

The Impact of Instructional Technology on the
Reading Achievement of High School Students

by

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Abstract

The purpose of this study was to determine if instructional technology has an impact on ninth grade students' reading achievement. There were two groups of students, both of which included students with IEP's and 504 plans, that participated in the study. This study used a pretest to determine that the groups did not differ in reading achievement prior to experiment. The groups read and annotated a short story either through technology (n = 20) or by pencil and paper (n = 16). Reading achievement was evaluated through a post assessment that involved multiple choice questions and a literary analysis essay about the story. The mean reading comprehension scores did not differ significantly between students that used a technology format (Mean = 78.00, SD = 13.12) and those that used a paper format (Mean = 73.50, SD = 12.93) [$t(31) = .99$, $p = .33$]. Consequently, the results of this study determined that there was no significant difference in achievement when students used instructional technology. Observational data, however, suggested students were more engaged when using technology. Research in this area should continue as students are becoming more familiar with technology through their daily life.

CHAPTER I

INTRODUCTION

Overview

Reading is a vital aspect of school child's life to prepare for life-long learning. In order for students to comprehend the material they are reading, students need to be motivated to read which then allows them to achieve success in academics. Reading comprehension allows the individual to relate, connect, learn and grow from the material. Teachers may be able to enhance these connections through strategies that allow students to have increased reading comprehension and reading motivation in and outside of the classroom through instructional technology.

Law, Niederhauser, Christensen and Shear (2016) state that "integrating the use of digital technology into the learning and teaching process to improve the quality of learning outcomes has become an important strategy for improving educational quality" (p. 73). Teachers can see the impact that technology has on learning through devices such as smart phones, tablets, laptops, and audio books. Students are more likely to become successful in reading comprehension when they are interested, motivated and engaged in the reading through technology. According to Ciampa's research, students who were not intrinsically motivated through print text, seemed to be more motivated when technology was involved: "They always looked forward to working on the computer during the reading sessions" (Ciampa, 2012, p. 12).

This researcher is a Secondary English teacher at a school with a significantly low income population, as indicated by its status as a Title I feeder school. Many of her students struggle with reading achievement and have low motivation. Although most of her students have

phones, they do not have regular access to other technological devices that are more typically used to promote learning, such as laptops.

This researcher has noticed that the students who have access to technological resources tend to have higher academic achievement than those who do not. This is evident through the different incomes that the researcher's school encompasses: ranging from low-class to high-class based on parent income.

Based on these observations and the reports in the literature about the benefits of technology for increasing motivation and achievement, this researcher wanted to investigate the impact of technology on the reading achievement of her students. Having access to technology offers all students a way to increase reading comprehension and motivation which, if feasible from an economical and logistical standpoint, is an easy strategy for teachers to implement in classrooms. It is stated that the "medium has undergone considerable development since its inception in the 1980's and there has been significant advantages to switching from paper to hypertext" (Vernon, 2006, p. 417). If offering technology in the learning environment promotes reading achievement, it would be a simple strategy to apply for all students at any grade level.

Statement of Problem

The purpose of this study is to examine the impact of instructional technology on reading comprehension in 9th grade students at a high school that includes a significant number of students from low income families.

Hypothesis

The null hypothesis was that reading comprehension scores will not differ significantly between students who used technology to read, annotate, and answer questions about a story and students who completed these tasks on paper

Operational Definitions

Reading Comprehension: For purpose of this study, students were tested on their reading comprehension on a researcher designed end assessment on one short story through multiple choice questions involving inferring about characters, analyzing theme, and determining the purpose of reading along with a literary analysis essay discovering the effect of figurative language on the text.

Instructional Technology: Technology can include computers, and mobile devices to access the internet, email, social media, and video games (Siegel & Claydon, 2016). For the purpose of this study, students will be using laptops or tablets to read and annotate a given text.

Significant number of students with low income: The high school is a recipient of students from elementary and middle schools that have Title I status. Title I status reflects that a large proportion of the students received free or reduced lunch. Although the high school in the current study has many students from these lower income schools, it also has children that came from elementary and middle school that did not have Title I status.

CHAPTER II

Review of The Literature

This literature review discusses the effects of instructional technology on high school students in 9th grade and reading achievement and motivation. The first section of this literature review defines instructional technology and its positive effect on the classroom. In the second section, reading ability and motivation are defined along with how achievement and motivation are measured in the classroom. In the final section of this literature review, interventions for improving reading achievement and reading motivation are described through various forms of technology.

Definition of Instructional Technology in the Classroom

Instructional Technology can be generally defined as technology, such as computers, smart phones, tablets, audio books, etc that are used for educational purposes both in and out of the classroom. Today's students are very accustomed to the use of technology which can included computers, and mobile devices to access the internet, email, social media, and video games (Siegel & Claydon 2016). It is stated, "Integrating the use of digital technology into the learning and teaching process to improve the quality of learning outcomes has become an important strategy for improving educational quality and is often referred to as Technology-enhanced Learning and Teaching (TEL&T)" (Law, et al., 2016 p. 73). Throughout this philosophy on technology in the classroom, students are likely to be more engaged and achieve higher when they are using technology.

Since education has progressed over the course of time to fit the needs and requirements of all students, technology is becoming more looked for than ever before since countries are

preparing their youth for the future (Boardman, 2012). Instructional technology is a growing strategy in classrooms to help teacher instruction and student achievement. Over time, there has been a shift in educational practices that allow teachers and students to learn in our technology driven society. “In the 21st century, the definition of literacy has expanded from traditional notions of reading and writing to include the student’s ability to learn, comprehend, and interact with technology” (Ciampa, 2012, p. 5). Employers in today’s technology rich society force teachers to respond in a way that goes beyond content development by “creating a teaching-learning environment that promotes critical reflection and student engagement” (Siegel & Claydon, 2016, p.24).

Since technology is driving the 21st century, it is vital for teachers and students to be accustomed to the growing knowledge, ability and skills related to technology and education.

Reading Ability and Reading Motivation Measures

Reading ability is the achievement and success of students when compared to peers that are the same grade and age. Students are assessed throughout school using measures such as Scholastic Reading Inventory, a Lexile assessment. Students are tested through a series of fictional and nonfictional passages in which they are asked to answer questions. “The score from the test helps teachers place students in the correct educational path, adjust their teaching style to student needs, track students’ reading growth, and match readers to books that are appropriate for their reading skills” (Scholastic Reading Inventory, 2005, p. 3). The SRI test is a standardized test of reading achievement that can be administered to measure students progress in reading comprehension through a computer-adaptive instrument that includes questions which determine levels in both norm-referenced and criterion referenced terms, such as percentile ranks, grade equivalency scores, normal curve qualitative scores, and Lexile scores. The SRI can be

administrated throughout the school year and it takes approximately 20 minutes to complete. Students are asked to make inferences, draw conclusions, and exhibit vocabulary knowledge in content. According to Melekoglu (2011), the SRI test is an accurate descriptor for student reading level.

Reading motivation is intrinsic which is more difficult to measure. Reading motivation can be generally define by how engaged students are when they are reading and if they are interested in their reading. Actively engaging students in reading and reading tasks is an essential aspect for all student success in the classroom since reading motivation represents one of the key elements for engaging students (Law, et al., 2016). Students can be measured on their reading motivation through a survey to inform the researcher of their motivation for reading. Students can also be measured through informal and formal observations in the daily classroom when students are asked to read a text. Ciampa (2012) looked at the effect of technology on elementary aged students, she conducts a study where observations and surveys are used to illustrate student motivation which include directly observing on and off task behaviors during reading activities that demonstrate students levels of engagement. Along with the observations, Ciampa used an adapted version of “Motivation to Read Profile” survey in which students would answer questions about reading and technology. Based on these measures of reading motivation, one can discover student’s thoughts, feelings, and behaviors when given a reading task.

Through Ciampa’s study, it is stated that “children with lower motivation also usually exhibit poor reading skills and resist reading in the classroom” which is why interventions are a critical aspect of student’s educational lives and reading achievement (Ciampa, 2012, p.3).

Interventions for Improving Reading Achievement and Motivation Through Technology

Interventions are an important process in preventing early reading difficulties and reducing the achievement gap to ensure motivation for reading and consequently reading achievement (Ciampa, 2012). When examining an average low-income high school classroom, students are not motivated to read based on many factors: environment, lack of resources, little to no home support. When students are given resources such as technology in the school classroom, motivation increases since their interest in technology is ignited.

Some strategies that are being implemented in schools are self-monitoring, mental imagery, guided retelling, independent reading, and flipped classrooms. The whole domain of educational technology incorporates flipped classrooms that are being used to enhance instruction, digital journalism sites which support work with original sources, and e-portals used as the primary communication channels between home and school (Siegel & Claydon, 2016). “The use of technology may also make it possible to provide task variability, which can be beneficial to students’ motivation and learning” (Cueva, Russell, & Irving, 2012, p. 448). According to research, it was found that students displayed great motivation in high variability formats, showing more interest and exerting more effort and task persistence, which in turn translated to higher academic performance. With strategies in place that include instructional technology, students are more likely to be intrinsically motivated which leads to higher reading achievement.

Independent reading and choice are very important for students to increase their motivation and therefore achievement. According to Cuevas et al. (2012), students are proven to improve on their reading achievement when there is a variety of student-centered strategies as interventions such as offering computer based scaffolding tools that address vocabulary, prior

knowledge, inferencing and predicting, and cognitive and metacognitive strategies. With these tools being implemented as an intervention, the result was that it increased learner control, student engagement and reading motivation. Independent reading and choice allows students to choose their own text based off of their interests which adds to their motivation along with the technology student centered strategies which help reading achievement.

Along with independent reading, eBooks have also been proved to help low achieving readers with their motivation and ultimately their achievement. Ciampa (2012) studied that “eBooks contribute to children’s early reading development, further research documenting student’s experiences with, attitudes toward, and their motivation for reading these digital texts in early primary grades are warranted” (p. 3). Studies suggest that children need to have technology applied in the early grades to improve achievement later in life. Technology motivates students to explore the new literacies of the Internet. In order for Ciampa to conduct his study, she surveyed students to determine their motivational level along with formally observing their on and off task behaviors during reading instruction before the intervention was enforced. It was concluded that “this study contributes to the growing evidence base on the positive motivational effects of computer-assisted reading instruction on students” (p. 17).

EBooks and eReaders are used through a variety of classroom types including one with students with disabilities. According to Camardese, Morelli, Peled, and Kirkpatrick (2014) instructional technology through EReaders can be as simple as changing or increasing the font which has shown to help students with intellectual disabilities to perform better on reading assessments. These resources and opportunities to implement technology in the classroom allows for new possibilities for teachers who are working with students with disabilities.

Similarly, Parenti (2016) states “the idea behind using technology as a resource for collecting images to encourage self-monitoring and comprehension houses a few key aspects of motivation” (p. 3). When implementing self-monitoring through technology, it allows the students to gain autonomy which enables all students to gain background, real-world and actual images of how the items appear in reading. Interactions with technology allow students to access resources that might not have been available before which also enables students to make personal connects which improves comprehension.

“By using this technological support in education, students can then have options to tailor learning experiences to their preferred mode of learning; thus, motivating themselves to continue to learn” (Boeglin-Quintana & Donovan, 2013, p. 50). Through research and studies, technology is a tool that is used by teachers to increase motivation for students and once a student is engaged in the activity there are more likely to participate and achieve.

Through the use of intervention and technology, students have more options for their learning that matches their preferences and peaks their interests.

Summary

Instructional technology has been applied to many classrooms throughout the 21st century since students have a high interest in computers. Instructional technology can be apparent through many forms of classroom instruction such as computers, eBooks, mobile devices, etc. Technology has been described in research studies that demonstrate the effect of technology on student reading motivation and achievement level. Student reading motivational level can be measured through informal and formal observations as well as student surveys. Consequently, student achievement, measured through the SRI assessment, can change when technology is

enforced in and outside of the classroom. Numerous intervention methods have been suggested which have the potential to produce positive results in regard to reading motivation and achievement through technology such as mental imaging, self- monitoring, and independent reading choice.

CHAPTER III

METHODS

The purpose of this study was to examine the impact of instructional technology on reading comprehension in 9th grade students at a low-income school. Students level of comprehension was measured by their performance on an end of unit exam which included high-level multiple-choice questions and a written essay.

Design

This study was a quasi-experimental, nonequivalent control group design. Two classes of ninth grade students were purposively selected to be in this study due to their low reading achievement. The two pre-existing classes were randomly assigned to conditions. Scores from a benchmark assessment taken prior to the intervention were used. This assessment was the same for both groups, and it was given in the same format. The benchmark assessment is to evaluate whether groups varied significantly from each other in reading comprehension skills prior to the intervention. Although the outcome variable was designed to be similar to the benchmark assessment, they were not the same tests so it was not a true pre-test/post-test design.

The independent variable was the method in which the students read, annotated, and answered questions about a text—either through technology or on paper. The dependent variable was performance on a teacher made test that students completed after reading and annotating a story either through technology or on paper. The hypothesis was tested by comparing post-test scores.

Participants

The participants in this study were ninth grade students in a Title I feeder school. These students are diverse in race, ethnicity, gender and age.

These subjects were enrolled in this school from September and were placed into one of the lower level classes based on previous test scores, Lexile scores, and IEP needs. Students were low accomplished readers that typically fall below grade level according to the SRI Performance Series test scores.

There were 20 students in the technology group and 16 students in the paper group. In the technology group, there were five females and 15 males. Two of these students were repeating the ninth grade. In the paper group, there were seven females and nine males. One of these students was repeating the ninth grade. Throughout these students, there are 20 students with IEP's or 504 plans in which students need reading and writing services.

Instrument

Students read a short story that is provided from the Houghton Mifflin Harcourt "Collections" (Beers, Hougen, McBride, Palmer & Stack, 2015) textbook either online or in print. The researcher modeled the reading assessment from state exam type questions, such as PARCC, and the textbook. There were 10 multiple choice questions that included content such as theme, characterization, plot development, and writing style which had to be supported with textual evidence from the given story. These questions are asked in two parts: Part A receives one point, Part B receives one point to support with textual evidence. After the multiple choice, students were asked to write an essay in which they discuss the effects of the author's use of figurative language on the theme of the story.

Although the instrument was not a PARCC test, it was scored using a PARCC rubric that assigns scores of zero, one, two, three, or four based on reading comprehension and writing expression. Students receive higher scores for in-depth analysis, full comprehension of ideas, clear reasoning with the most accurate textual evidence, including all components of an essay and demonstrating clear and efficient organization.

The multiple choice questions are worth 2 points each (for both parts) for a total value of 20 points. The essay is worth 80 points.

Procedure

The researcher and a special educator were co-teachers in both classrooms and instructional activities were the same in both classrooms. The two instructors collaboratively planned the guided instruction, independent work, reading selection, and final assessment. Throughout the course of the experiment, lessons were provided to both groups involving reading comprehension and writing. All students were being taught from the English Language Arts Common Core Standards through the same direct instructional approaches.

Students have been exposed to annotation through a poetry unit, but they were not exposed to short stories. Each group received the same short story and the same assessment questions; however, the only difference between the two groups was that the experimental group used technology in the form of reading, answering comprehension and support questions, as well as writing the essay on a laptop while the control group used paper and pencil. The short story provided was “The Prisoner Who Wore Glasses” by Bessie Head (Allen, 2012). The instructors gave a brief summary of the concept of apartheid in South Africa along with a synopsis on why the author wrote the text. The students were provided with instruction to pay attention to the two

main characters and their relationship along with the setting and how these writing techniques contribute to theme in order to prepare them for the final assessment.

Students read the short story independently either on the laptop or in print depending on the group. Students were able to use tools such as highlighting and annotating through both forums. Throughout the course of three 90-minute class periods, students were able to finish reading, annotating, answering questions and writing an essay which illustrated their reading comprehension and analytical skills.

The assessments were scored according to the rubric which provided the researcher with a reading comprehension score with a possible range of X out of 100 points. The reading comprehension scores were compared by an independent samples t-test.

CHAPTER IV

The purpose of this study is to examine the impact of instructional technology on reading comprehension and achievement in 9th grade students at a low-income school. The two classes that were examined include students with low reading achievement. One class completed a unit assessment, involving high-level multiple-choice questions and a written essay, using technology while the other group used a paper format.

An independent sample t-test was conducted with the independent variable being the method in which the students read, annotated, and answered questions about a text—either through technology or on paper. The dependent variable was performance on a teacher made test that students completed after reading and annotating a story either through technology or on paper. The mean reading comprehension scores did not differ significantly between students that used a technology format (Mean = 78.00, SD = 13.12) and those that used a paper format (Mean = 73.50, SD = 12.93) [$t(31) = .99, p = .33$]. (See Table 1). Consequently, the null hypothesis that reading comprehension scores will not differ significantly between students who used technology to read, annotate, and answer questions about a story and students who completed these tasks on paper was retained.

Table 1.

Means, Standard Deviations, and t-statistic for Reading Comprehension scores under Technology and Paper Conditions

Condition	N	Mean	SD	t-statistic
Technology	17	78.00	13.12	.99 (NS)
Paper	16	73.50	12.93	

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

CHAPTER V

DISCUSSION

The purpose of this study was to determine if instructional technology had an impact on reading achievement and motivation for ninth graders. Their performance was measured by a pre and post test with similar text-based questions. It was determined that there was no significant difference in performance when students used technology. The null hypothesis that reading comprehension scores will not differ significantly between students who used technology to read, annotate, and answer questions about a story and students who completed these tasks on paper failed to be rejected.

Implications of the Study

When reviewing the results of the analysis of the null hypothesis, there was no evidence to suggest that providing students with instructional technology is an effective strategy to use in order to increase reading achievement. The results of the post assessment do not justify using technology for reading achievement over paper and pencil texts. If just considering the students' performance on the unit tests, this study did not demonstrate that instructional technology affected the students' performance.

Through the researcher's observations, however, it can be noted that students enjoyed the technology more and, based on their on-task behaviors. When looking at the group with instructional technology (laptops) the students were more focused on their work, less talkative with other students, and using reading strategies such as highlighting, paraphrasing and asking questions. Overall, students seemed more interested in using technology rather than paper and pencil.

Based on the results of the observation of the researcher, if schools and teachers have the ability and funds for technology students will be more engaged and willing to read. This could have a long-term effect on students since society is technology based and can help students better prepare for their future education. Nevertheless, the results of the study suggest that if the resources are not available, students will have the same achievement with a paper and pencil text. Consequently, the study does not justify a large expenditure to provide laptops to all students or to pay for electronic texts.

Theoretical Consequences

Observational data supports the theory that technology is more engaging and interesting to students for reading, even though the results of the study did not measure this outcome. The researched noted that the students were more motivated when they had technology rather than no technology. It appears that the students' motivation came intrinsically based on the technology which they use every day to support their reading engagement. However, no assessment results are available to prove this.

The observations suggested that students more engaged when using technology which relates to Law's theory: "Integrating the use of digital technology into the learning and teaching process to improve the quality of learning outcomes has become an important strategy for improving educational quality and is often referred to as Technology-enhanced Learning and Teaching (TEL&T)" (Law, et al., 2016 p. 73).

Threats to Validity

There are a couple threats to the study's validity that are worth discussion. One threat to the validity of the study is that both groups had a small sample size. When there is a small group

of students, the external validity decreases because a small sample may not be fully representative of people within the same age, ability level, and grade level.

A threat to the internal validity is the attendance rate of the students in the study. There are many students that have been suspended, moved, or did not complete the assignment due to their lack of attendance in class. These students were dropped from the study, which creates a mortality threat, which is a type of internal validity concern.

There were issues related to poor attendance even for students who remained in the study. This provides a clear threat because if students were in class the majority of the time, the familiarity of technology would be greater.

Another validity concern is that some students were not familiar with the applications of the technology resources that were presented to them. This could have caused them to not try as hard. To the extent that lack of effort related to unfamiliarity with the technology resources impacted the performance on the unit test, it is a threat to external validity. The limitations of generalizability of the results to students with limited experience with the technology is a threat to external validity.

Although there was a generated rubric, there could be unintended biased scoring for the written response given on both the pre and post assessment because the researcher was aware of which students were in which groups. This is a potential threat to internal validity.

For students of different age, ability and resources, the effects of this intervention may have differed. This limitation in generalizability is a threat to internal validity.

The end of assessment unit test involved an essay in which the student quality of writing had some impact on the score. Consequently, it was not purely a measure of reading

comprehension so the results cannot be generalized as being a pure measure of reading comprehension. This can cause a threat to external validity.

Connection to Previous Studies and Existing Literature

The results of this study indicate that there is no significant difference in reading achievement through the use of instructional technology. Observational data, however, suggested that the students using technology were more motivated. Consequently, the current study was partially consistent with findings of Cueva et al. (2012). According to their research, “The use of technology may also make it possible to provide task variability, which can be beneficial to students’ motivation and learning” (p. 448). It was also discovered through Ciampa that, “[the] study contributes to the growing evidence base on the positive motivational effects of computer-assisted reading instruction on students” (Ciampa, 2012, p. 17).

Implications for Future Research

Based upon the results of this study, it is recommended for future research to continue to consider the impact instructional technology has on reading achievement and motivation. It is recommended to use a bigger sample size with a broader range of reading ability so that the results can be generalized to more people.

Future research could also use different measures of achievement. The unit test may not have been sensitive to the effects of technology.

The possible long-term effects of technology would have to be further researched. Researchers would focus more on the consistency of technology with their classes and provide more opportunities for students to choose if they are more comfortable with laptops or paper and pencil.

Researchers might also consider measuring motivation through student-interest surveys rather than just observational measures. The outcome of the surveys may vary from the results of this study.

Conclusion/Summary

The study did not provide enough evidence to prove that instructional technology improved reading achievement after the post assessment given by the researcher to ninth grade students with low reading ability. However, the observational data collected by the researcher suggests that students were more engaged through the learning process when given technology. The study raises questions for further research that would explicitly measure student motivation and the long-term effects on the consistent use of technology in the classroom. Since the study did not indicate that technology made a difference in the reading achievement of students, teachers could either use technology or paper-based tests to assess students reading.

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