

**The Effect of Three Reading Comprehension Strategies on Reading Comprehension  
when Reading Digital Informational Texts**

by

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### **Abstract**

This study explored the effects of three reading comprehension strategies: Cloze Reading Comprehension Activity, Reading Road Map (RRM), and Survey-Question-Read-Recite-Review (SQRRR) on reading comprehension when reading digital informational texts. The participants were 48 students in either 7th or 8th grade with 36 or 75% of those students having a reading comprehension ability at or above their grade level as measured by Scholastic Reading Inventory software. A one-way analysis of variance (ANOVA) of the reading comprehension ability of the three groups of participants as measured by Scholastic Reading Inventory software suggested there were no statistically significant differences in the means of the reading comprehension ability of the three groups. A non-equivalent groups pretest/post-test comparison group design was employed that examined the three treatments. The primary analysis evaluated treatment effects by conducting a one-way analysis of covariance (ANCOVA). Results suggested that the 3 reading comprehension strategies in this study have the same effect on reading comprehension when digital informational texts are read.

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## **Chapter I: Introduction**

### **Introduction**

Today there is an ongoing transition from print based texts to multimodal digital texts which can be read and interacted with using a variety of devices such as computers, laptops, tablets, Chromebooks, phones and iPods. This trend is also mirrored in education. At first colleges and then high schools incorporated digital informational texts within instruction. Now an increasing number of middle and even elementary schools are moving towards using digital informational texts for instruction. Wisconsin Evangelical Lutheran Synod (WELS) schools are also following this trend of incorporating digital texts within instruction. This may be in the form of e-textbooks or through incorporating web-based research activities which require students to investigate and comprehend Internet-based digital informational texts.

### **Problem Statement**

While there is a push to embrace digital texts and leave print texts behind, this might not be in the best interest of students. The research shows the level of reading comprehension is mixed at best when students use digital expository or informational texts within instruction. Mangen, Walgermo, and Brønneick (2013) demonstrated that reading linear expository texts on a computer screen leads to poorer reading comprehension than reading the same text on paper. On the other hand, Aydemir, Öztürk, and Horzum (2013) shared that students reading informational text on a screen demonstrated higher comprehension than students reading from printed materials.

Coiro and Dobler (2007) proposed an area of concern regarding the use of digital texts in education. They claimed that not enough attention is being paid to how



adolescents develop and demonstrate the literacies needed to read and use online informational texts. If educators are not aware how students read and use digital informational texts, they will not be able to provide the type of instruction necessary to ensure a high level of comprehension when such texts are used.

WELS schools need to move forward in education incorporating the technology needed to support what has come to be known as a 21st century education (Kivunja, 2014, 2015; Koehler, et.al., 2011; Mishra, Koehler, & Henriksen, 2011). A 21st century education includes the four Cs of critical thinking, communication, collaboration, and creativity in addition to the three Rs of reading, writing, and arithmetic (21st Century Skills, 2009). WELS teachers need to understand and practice sound methods of reading instruction to ensure the maximum level of learning takes place through the use of digital informational texts.

### **Purpose of the Study**

Despite the widespread inclusion of digital informational texts within WELS schools, there is inconclusive evidence as to its effectiveness on learning. There is also minimal evidence as to what the best practices and methods are to ensure digital informational texts are used to promote the maximum amount of learning. This study explored three reading comprehension instructional methods to determine if their use by WELS educators had an effect on reading comprehension by students as they used digital informational texts.

### **Research Questions**

This study looked at three reading comprehension strategies: Cloze Reading Comprehension Activity, Reading Road Map, and Survey-Question-Read-Recite-Review and answered the following questions:

1. What effect will the Cloze Reading Comprehension Activity have on reading comprehension compared to two other methods when reading digital informational texts?
2. What effect will the Reading Road Map have on reading comprehension compared to two other methods when reading digital informational texts?
3. What effect will the Survey-Question-Read-Recite-Review have on reading comprehension compared to two other methods when reading digital informational texts?

### **Definition of Terms**

The following definitions are provided to ensure uniformity and understanding of these terms throughout the study.

**Cloze Reading Comprehension Activity.** This is a reading comprehension strategy in which the teacher provides a sheet of paper with passages from the text in which key vocabulary or content words are missing. Students fill in the missing words by themselves as they read through the text. This activity guides the students through the text and helps them focus on the content the instructor wishes the students to comprehend (Bormuth, 1968).

**Multimodal text.** Multimodal text includes the combination of two or more semiotic systems. These semiotic systems include print, images, icons, audio, and how these systems are organized within a space (Anstey & Bull, 2010).

**Reading Comprehension.** Reading comprehension refers to the process of simultaneously extracting and constructing meaning through interaction and involvement with written language (Snow, 2002).

**Reading Road Map.** This is a reading comprehension strategy where the teacher provides a written plan students follow by themselves at times and with a partner at other times as they read through an informational text and work on associated activities. (Wood, Lapp, Flood, & Taylor, 2008).

**Survey-Question-Read-Recite-Review.** This is a reading comprehension strategy where students independently scan through a chapter turning headings into questions, then answer those questions when reading. When done they recite the questions and answers, and afterwards they review the material they learned when reading the material (Robinson, 1978).

### **Assumptions and Limitations of the Study**

There were four assumptions made in this study. First, it was assumed that students would have access to their digital textbook for the entire duration of the study. The second assumption was that the reading comprehension methods being studied would be used correctly by the participating teacher. The third assumption was that students would answer pretest, post-test, and student survey questions in an honest and candid manner. The final assumption was that the pretest and post-test questions would be able to be read and understood by participants.

There were four limitations in applying this study's data to elementary schools that are different than the school involved in this study. First, this study used a sample of convenience and not a random sample; furthermore, subjects in this study were Caucasian, middle class, and came from one school in a Midwestern city. This means the results would not be generally applicable to a larger population. Second, this study utilized a pretest. This could have increased or decreased a subject's sensitivity or responsiveness to the experimental variable. Third, since one teacher was involved, his bias could have influenced how he presented the various reading comprehension strategies to the three groups. A fourth limitation would be the length of time between the pretest and post-test. This study took place over three weeks. Having the pretest and post-test closer together could have yielded more accurate results.

### **Overview**

The remainder of this paper explores what the literature had to say regarding reading digital texts and their comprehension, the methodology used in this study and the results of this study. Following that is a summary of the study along with conclusions and recommendations.

## **Chapter II: Literature Review**

### **Introduction**

Creating meaning from text is a key to learning (Dole, Duffy, Roehler, & Pearson, 1991). In today's world, there is an increasing amount of digital text students are expected to read in addition to the traditional print text they read. It is understood that there are preferences in the way students read and comprehend digital text compared to print text (Mangen, Walgermo, & Brønning, 2013). As a result of these preferences people usually identify with one of two groups. One group feels that print text on paper is superior to digital texts on screens. The other group believes digital text is better and will soon replace print texts. Many educators also find themselves in one of these two groups. Regardless of group affiliation, the concerns with how students read and comprehend digital text versus print text are still valid.

### **Reading Digital Texts**

One concern with reading digital texts is how the speed and accuracy when reading from screens affects reading comprehension. Other concerns focus on how the ability to navigate through and manipulate digital text, along with the non-tactile nature of digital text, affects reading comprehension. Studies that have explored these topics have led to conflicting results. In one study students who read informational text on a screen demonstrated higher comprehension than students who read from printed materials (Aydemir, Öztürk, and Horzum, 2013). While another study showed that students who read linear expository texts on a computer screen had poorer reading comprehension than their peers who read the same text on paper (Mangen, Walgermo, and Brønning, 2013). Additionally, it appears that the format of the digital text, either being long pages where students have to scroll to view the text, or single pages that appear and fill the screen after

a click on a link does not matter as students have shown they equally comprehend digital informational text when using either format (Şahin, 2011). These conflicting results might be because many studies used a single variable to identify an issue that affects screen readers, where in reality, there is more than one variable involved (Dillon, 1992). Since there are contradicting studies, there must be another variable or variables that are at work.

Even though the research is inconclusive in these specific cases, educators need to realize that there are other differences between reading print text and digital text and that reading comprehension is not necessarily determined by the format or the layout of the text on the screen. Walsh (2010) reminded us that, “Reading on screen involves various aspects of online processing that includes responding to animated icons, hypertext, sound effects, and the continuous pathways between and within screens for Internet and intranet” (p. 214). These additional features of digital text mentioned by Walsh are considered multimodal features since they are also used to make meaning. It is these other aspects of reading digital texts that educators also need to focus on if they are going to ensure their students can demonstrate they comprehend digital texts when read.

### **Student Interaction with Digital Text**

Today, we are living in an icon driven world that is filled with video and need to realize our students are no longer used to long paragraphs of text (P. Lee, personal communication, March 23, 2015). Many students spend more than two hours per day viewing screens where they watch videos, play games, and browse the web. They quickly scan text and other information as they browse online spending less time on a website than is necessary to actually read the text on the screen (Houghton, et. al., 2015;

Weinreich, Obendorf, Herder, & Mayer, 2008). Despite these changes in the way students view information, reading comprehension and literacy is just as important today as it was before the expansion of the Internet began in the early 1990s.

Other changes have taken place over the past few decades as technology and globalization helped reshape our economy while emigration has made America more culturally diverse. These changes require students to be highly skilled at comprehending text and masterful communicators as they work with others across cultural lines.

(McKinsey Global Institute Report, 2012). Yet, as students spend more time communicating with others through a variety of digital mediums and reading information on screens, the concerns explored by Dillon (1992) are still here; namely, what effect does reading digital text on a screen have on comprehension and how does the multimodal component of digital texts come into play?

### **Expanded Definition of Literacy**

Information today is shared and communicated more readily and in a variety of formats than in the past. Educators are aware of the changes in the format of information and its use and how those changes impact the area of literacy. As a result, they have modified and expanded the definition of literacy. The literacy model of the past, which focused on reading and writing and using those skills in life, has expanded to a multimodal literacy model where print-based texts, digital texts, multimedia texts, and spoken texts now make up the sphere of literacy. Their importance has also been noticed by state educational agencies which in turn have included them in current educational standards (Walsh, 2010; Minnesota Department of Education, 2010).

Educators know that students comprehend informational print text mainly through tapping their prior knowledge, conducting inferential reasoning, and employing self-regulation as they read (Paris & Paris, 2001; Armbruster, Lehr, & Osborn, 2001). If students become stuck understanding a concept they can make a prediction and keep reading the static text. This type of reading comprehension technique does not always happen on its own when a multimodal component is introduced to the text as is found in digital textbooks and online web pages. Students may end up getting physically lost as they click on hyperlinks searching for an answer to their prediction. This can in turn decrease their comprehension of the digital text (Coiro & Dobler, 2007). Digital texts, more than print texts, depend on the “design and representation of language and thus require a semiotic understanding on the part of the reader” (Rowse & Burke, 2009, p. 117). Therefore, it is not only important to read and interpret the text, but it is also important to interpret visual clues and master nuances of subtext all while following at times ideas in a non-linear way as the text is read (Rowse & Burke, 2009).

Realizing that the multimodal component of digital textbooks and web pages could lead some students to comprehend less when compared to reading printed text, some have worked to uncover the type of skills needed for comprehending digital texts. Newer techniques are needed because of the multimodal component of digital texts (Harris, 2011). Rather than inventing new techniques, it makes sense first to explore if print-based comprehension strategies are effective at promoting reading comprehension of multimodal text as Herold (2014) reports some educators, academics, and technology vendors are trying to figure out how to do.



### **Bridging Print and Digital Literacies**

Along this line of thinking some educational researchers are now promoting that teachers bridge print literacies and digital literacies using reading comprehension strategy guides. These strategy guides seek to promote student comprehension through a blend of print textbook content with related digital content. The *Reading Road Map* is one such example where students follow a written plan that guides them through a printed textbook while providing links to online activities (Wood, 2011). Other examples of reading comprehension guides developed for reading print text that have been shown to improve reading comprehension when print text is used include the *Cloze Reading Comprehension Activity* and the *Survey-Question-Read-Recite-Review Guide*. Both of these might also have an effect on reading comprehension of digital texts. With the increased use of digital textbooks, it is important that educators are able to find reading comprehension strategies that will help students better comprehend the multimodal digital informational text that is common within and outside of education today.

### **Summary**

Research has shown that there are differences when it comes to reading and comprehending digital text and print text. Aspects of reading digital text that are not a part of reading print text include video, animated icons, hypertext, and sound effects. These additional features of digital text are considered multimodal since they are also used to make meaning. To help students comprehend both digital and print texts it is suggested that educators use strategy guides to bridge the differences between reading print and digital text.

### **Chapter III: Methodology**

#### **Introduction**

Research has shown that people comprehend digital text differently than print text (Rowse & Burke, 2009). It has been suggested that educators use comprehension strategies to bridge the gap between how students read print and digital text to help them better comprehend what they are reading (Wood, 2011). This non-equivalent groups pretest/post-test comparison group study explored three reading comprehension strategies to determine what effect they might have on reading comprehension when students read digital informational texts. This chapter looks at subject selection and demographics, instrumentation, data collection procedures, data analysis, and limitations.

#### **Research Questions**

1. What effect will the Cloze Reading Comprehension Activity have on reading comprehension compared to two other methods when reading digital informational texts?
2. What effect will the Reading Road Map have on reading comprehension compared to two other methods when reading digital informational texts?
3. What effect will the Survey-Question-Read-Recite-Review have on reading comprehension compared to two other methods when reading digital informational texts?

#### **Research Design and Procedures**

This study followed a non-equivalent groups pretest/post-test comparison group design and examined three treatments. The study began in mid-January 2016 and ended in early February 2016. Data was gathered via a pretest and post-test and was used to answer the three research questions (see Appendices C and D). Data was also gathered

after the post-test using a Likert-type survey (see Appendix E). This survey helped determine student attitudes and beliefs regarding the method of reading comprehension instruction they used in this study.

Prior to the start of the 2015-2016 school year the school's 7th and 8th-grade history teacher was contacted and asked if he, along with his students, would be interested in being a part of this research study. He agreed to participate along with the students in the three sections of history that he teaches. Since he is also the school's principal he gave written approval to the researcher to allow this study to take place in his school. Written permission was then received from the parents of his students (see Appendices A and B). This included permission for 52 out of a possible 53 students with one parent declining to have their child participate. Adjustments were made to accommodate the one student not participating in the study.

From December 2015 to January 2016 the 7th and 8th-grade history teacher was instructed in three separate sessions in how to use the Reading Road Map and Survey-Question-Read-Recite-Review methods of reading comprehension. Each session lasted roughly 25 minutes. The history teacher did not require instruction in the Cloze method as that was the method he regularly used when teaching his history classes. He demonstrated to the researcher how he used the Cloze method. During the study the researcher observed the principal's class when he used the Cloze method and found the Cloze activity sheets and his use of them consistent with the Cloze method as defined in this study.

To preserve anonymity as data was reported, students in each of the three classrooms were assigned numbers as identifiers. On the agreed upon day, a pretest (see

Appendix C) was given to 51 students by the history teacher. One student was absent. The researcher then collected the pretests and tabulated the results. Over the following 28 calendar days the history teacher taught two chapters of course material using the digital Discovery Education Techbook, *World Geography and Culture*, in 12 lessons following the schedule of three lessons per week. He used a different reading comprehension strategy for each of the three classrooms of students when assigning digital textbook readings. In one classroom students followed a Reading Road Map and wrote down answers to questions included in the RRM document. In a second classroom students created their own questions from reading headings in the digital textbook then read to answer those questions using the SQRRR method. In the third classroom students filled in blanks on a Cloze worksheet as they read the digital textbook.

After the history teacher concluded his final lesson, the post-test (see Appendix D) was given on the same day to a total of 48 students in three classrooms. Three students were absent on the date of the post-test. The researcher then collected the tests and tabulated the results, excluding data from four students who did not take both the pretest and post-test.

### **Population and Sample**

All participants in this study attend the same Wisconsin Evangelical Lutheran Synod (WELS) elementary school in a Midwestern city that has a population of roughly 13,000. The elementary school serves predominantly white middle class families and has a total enrollment of 324 students from prekindergarten to eighth grade. The students in this study were distributed across three mixed-gender and mixed-grade 7th and 8th-grade

classrooms. Within the three 7th and 8th-grade classrooms eight students or 15% qualify for free or reduced price lunches.

This study explored three different treatments which required three groups. These three groups were chosen using three existing 7th and 8th-grade classrooms. Each group was randomly assigned one of three treatments. See Table 1 which lists the distribution of the number of boys and girls in each sample as well as how many are in each grade level. The first sample included 16 students in the 7th and 8th grades. The second sample included 17 students in the 7th and 8th grades. The third sample included 15 students in the 7th and 8th grades.

Table 1.

*Distribution of Subjects among the Sample Groups*

	Sample 1 RRM Group	Sample 2 SQRRR Group	Sample 3 Cloze Group
Boys Grade 7	2	3	3
Boys Grade 8	5	6	6
Boys Total	7	9	9
Girls Grade 7	6	4	3
Girls Grade 8	3	4	3
Girls Total	9	8	6

*Note.* RRM = Reading Road Map. SQRRR = Survey Question Read Recite Review.

The reading comprehension ability of participating students as measured by Scholastic software was provided by the participating school. A review of this showed

that 36 of the 48 students who completed this study had a reading comprehension ability that was at or above grade level as measured by Scholastic software.

A one-way analysis of variance (ANOVA) was conducted on the reading comprehension data of the three groups to determine if there were any statistical differences. The ANOVA was not significant,  $F(2, 45) = 0.59, p = 0.56$ . This suggests there were no statistically significant differences in the means of the reading comprehension ability of the three groups.

Table 2.

*ANOVA Data Summary*

<i>Groups</i>	<i>Count</i>	<i>Sum</i>	<i>Average</i>	<i>Variance</i>
RRM	16	17212	1075.75	32479.40
SQRRR	17	19291	1134.76	83837.44
Cloze	15	17446	1163.07	39526.50

Table 3.

*ANOVA of Reading Comprehension Ability Among Three Groups*

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Between Groups	62111.82	2	31055.91	0.59	0.56	3.20
Within Groups	2381961	45	52932.47			
Total	2444073	47				

**Instrumentation**

Reading comprehension data was gathered by a set of 10 pretest questions and a different set of 10 post-test questions devised by the researcher (see Appendices C and

D). Attitudes and beliefs students had regarding the method of reading comprehension they used was gathered by the researcher through a Likert-type survey conducted after the post-test was completed (see Appendix E).

### **Data Analysis Procedures**

The assumption of normal distribution of post-test data was analyzed by looking at the numerical frequency of post-test data. The VassarStats: Website for Statistical Computation was used to analyze the pretest post-test data. A one-way analysis of covariance (ANCOVA) for three independent samples was conducted to compare the average results of each group as measured by the post-test. ANCOVA was used instead of individual t-tests to see what effect the independent variable had once the covariate or pretest scores were removed. Finally, data from the Likert-type survey was analyzed using mode and frequency.

### **Limitations**

There are five limitations in applying this data to elementary schools that are different than the school involved in this study. First, this study used a sample of convenience and not a random sample; furthermore, subjects in this study were Caucasian, middle class, and came from one school in a Midwestern city. This means the results cannot be generally applied to a larger population. Second, this study utilized a pretest. This might increase or decrease a subject's sensitivity or responsiveness to the experimental variable. Third, since one teacher was involved and he normally uses the Cloze method when teaching history, his bias might influence how he presented the various reading comprehension strategies to the three groups. A fourth limitation was the length of time between the pretest and post-test. There were three snow days during this

study that extended the duration of the study past the scheduled length. The number of participants who were absent on the day of the pretest and post-test is a fifth limitation to this study. While there were 52 original participants, the study ended with 48 participants.

### **Summary**

Three reading comprehension methods were studied to determine their effect when students read digital texts. Three groups of students were randomly assigned to use either the RRM, SQRRR or Cloze method when reading their digital textbooks in their history class. A review of reading comprehension ability data provided by the school showed that 75% of the students in this study have a reading comprehension ability that is at or above grade level as measured by Scholastic software. A one-way ANOVA conducted on the means of the reading comprehension ability of the three groups suggested there were no statistically significant differences in the means of the reading comprehension ability of the three groups. A pretest and post-test was conducted. An assumption of normal distribution of post-test data was explored by looking at the numerical frequency of post-test data. A one-way ANCOVA for three independent samples explored the differences among the pretest and post-test results. Finally, a Likert-type survey was conducted. Data from the Likert-type survey was analyzed to determine student attitudes and beliefs towards the method of reading comprehension students used in this study.



## **Chapter IV: Results**

### **Introduction**

The purpose of this study was to explore the effects three reading strategies, the SQRRR method, the RRM method, and the Cloze method, would have on reading comprehension when students read digital texts. A pretest post-test was conducted. The numerical frequency of the post-test data was explored to determine if the assumption of normal distribution of post-test data had been met. Additionally, a one-way ANCOVA for three independent samples explored the differences among the post-test average scores when controlling for pretest scores. Finally, a Likert-type survey was conducted after the post-test to determine student attitudes and beliefs about the method of reading comprehension they used in this study.

### **Data Analysis**

The numerical frequency of the post-test data was analyzed to determine if the assumption of normal distribution of post-test data had been met. The results of this analysis showed that the assumption of normal distribution of the post-test data was met (see Appendix G).

A one-way ANCOVA for three independent samples was conducted (see Table 4). The independent variable, type of reading comprehension strategy, included three variables: Reading Road Map method, Survey-Question-Read-Recite-Review method, and the Cloze method. The dependent variable was the level of reading comprehension as measured by the post-test, and the covariate was the level of reading comprehension as measured by the pretest. A preliminary analysis evaluating the homogeneity-of-regression (slopes) assumption indicated that the difference between the covariate and the dependent variable did not differ significantly as a function of the independent variable,

$F(2,42) = 0.67$ ,  $p = 0.52$  (see Table 5). The ANCOVA was not significant,  $F(2,44) = .28$ ,  $p = 0.77$  which suggests that the three types of reading comprehension strategies, the Reading Road Map method, Survey-Question-Read-Recite-Review method, and the Cloze method, had the same effect on reading comprehension when students read a digital textbook.

Table 4.

*ANCOVA Summary*

Source	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Significance
Adjusted Means	6.45	2	3.22	0.28	0.767
Adjusted Error	505.12	44	1.48		
Adjusted Total	511.56	46			

Table 5.

*Test for homogeneity of regressions*

Source	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	Significance
Between regressions	15.53	2	7.77	0.67	0.517
Remainder	489.58	42	11.66		
Adjusted error	505.12	44			

Finally, a Likert-type analysis survey was conducted after the post-test to determine student attitudes and beliefs about the method of reading comprehension they used in this study. Data was analyzed by looking at modes and frequency of responses. Percentage frequency was generated from the raw data. See Appendix F for percentages of how the subjects responded. Some highlights from this survey include 87% of those in

the RRM group agreed or strongly agreed that this method was easy to use. Additionally, 75% agreed or strongly agreed they enjoyed using it, while 75% agreed or strongly agreed that this method helped them complete assignments more accurately than the reading comprehension method they normally use. Finally, 82% agreed or strongly agreed they would like to use this method again if given the chance. Within the SQRRR group, 70% not only disagreed or strongly disagreed they enjoyed using this method, the same percent also disagreed or strongly disagreed when asked if they would like to use this method in the future. In the Cloze group, 73% agreed or strongly agreed that this method was easy to use. The participants in the Cloze group normally use this method in their history class. It is interesting to note that even though they regularly use this method, 27% do not think that it is easy to use.

### **Summary**

The results of the analysis of the numerical frequency of the post-test data confirmed the assumption that the normal distribution of post-test data had been met. The results of the analysis of the one-way ANCOVA for three independent samples suggested that the three types of reading strategies explored in this study had the same effect on reading comprehension when students read a digital textbook. Finally, at least three-fourths of those in the RRM group felt they had a positive experience with that type of reading comprehension strategy, while an almost similar amount felt that the Cloze method was easy to use.

## **Chapter V: Summary, Conclusions, and Recommendations**

### **Introduction**

Today there is an ongoing transition from print based texts to multimodal digital texts which can be read and interacted with using a variety of devices such as computers, laptops, tablets, Chromebooks, phones and iPods. This trend is also mirrored in education. The study results shed light on the reading comprehension of middle school students when they used one of three reading comprehension techniques when reading digital textbooks in their history class. The sample make-up and size may prevent making generalizations for a large population, yet the results of this study provide insights into the impact these three reading comprehension techniques have on reading comprehension when digital texts are read.

### **Summary of Results**

A one-way ANCOVA was used to test for differences in the means of the post-test scores. The ANCOVA for three independent samples calculations suggested that the three reading comprehension methods studied, the RRM method, SQRRR method, and the Cloze method, had the same effect on reading comprehension when students read a digital textbook in their history class. On average, students performed the same across treatments. The results of a survey done after the subjects had taken their post-test indicated that 75% or more of the subjects in the RRM group enjoyed this reading comprehension method and felt it helped them be successful as they worked through their history course material during this study. This was found to be a higher satisfaction rate than was experienced by both those in the SQRRR group and those in the Cloze group.

**Conclusions**

The results of this study suggests that the three reading comprehension methods that were studied have the same effect on reading comprehension when students read a digital textbook. The literature has suggested that the Reading Road Map method should be used to bridge the gap between print and digital literacies (Wood, 2011). When using the Reading Road Map to read and comprehend digital text only as was done in this study, it appears to have the same effect when compared to traditional reading comprehension methods such as the SQRRR method and the Cloze method that were devised to be used when only reading print text.

**Recommendations**

While the results of this study seem to show that the three reading comprehension methods have the same effect on reading comprehension when students use either the RRM, SQRRR or Cloze method when reading digital text, there are still other questions that need to be answered regarding this topic based on reported limitations. The study did have a total sample size of over 30; yet, the size of each sample within the study was under 20. Furthermore, although there were no statistically significant differences in the means of the reading comprehension ability of the three groups, the study used three non-random groups. Further research with larger samples that are randomized could help determine if the results found in this study continue to be the same.

Another limitation in this study was the length of time between the pretest and post-test. Three snow days pushed the post-test date past the scheduled date by roughly a week and a half. In addition to this, the history class is only taught three days a week.

Teaching history more times a week and having the pretest closer to the post-test might yield different results.

Finally, the history teacher in this study normally uses the Cloze method in his history class. Student surveys showed that those in the Cloze group did not like their method nearly as much as those in the RRM group liked their method. This was interesting. Further study exploring these two methods of reading comprehension when using digital texts would help see what other factors led those in the RRM group to have such positive feelings towards the reading comprehension method they used.

### **Summary**

In this study students on average performed the same across treatments. The data did not reveal any differences in reading comprehension when students read digital text using either the RRM, SQRRR or Cloze method. Despite these findings with these three reading comprehension strategies it is important for educators to be aware how their students comprehend both print and digital text.

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**Appendix A: Research Participation Letter**

Dear Parents and Guardians,

My name is Michael Plocher. I am one of the seventh and eighth grade teachers at St. Paul Lutheran School in New Ulm, MN, and am currently working toward my Master's degree in education. During the course of the 2015-2016 school year I will be conducting research on reading comprehension when students use digital textbooks. This research will allow me to write my thesis and complete my degree program.

I have received permission from Principal Greg Thiesfeldt to include students in Alissa Griebel's, Steve Biedenbender's and my classroom in my research study. I am now asking you for permission to include your child in my research study. My research involves gathering reading comprehension information two times during the school year from your child in the form of a pretest and a post-test. These tests will be administered at St. Paul's Lutheran School during the normal school day.

Neither names nor any other personally identifiable information will be collected from your child. Any information I gather concerning your child during my research will be kept completely confidential and in my possession. Your child will not be named or identified in any way in my research paper (thesis). After the study is concluded and the raw data is recorded, your child's pretest and post-test will be destroyed.

If for any reason during the course of this study you wish to withdraw your child from the research study, you may do so by notifying me or your child's classroom teacher. If you would choose to withdraw your child from the study, any information concerning him/her which had already been gathered would be destroyed.

If you have any questions concerning this research study please contact me (mplocher@splnewulm.org – email, 507-276-3938 – cell; 507-354-2329 – school) or your child’s classroom teacher.

Thank you,

Mr. Michael D. Plocher

**Appendix B: Permission Form**

*Please fill out the form below and return it to your child's classroom teacher.*

**Yes,** \_\_\_\_\_ has permission to participate  
(Print child's first and last name.)

in the reading comprehension research study during the 2015-2016 school year.

**No,** \_\_\_\_\_ does not have permission to  
participate  
(Print child's first and last name.)

in the reading comprehension research study during the 2015-2016 school year.

**Parent or Guardian signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Appendix C: Pretest Questions**

1. Explain how the free trade agreement between the United States and Mexico has resulted in close connections between the countries in terms of manufacturing, energy and finance.
2. List the characteristics of a mixed-market economy.
3. List on a map the four common sub-regions of Latin America: South America, Caribbean, North America and Central America.
4. Describe how the dictatorship form of government in Latin America that was prevalent from the 1800s through the late 1900s still impacts the people and society of Latin America whose countries today are now governed by presidential democracies or parliamentary democracies.
5. Name three goods or products that are exported by Latin American countries.
6. Mark on a map the location of the Amazon Rain forest.
7. Describe how the physical features of the Amazon Rain Forest affect human activity and settlement in that region.
8. Analyze maps and pictures of Brazil and Minnesota then explain the differences between the physical characteristics of each location.
9. Explain how ecotourism in the Amazon Rain Forest could help lead to the decline of the traditional cultural identity and distinctiveness of indigenous groups who live there.
10. List four reasons why the Amazon Rain Forest is undergoing deforestation.

**Appendix D: Post-test Questions**

1. Mexico and the United States have a free trade agreement which results in a close connection between them. How has this agreement impacted manufacturing, energy, and financial relations between the two countries?
2. Name the characteristics of a mixed-market economy.
3. Show on a map the four common sub-regions of Latin America: South America, Caribbean, North America and Central America.
4. Most Latin America countries have changed their form of government from dictatorships to presidential or parliamentary democracies. Despite this change, the old form of dictatorship government still impacts the people and society of this region. Describe these impacts.
5. Latin American countries export many goods and products. List three of them.
6. Plot the location of the Amazon Rain forest on a map.
7. Human activity and settlement in the Amazon Rain Forest is affected by the physical features of the rain forest. Describe how the physical features do this.
8. After looking a maps and pictures of Minnesota and Brazil, explain the differences between the physical characteristics of each location.
9. Explain how ecotourism could lead to the decline in the distinctiveness and cultural identity of indigenous groups who live in the Amazon Rain Forest.
10. What are four reasons the Amazon Rain Forest is undergoing deforestation.

**Appendix E: Likert-type Survey**

<b>Reading Road Map (RRM) Reading Method</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
The RRM reading method was easy to do.	1	2	3	4	5
I enjoyed using the RRM reading method.	1	2	3	4	5
If given the chance I would like to use the RRM reading method again.	1	2	3	4	5
	<b>Strongly Agree</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
Using the RRM reading method prepared me for the following day's history class.	1	2	3	4	5
The RRM reading method allowed me to answer questions on assignments without having to go back and re-read information from the digital textbook.	1	2	3	4	5
The RRM method prepared me for tests and quizzes.	1	2	3	4	5
	<b>Strongly Agree</b>	<b>Agree</b>	<b>Undecided</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
Comparing the RRM method with the reading method I normally use in history class, the RRM method helped me better recall information I read when I was completing my assignments.	1	2	3	4	5
Comparing the RRM method with the reading method I normally use in history, the RRM method allowed me to complete my daily assignments more accurately.	1	2	3	4	5
Comparing the RRM method with the reading method I normally use in history, the RRM reading method allowed me to do better on tests and quizzes.	1	2	3	4	5

What did you enjoy most about the RRM method?
What did you enjoy least about the RRM method?

<b>SQRRR Reading Method</b>	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The SQRRR reading method was easy to do.	1	2	3	4	5
I enjoyed using the SQRRR reading method.	1	2	3	4	5
If given the chance I would like to use the SQRRR reading method again.	1	2	3	4	5
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Using the SQRRR reading method prepared me for the following day's history class.	1	2	3	4	5
The SQRRR reading method allowed me to answer questions on assignments without having to go back and re-read information from the digital textbook.	1	2	3	4	5
The SQRRR method prepared me for tests and quizzes.	1	2	3	4	5
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Comparing the SQRRR method with the reading method I normally use in history class, the SQRRR method helped me better recall information I read when I was completing my assignments.	1	2	3	4	5
Comparing the SQRRR method with the reading method I normally use in history, the SQRRR method allowed me to complete my daily assignments more accurately.	1	2	3	4	5
Comparing the SQRRR method with the reading method I normally use in history, the SQRRR reading method	1	2	3	4	5



allowed me to do better on tests and quizzes.					
What did you enjoy most about the SQRRR method?					
What did you enjoy least about the SQRRR method?					

<b>Cloze (Fill in the Blank) Reading Method</b>	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
The Cloze reading method was easy to do.	1	2	3	4	5
I enjoyed using the Cloze reading method.	1	2	3	4	5
If given the chance I would like to use the Cloze reading method again.	1	2	3	4	5
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Using the Cloze reading method prepared me for the following day's history class.	1	2	3	4	5
The Cloze reading method allowed me to answer questions on assignments without having to go back and re-read information from the digital textbook.	1	2	3	4	5
The Cloze method prepared me for tests and quizzes.	1	2	3	4	5
What did you enjoy most about the Cloze method?					
What did you enjoy least about the Cloze method?					

**Appendix F: Likert-type Survey Responses**

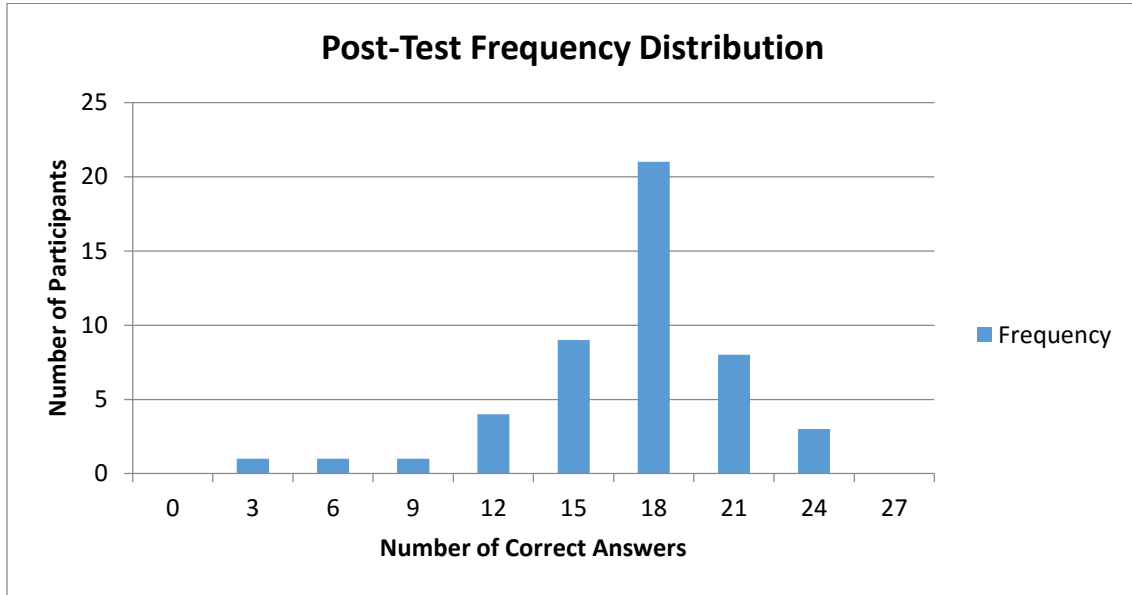
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM was easy to do:	31%	56%	13%	0%	0%
SQRRR was easy to do:	12%	24%	35%	29%	0%
Cloze method was easy to do:	33%	40%	7%	20%	0%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
I enjoyed using the RRM:	31%	44%	25%	0%	0%
I enjoyed using the SQRRR:	12%	18%	41%	29%	0%
I enjoyed using Cloze:	7%	27%	27%	33%	7%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
I would like to use the RRM again:	38%	44%	19%	0%	0%
I would like to use the SQRRR again:	0%	6%	24%	29%	41%
I would like to use the Cloze again:	7%	47%	33%	7%	7%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM prepared me for class:	6%	44%	50%	0%	0%
SQRRR prepared me for class:	0%	44%	25%	19%	13%
Cloze prepared me for class:	0%	36%	43%	21%	0%

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM - Did not need to re-read textbook when doing assignments:	25%	44%	13%	19%	0%
SQRRR - Did not need to re-read textbook when doing assignments:	0%	18%	18%	53%	12%
Cloze - Did not need to re-read textbook when doing assignments:	13%	40%	20%	20%	7%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM prepared me for tests and quizzes:	13%	40%	40%	7%	0%
SQRRR prepared me for tests and quizzes:	0%	18%	35%	29%	18%
Cloze prepared me for tests and quizzes:	13%	47%	20%	13%	7%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM helped me better recall what I read compared to the reading comprehension method I normally use:	19%	38%	38%	6%	0%
SQRRR helped me better recall what I read compared to the reading comprehension method I normally use:	6%	6%	29%	35%	24%
	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
RRM helped me complete daily assignments more accurately compared to the reading comprehension method I normally use:	31%	44%	13%	13%	0%
SQRRR helped me complete daily assignments more accurately compared	12%	0%	24%	53%	12%

to the reading comprehension method I normally use:

	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
The RRM helped me do better on tests and quizzes compared to the reading comprehension method I normally use:	0%	31%	50%	19%	0%
The SQRRR helped me do better on tests and quizzes compared to the reading comprehension method I normally use:	0%	0%	59%	18%	24%

**Appendix G: Exploring Post-Test Frequency Distribution**



This figure illustrates that the assumption of normal distribution was met.