as middle to upper-middle class. These students were grouped into a reading class at the beginning of the school year based on their fourth grade PARCC scores, fourth grade Lexile scores, fourth grade reading classes, as well as teacher recommendations. These students

were all reading on grade level. The experimental group consisted of twenty-seven students, ten females and seventeen males. Twenty-five students were Caucasian, one student was Asian, and one student was Hispanic.

Instrument

All three of the instruments used in this study were created by Storyworks, and they included eight multiple choice questions and two short answer questions that were worth three points each. This researcher created one short answer question to add to each of the quizzes that would also be worth three points. Each quiz was worth a total of 17 points and this researcher used a rubric to score each of the short answer questions. Each week the quiz was completed on paper. Each multiple-choice question was worth one point each for a total of eight points. Each short answer question was worth three points: one point for an accurate and complete claim, one point for appropriate text evidence, and one point for reasoning that links the evidence to the claim, for a total of nine points. Students had one whole class period, sixty minutes, to complete the comprehension quiz. Students had access to the text while they were taking the quiz.

Procedure

Each week, students were introduced to the new Storyworks text. Storyworks is a magazine that is produced monthly by Scholastic that features various kinds of text. Each of the three texts that were used during this study were the non-fiction article in a Storyworks magazine. Each text was within the 5^{th} grade Lexile range of 830-1010. Text #1 had a Lexile level of 850, text #2 had a Lexile level of 860, and text #3 had a Lexile level of 890.

The first time students read each text, it was as a class with the teacher stopping to clarify new, unknown, or important information. The second time the students read the text, it was independently. Each week, the class worked with the selected text for four days before taking the

comprehension quiz on Friday. Each week students reread the text every day (4 times total) to complete various comprehension activities. On Friday, students took a comprehension quiz to answer multiple choice and short answer questions; they were allowed access to the text during the comprehension quiz.

Week one, students were given a paper copy of the Storyworks magazine. Students used the paper copy of the text all week when rereading and working on comprehension assignments. Students were allowed to write on, highlight and use sticky notes on the paper copy of the text. The text during week one was a nonfiction article called *The Pigeon Hero of World War One.* This story was about carrier pigeons, but more specifically a pigeon named Cher Ami that carried an important message to save American soldiers during World War One. During week two, students were assigned the Storyworks text on the computer and used the computer all week. The computer text is a bit more interactive than the paper text. It has highlight, draw and sticky note just like the paper text, but it also allows the students to zoom in and zoom out of the text. The zoom feature is the only "tool" that was different from the paper copy of the text. The text for week two was called *Our World Turned to Water* and was a nonfiction story about the devastating 2016 floods in Baton Rouge, Louisiana. The text told the story of people who survived the flood, how they overcame the disaster, and how they helped others in need. Week three, students could choose which modality they wanted to use for that week, but they had to use the same modality the whole week, they couldn't choose paper text on Monday and then switch to the computer text on Tuesday. On Monday morning, this researcher called the students' names in alphabetical/numerical order and they told the researcher which modality they were choosing, so it was not an anonymous choice. Twelve students chose the magazine/paper copy for the week and fifteen students chose the computer text. The text for week three was called *The*

Search for Pirate Gold and was a nonfiction story about a man who grew up hearing stories of pirates and treasure off the Cape Cod coast. When he grew up, he hired a team to search the waters for the missing treasure and eventually found it.

A one-way repeated measures ANOVA was conducted to compare the effect of text assignment on reading comprehension in teacher assigned print, teacher assigned computer, and student choice conditions.

CHAPTER IV

RESULTS

The primary purpose of this study was to see if giving students a choice in reading modality would improve their reading comprehension scores. Students were assigned a print text for one week and a different computer text another week. Students could then choose which modality they would use for the third week. Each week, students were given a comprehension quiz with multiple choice and short answer questions to assess their comprehension of the text.

The comprehension scores from teacher assigned print (Mean = 14.67, SD = 1.36), teacher assigned computer (Mean = 14.44, SD = 1.83), and student choice conditions (Mean = 15.11, SD = 1.67) were compared by a repeated measures ANOVA. Please see Table 1 for descriptive statistics. There was not a statistically significant effect for mode of text assignment [F (2, 52) = 1.89, p = .16]. Please see Table 2 for repeated ANOVA results. Consequently, the null hypothesis that there will be no significant differences in reading comprehension under three different text assignment conditions—teacher assigned computer, teacher assigned print, and student choice was retained.

Table 1. *Descriptive Statistics for Comprehension Scores by Text Assignment Conditions*

Condition	Mean	Standard Deviation
Teacher Assigned Paper Text	14.67	1.36
Teacher Assigned Computer Text	14.44	1.83
Student Choice- Paper or Computer Text	15.11	1.67

n = 27

Table 2. *Results of Repeated Measures ANOVA for Mode of Text Assignment Within-Subjects Effects*

Source	SS	df	Mean Square	F
Text Assignment	6.22	2	3.11	1.89 (NS)
Error	85.78	52	1.65	

NS = non-significant at $p \leq .05$

CHAPTER V

DISCUSSION

The primary purpose of this study was to see if giving students a choice in reading modality would improve their reading comprehension scores. Students were assigned a print text for one week, and a different computer text another week. Students chose which modality they would use for the third week. At the end of each week, students were given a comprehension quiz with multiple choice and short answer questions to assess their comprehension of the text. Students were able to use the text to answer these comprehension questions. This researcher focused on a class of twenty-seven on grade level fifth grade students and found the null hypothesis that there will be no significant differences in reading comprehension under three different text assignment conditions—teacher assigned computer, teacher assigned print, and student choice was retained.

Implications of the Results

When analyzing the results of this study, there is no statistical evidence or data to support that print text is better or worse for comprehension than computer text and there is no statistical evidence to support that giving students a choice in their reading modality has an effect on their reading comprehension. When the students used each modality in reading, this researcher noted observations about student behavior and student engagement. In week one, students were instructed to read a paper copy of a text; this researcher noticed that students did not seem very excited about reading the text since paper text is what they are used to reading each week. Students read the text but were not eager to go back into the text to find evidence to answer questions. In week two, when students were told that they would read the text on their computers, they were visibly excited and were anxious to start working. Students then seemed

more engaged in the story throughout the week because they were able to read on their computers, they were more willing to go back into the computer text to find the answers to questions. It is reasonable to infer that after using computer text for a few weeks in reading class, students may not be as excited to read on the computer since it would become commonplace in the classroom. It is also reasonable to infer that giving students a different stimulus, like the computer text, will help to improve student engagement.

When students were given a choice of reading modality, students took a few minutes to determine which modality would work best for them. This researcher can infer that students did not make a random choice, but a calculated one. Students were excited to share their choice when asked if they were going to read the print text or the computer text for the week. Students were not able to change their choice, so they knew they had to think hard about their decision. It is fair to infer that it is important for teachers to give students opportunities to make choices in their learning throughout the year.

Theoretical Consequences

A theoretical implication of this study may be that allowing students to use a computer-based text can give them access to more tools and resources to create a richer learning experience. The online version of the Storyworks text included a highlighter, zoom in and out button, pen, and note feature. While students had access to a highlighter, notepad, and pen while reading the print text, these online tools are used a bit differently than regular pens, highlighters and notepads. Instruction developed and presented based upon sound instructional strategies, couched in the philosophy that learners learn with technology and not from technology will help to advance learning mediated by technology (MacDonald, 2008). It is therefore conceivable that a richer experience in the learning process could take the reader into a concrete experience

(doing) mode instead of the reflective (observation) mode. Such enhancement of print material is available through digital links embedded in traditional print (Damon, 2014).

Although there was no significant difference in student performance when reading on a screen, in print or given a choice between the two, this researcher believes that giving students a choice in their reading modality increased their engagement and their willingness to go back into the text to gather evidence.

Threats to Validity

There were some threats to validity in this study. A convenience sample of 27 students was used in this study. Due to the relatively small sample size, the statistical power was limited, which made it difficult to detect difference in performance for different reading modalities. If an even larger sample of students was used, more valid results could have been achieved.

Another threat to internal validity was the texts that were chosen by this researcher. While this researcher worked to be sure the texts were all similar, they did range in Lexile level slightly. While all the texts were within the fifth grade Lexile level, they did range from 850-890. Each text was a non-fiction article, but they were about very different topics. The first text was about WWI carrier pigeons, the second text was about historic flooding in New Orleans, and the third text was about the search for pirate treasure in Cape Cod. The varying topics of each text may be a concern to validity due to student interest level in each text's topic.

In addition, another threat to internal validity was the way students chose their reading modality in week three. At the beginning of week three, this researcher went in alphabetical order and asked each student if they were choosing print text or computer text and the students responded out loud. While the students did take their time in deciding which modality they

would use, they did have to say their choice out loud. This means that students with names lower in the alphabet could have changed their choice once someone else made their decision.

Lastly, another threat to internal validity is that the class was instructed by the researcher and the assessments were scored by the researcher. This means that experimental bias is a possibility since this researcher was the only person who scored the assessments and worked with this group of students.

In addition, there were some threats to external validity. This study was conducted with a group of on grade level fifth graders. This researcher did not have a group of students on various grade levels to use as a comparison to the on-level group. Therefore, the results of this study cannot be generalized to other fifth grade students of various reading levels as well as middle school and high schoolers reading on grade level.

One last threat to external validity is the fact that the students in this study were not used to reading a text on the computer. The beginning of week two of this study was the first time this group of students were asked to read a text on the computer. The results of this study cannot be generalized to other classes that may have been working with computer texts throughout the entire school year.

Connections to Literature

The results of this study show that there are no significant differences in reading comprehension based on assigned reading modality or student choice of reading modality; however, students did seem to be more motivated to read and reread a story when they are given the choice in reading modality. Enriching and elevating reading comprehension and motivation levels of those placed in a developmental reading course may require educators to seek an alternate approach to teaching, such as including multimedia in the curriculum in order to

improve a student's reading comprehension and motivation level in the classroom (Rodrigues & Martins, 2008).

According to multiple studies and their varied results, the difference in student comprehension between reading a text in print and online is still uncertain. Several researchers found no difference in reading comprehension between the two types of books in two different studies (Wright et al., 2013; Proctor et al., 2007). One study investigated the effects of multimedia story reading and questioning on preschoolers' vocabulary learning, story comprehension and reading engagement. The participants were randomly assigned to one of four conditions: multimedia story reading, multimedia story reading with questioning, paper story reading, and paper story reading with questioning. Each participant had two reading sessions. All the reading sessions were video- taped for engagement analysis. At the end of the second reading session, children took a target vocabulary test and a comprehension test. The results showed a significant main effect for condition on target vocabulary scores and engagement level, but not on comprehension scores

The results of the current study in conjunction with the above referenced research suggests that student reading comprehension is not differentially impacted by screen versus print text.

Implications for Future Research

With technology becoming so prevalent in the personal and school lives of students, further research should be done to further investigate if differences in modality impact reading comprehension. It would be beneficial to select a larger sample of students with varying levels of reading ability. Future research might use students from different populations and backgrounds to see if print vs screen text is beneficial to students of other demographics. It would also be

beneficial to complete a study like this over a longer period, this would give students the opportunity to become familiar with each type of reading modality. Lastly, a researcher might want to consider using fiction stories instead of non-fiction texts.

There should also be further research done to see if giving students a choice in reading modality can increase student comprehension of a text. Researchers might want students to make their choice of print or text known privately instead of sharing their choices. Researchers could also use various assessments throughout the week to measure comprehension instead of one assessment at the end of the week.

In addition, further research should be done regarding student motivation and reading comprehension. This study only focused on comprehension and did not measure student motivation in relation to reading modality, but this researcher noticed that giving students a choice did seem to increase their motivation. This researcher also observed that when students worked with a modality, the computer text, that was unfamiliar and new, student motivation seemed to increase. Since this study was conducted over a three-week period, researchers might also want to conduct longer studies to see if the data changes. If the study is conducted over a longer time period, student motivation could shift since the impact of increased motivation is not always immediate. If students had a high level of motivation over an extended period of time, they might be more likely to read in their spare time which could lead to improvement in reading comprehension.

Summary

The purpose of this study was to see if there was a difference in reading comprehension when students read three different texts in print, on a computer screen, or given the choice between the two. Although there was no significant difference in student scores between the

three variables, teachers may want to consider the fact that this researcher noticed an increase in student engagement when students were given a choice in which modality to use. With technology becoming more common in the classroom, and the fact that students have different learning styles, it is important to give children access to technology whenever possible. Comprehension is a vital skill in a person's life, so educators need to be prepared to use an assortment of teaching and learning techniques to ensure all students succeed.

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