EXAMINING THE EFFICACY OF USING IPOD TOUCHES TO DELIVER READING COMPREHENSION STRATEGY INSTRUCTION AND TO PROVIDE ELECTRONIC TEXT SUPPORT ON THE READING COMPREHENSION PERFORMANCE OF SIXTH-GRADE STUDENTS

by

MARILYN ANNE WILLIAMS

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Dr. Edward J. Kame'enui, Chair of the Examining Committee

Date

Committee in Charge: Dr. Edward J. Kame'enui, Chair
Dr. Kathleen Scalise
Dr. Louis Moses
Dr. Lynne Anderson-Inman

Accepted by:

Dean of the Graduate School

An Abstract of the Dissertation of

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Approved: _____
Dr. Edward J. Kame'enui

Instructional use of the iPod Touch is increasing as evidenced by anecdotal reports of its efficacy as a learning tool. However, research documenting the impact of this technology has been limited. This study was based on the following research questions: (a) Does providing explicit reading comprehension strategy instruction using an iPod Touch increase students' reading comprehension outcomes based on standardized reading tests and multiple-choice probe measures when compared to a No Support comparison group? (b) Does providing different types of electronic text support increase students' reading comprehension outcomes and if so, which type of support is most

students' attitudes toward the use of comprehension strategies as well as using an iPod Touch for this task? Participants included 155 sixth-grade students at a public middle school. Students were randomly assigned to one of three intervention groups; (a) Notational Only support (a note-taking sheet), (b) Notational + Instructional support (embedded prompts), and (c) Notational + Instructional + Translational support (audio version of the text and prompts) and received reading comprehension strategy instruction and text support using an iPod Touch. An intact No Support ($N = 61$) group that did not receive instruction or text support but read the texts using an iPod Touch was used as a quasi-experimental comparison group. Two standardized reading comprehension measures were employed at pretest and posttest as well as researcher developed probe measures that were used throughout the study. An ANOVA analysis determined that no statistically significant differences existed between the groups at pretest. An ANCOVA with pretest scores as a covariate found no statistically significant differences between groups on the standardized reading comprehension measures. Because of a high level of variation among the probe measure data, including significant missing data, these results were not analyzed statistically and were reported descriptively. Students responded positively to survey questions about using the iPod Touch for summarization strategy instruction and the text supports.

CURRICULUM VITAE

NAME OF AUTHOR: Marilyn A. Williams

GRADUATE AND UNDERGRADUATE SCHOOLS ATTENDED:

University of Oregon, Eugene
University of Western Oregon, Monmouth
University of Regina, Regina, Canada

DEGREES AWARDED:

Doctor of Education, Educational Methodology, Policy, and Leadership, 2010, University of Oregon
Master of Science in Special Education, 2000, Western Oregon University
Bachelor of Education, 1984, University of Regina,

AREAS OF SPECIAL INTEREST:

Middle and High School Literacy
Instructional Technology

PROFESSIONAL EXPERIENCE:

Instructional Technology Specialist, Eugene School District, Eugene, Oregon, 2007 – present

Middle School Staff Development Specialist, Eugene School District, Eugene, Oregon, 2009 – present

Special Education, Reading Specialist, Language Arts teacher, Eugene School District, Eugene, Oregon, 2000 - 2007

Special Education, Salem-Keizer School District, Salem, Oregon, 1997 – 2000

Special Education, Regina School District, Regina, Canada, 1983-1987

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DEDICATION

For my husband and family who helped in so many ways, stood with me, and made it possible to complete this undertaking.

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CHAPTER I

INTRODUCTION

Students today live in an increasingly digital world where information and communication are almost constantly available. In 2005, the average public school had 154 computers used for instruction and 94 percent of these computers had internet access. Additionally, 83% of elementary and secondary students reported using computers in school (Snyder, Dillow, & Hoffman, 2009). Since the early 1980s, educators have been interested in exploiting the use of computers as an instructional tool with the result that many schools are now implementing one-to-one laptop to student learning environments. However, this can be cost-prohibitive with individual laptops costing $1000.00 or more. A more cost-effective alternative may be the use of smaller, yet still powerful, handheld computing devices such as the iPod Touch.

The capabilities of today's mobile, handheld devices such as cell-phones and MP3 players are exponentially greater than even desktop computers of five years ago. Although often perceived as mere entertainment gadgets, these ubiquitous devices are, in reality, powerful computers. They have internet capabilities and can be used to create documents, access files, check email, and even read books. As such, educators are beginning to embrace them as learning and teaching instruments.

One of the most important features of these devices, and digital text in general, is its portability. Digital files can easily be shared and stored via email, internet portals,

servers and external hard drives. This convenience factor is important as educators seek to make materials as widely available and accessible as possible. Once stored, the digital files can easily be downloaded to a variety of tools including computers, and hand-held devices such as phones, PDAs and MP3 players. However, once accessed, the files can be used in a variety of electronic and physical environments (Gregg and Banerjee, 2008).

Using a digital device such as an iPod for academic purposes is becoming more widespread. Perhaps the most widely publicized academic use of iPod technology has been Duke University's Digital Initiative that, in 2004, began giving iPods to its incoming freshman. To date, iPods have been used to provide audio feedback for student writing reviews, to create video lectures and a video workbook, produce radio dramas, carry forward class discussions, listen to Bach, record interviews and conversations, illustrate engineering principles, and collect data (Duke University, 2009). The Duke University program received a great deal of attention and was alternately hailed as either cutting-edge pedagogy or a waste of money. However, Duke University staff, including the Provost, sees it as a tool to encourage increased use of digital media in instruction. By saturating the campus with this mobile tool, professors began to consider new and innovative ways to both deliver content and encourage student participation and learning.

Although the Duke University experience may be the most well known, there are many teachers who are embracing this technology and creating new ways to deliver instruction in classrooms. Although a search of peer-reviewed literature will yield very little rigorous research data, there is a growing body of anecdotal and classroom-focused reports. These tend to be teacher created responses to specific student needs.

Academic Uses of Mobile Technology

As ubiquitous as iPods are, and as diverse as the learning opportunities they provide, simply adding them to a classroom does not guarantee that they will be used for educational purposes, or that the educational purposes will be effective. As with any instruction, an academic application must be based on solid pedagogical principles and designed with appropriate outcomes in mind. With that as a given, teachers are in a position to develop new and innovative ways to use the devices for instruction.

For example, Vess (2005) took advantage of her college level history students' familiarity with iPods to utilize them in her teaching methods. As part of the class, students used iPods to access class material and to create projects and presentations. Vess's goal was to create an active learning environment and to engage her students in inquiry as well as develop specific historical skills. Students reported the iPod gave them greater confidence, promoted greater discipline, and prompted increased reflection and personal learning. This learning environment created more continuous engagement with course material and encouraged active learning (Vess, 2005).

Becker and Finnegan (2005) supported the use of iPods in foreign language instruction. They found that in addition to motivating students, iPods also allowed students to record and listen to vocabulary, listen to and practice dialogues, and check their pronunciation. English language learners (ELL) are also a group for which iPods have been utilized.

As librarians, Patten & Craig (2007), integrated iPods into their English Language Learning (ELL) curriculum. They completed four action research studies with elementary (K-4 level) and middle school ELLs who used iPods to promote reading, writing and

listening skills. In this study, students were provided with audio versions of books and stories they were reading in class. Student comprehension was measured using Accelerated Reader tests, student surveys, recordings of student discussions, and journal entries.

The researchers found that overall writing and vocabulary skills improved in three of the studies and one study demonstrated a significant increase in comprehension skills as measured by an Accelerated Reader test. Scores showed a 90% pass rate whereas, previous to using the iPods, students had achieved a 60% pass rate. Teachers also noted that the depth and quality of students' writing improved as well as an increase in overall comprehension and vocabulary use. Additionally, they noted that students expressed increased motivation and appreciated being able to control their learning and to interact with this kind of technology.

In general, students are already using this device as a portable media player and are familiar with its operation. It is a small step for teachers to adapt their instructional materials to an iPod compatible format, thus giving students immediate, on demand access. This is also beneficial for students who require more time to learn skills or content. Having the course material available in a personalized format allows them to review and study at their own pace.

The availability and versatility of this tool has led to the development of an important set of research questions. Given the apparent benefits of the iPod and its capability for delivering instruction, as well as the dearth of evidence-based research about this tool, this dissertation study examined its use as a tool to deliver reading comprehension strategy instruction to sixth grade students. This study examined the

following questions: (a) Does providing explicit reading comprehension strategy instruction using an iPod Touch increase students' reading comprehension outcomes based on standardized reading tests and multiple-choice probe measures when compared to a No Support comparison group? (b) Does providing different types of electronic text support increase students' reading comprehension outcomes and if so, which type of support is most effective? (c) Does providing different levels of electronic text support influence students' attitudes toward the use of comprehension strategies as well as using an iPod Touch for this task?

Need for Explicit Reading Comprehension Strategy Instruction

Students today must be proficient readers in order to achieve academic success. However, eight million struggling readers in grades 4-12 in the United States lack proficiency in this skill (NCES, 2003). The most recent National Assessment of Educational Progress (NAEP) data reveals that 69 percent of eighth grade students scored below the proficient level (NAEP, 2007). Moreover, there has been little improvement in reading scores over the past 15 years.

Students in grades 6-12 who do not have strong literacy skills are at a disadvantage in many ways. They tend to drop out of high school more often, take less demanding academic coursework, and have fewer employment opportunities (Oregon State Board of Education, 2007). They have difficulty comprehending their content-area textbooks and, at a time when they are expected to become increasingly independent learners, their lack of reading skills put them at a distinct disadvantage. As they progress through increasingly more demanding literacy texts during middle and high school, their inability to process and make meaning of text becomes more of a liability (Biancarosa

and Snow, 2004). Silver-Pacuilla et al. (2004) note that although reading printed text may not be the only measurement of literacy, much of a student's academic and work-related success will be based on the level of their reading ability.

In order to help secondary level students become proficient readers it is essential that they be taught to comprehend. This is best accomplished by explicitly teaching them specific comprehension strategies (Biancarosa & Snow, 2006; Kamil, 2003; Kamil et al., 2008; National Reading Panel, 2000b). These strategies include summarizing, paraphrasing, finding the main idea, and asking and answering questions (Biancarosa & Snow, 2006; Kamil et al., 2008; Palinscar & Brown, 1984; Pressley, 1998). Students who receive instruction in how to use these strategies and are given opportunities to practice them appear to outperform students who have not received this instruction (Hagaman, J. L., & Reid, R., 2008; Jitendra, Hoppes & Xin, 2000; Kletzien, 1991; Rogevich & Perin, 2008).

Research supports providing explicit reading comprehension strategy instruction to secondary students. Anecdotal evidence supports the use of iPods as tools with which to deliver instruction. This dissertation study utilized the iPod Touch to deliver reading comprehension strategy instruction in one of three experimental conditions: (a) Notational Only (NO), (b) Notational + Instructional (NI), and (c) Notational + Instructional + Translational (NIT). It sought to answer the following research questions; (a) Does providing explicit reading comprehension strategy instruction via an iPod Touch increase students' reading comprehension outcomes based on standardized reading tests and multiple-choice probe measures when compared to a no-intervention control group, (b) Does providing different levels of electronic text support increase students' reading

comprehension outcomes and if so, which type of support is most effective, and (c) Does providing different levels of electronic text support influence students' attitudes toward the use of comprehension strategies as well as using an iPod Touch for this task?

CHAPTER II

LITERATURE REVIEW

Technology in education has been hailed as both a savior with its apparent promise to provide increased access to content and instruction or a death knell to the creativity of teachers and students (Cuban, 2001). As with any innovation, it was embraced by some and rejected out of hand by others. A significant reason for this, according to a 2008 National Education Association report, is that teachers do not feel adequately prepared to integrate technology in their instruction. The lack of appropriate and effective professional development for teachers is a fundamental problem. Many teachers simply do not know the capabilities and possibilities of using technology in instruction.

More than a decade ago, Kamil and Lane (1998) raised the issue of how we should examine the role and value of technology in instruction. Although there are certain types of technology that provide an entirely different instructional format, (e.g. hypermedia) perhaps technology should also be considered from a wider perspective. That is, technology such as iPod Touches can provide extended or even alternate learning opportunities specifically designed for individuals or small groups of students. The instruction may be conceptually similar to what a teacher provides but the delivery format and student learning environment may be very different from the typical classroom. Providing supported text for students is one way to utilize technology.

Efficacy of Supported Text

Providing access to text for students, especially struggling readers, is a major challenge. Older students especially, may be frustrated with the reading process and simply give up on the effort. Simply having students read more text and answer more comprehension questions is not effective (Pressley, 1998b). An alternative may be to provide a different way for students to access and interact with text. One way to assist these students as they encounter increasingly complex text is to provide electronic supports with the material they read (Anderson-Inman & Horney, 2007).

Types of Text Support

Electronic text supports may take many forms such as computer-assisted instruction, text to speech, audiobooks, and embedded instruction. In general, these supports use traditional print text that has been translated or reformatted into a digital form. Once this process is complete, the text can be modified to include text support that can be visual, tactile or auditory (Center for Applied Special Technology, 2009). Supports may also provide background and extended information, additional instruction, organizational tools, or translations. The primary goal for these modifications is to provide text that is more accessible and more easily comprehended.

Historically, these supports have often been provided via computer-assisted instruction. Computer programs can read text (auditory support), provide vocabulary and background information (informational or instructional support) and allow readers to manipulate fonts and sizes (visual support). Some programs also highlight text as it is being read by word, phrase, or sentence. This type of support can provide more customized instruction and allow students to adjust the pace at which instruction is

delivered (Kamil, 2003). Computers may also provide hypermedia support that includes graphics, organizing tools, extended explanations, or links to other resources. Text-to-speech capability may also be adjusted with a variety of voices and speed of reading.

Much like computers, digital text readers have some unique capabilities that may benefit struggling readers. These tools are designed to read text aloud. They may also include options to adjust font size and type, provide highlighting options, translate words and phrases, and change background color. In addition, they are portable and provide easy access to digital text in a variety of settings.

Anderson-Inman & Horney (1997, 1998) developed the concept of supported text to describe "electronic text that is modified or enhanced in ways that are designed to increase reading comprehension and promote content area learning" (p. 153). The idea behind this concept is that enhancing text will help readers, especially those who struggle, to overcome the difficulties they face when reading. Accordingly, they created a typology that identifies and elaborates upon eleven types of resources that are effective in supporting the reading process and improving comprehension (Anderson-Inman & Horney, 2007). This study incorporated instructional, translational, and notational text support.

Instructional text support. Instructional resources, according to Anderson-Inman & Horney (2007), "provide prompts, questions, strategies or instruction designed to teach some aspect of the text or how to read and interpret the text" (p. 154). This type of resource could incorporate reading comprehension instruction practices that emphasize before, during and after reading strategies by embedding additional information, asking

students to make connections with other text and personal experiences or prompting them to summarize.

Supported text could include instruction in utilizing a specific comprehension strategy. For example, the Reciprocal Teaching model (Palinscar & Brown,1984) includes four steps: summarizing, questioning, clarifying and predicting. Students might also be prompted to use a think-aloud strategy (McKeown & Gentilucci, 2007) or a paraphrasing strategy (Hagarman & Reid, 2008), both of which resulted in improved reading comprehension in these studies.

The Thinking Reader computer software program incorporates both translational (text-to-speech) and instructional eText (embedded reading comprehension strategy instruction and prompts) supports. As students read, and listen to the text they are reminded to use a reading strategy and to record their responses. Dalton and Strangman (2006) evaluated this program with 102 middle school students who read at the 25th percentile and below. These students were assigned to one of two treatments: (a) the Thinking Reader program, or (b) reciprocal teaching with print versions of the same material. Students in the Thinking Reader group scored significantly higher on the Gates-McGinitie Reading Achievement test than those in the print version group.

However, as Anderson-Inman and Horney (2007) explain, simply incorporating these functions into text does not necessarily mean that they will support students' needs nor improve their comprehension. These supports must be used in a carefully considered manner in order to actually increase learning. Translational supports such as text-to-speech in which digital text is converted to speech is one support that has received a fair

amount of attention and research on its capability to support student comprehension of text.

Translational text support. Translational text support, including text-to-speech and audio versions of a text, can be beneficial for those with visual impairment and reading disabilities as it allows them to access the content of printed text by translating it into an auditory format. Olson, Foltz & Wise (1986) found that utilizing text-to-speech led to significant learning benefits for this population. Specifically, students who used text-to-speech feedback scored 89% correct when compared to students who did not receive feedback who scored 64% on comprehension tasks. The researchers also pointed out that students who used this tool were enthusiastic about continuing to use it and expressed a desire to have it more readily available.

Since these early intervention efforts, text-to-speech has become more prevalent and accessible. There are free downloadable programs available on the internet (i.e., Natural Reader, Read Please) and many newer computers are pre-loaded with this capability. Programs are available that allow mobile devices such as MP3 players and even cell phones to read text aloud. This widespread, and cost-effective, availability make it a common tool of choice in educational settings.

Text-to-speech technology gives students more options in the ways they access text and allows them to modify the learning opportunity. Because students are listening to the text, they can adjust the volume of the text being read and, by using headphones, can filter out distracting sounds. These changes promote increased interaction with text and expand learning.

In addition to text-to-speech supports, providing audio versions of text has proven useful to many people. The audio version of a text may be classified as a translational support as the digital text has been translated into a different format (Anderson-Inman & Horney, 2007). Many trade paperbacks and, increasingly, textbooks are available in audio or e-book versions. Corollary companies, such as Bookshare, will convert textbooks to digital format for those with documented disabilities.

Most students can read text with translational supports that is above their actual reading level. This becomes important with older students who may not be reading at grade level because it provides a way for them to access grade level text. This has implications for both struggling readers and English Language Learners (ELL). Brown & Fisher (2006), Beers (1998), and Lane & Wright (2007) all make the case that audio books, or e-texts, which are audio versions of text rather than text-to-speech supports, provide opportunities for students to access text and learn essential reading skills. Providing this kind of bi-modal support where students are both listening to and reading text increases the likelihood that they will comprehend and remember the text better.

Audio books, or recorded readings of books reproduced in cassette, CD, or digital format, play an important role in supporting readers. They act as a scaffold that allows students to read at a more age-appropriate level than their reading ability would otherwise allow. Specifically, audiobooks allow students who struggle with decoding to focus on gathering meaning from the text. Torgeson (1986) explains that when students become mired in the process of word recognition, they have little short-term memory available for comprehension. By providing an audio component of text and freeing up cognitive processing these students are able to utilize higher-level comprehension processes.

Silver-Pacuilla, Ruedel and Mistrett (2004) note that audio books are a popular format and teachers report that students benefit from hearing a book as they read along. Research has shown that students' comprehension and vocabulary skills improve when they both hear and see the text (Montali & Lewandowski, 1996; Robinson, 1966, Steele, 1996). However, they also reported that simply listening to the text without having the accompanying visual text is not effective. Students who have access to both the print and audio version of text increase their comprehension and are more independent in their reading and learning.

Boyle et al., (2003) studied the effects of using a CD-ROM audio textbook, alone and in combination with a comprehension strategy. Students were assigned to one of three conditions: the audio textbook combined with the strategy, the audio textbook alone, or a control condition. The researchers found that students who used the audio text, either in conjunction with the strategy or without, performed consistently higher than the control group.

Further, Shumaker et al. (1984) found that students who used a learning strategy in conjunction with recorded text scored higher on chapter tests than students who used only the recorded text. This finding also supports the potential learning opportunities of using supported e-text, specifically as an instructional resource to provide reading comprehension strategy training.

Audio versions of text may also motivate reluctant readers. Franklin (1996), in an informal action research project with high school students, found that students who listened to the auditory version of the book while following along with the printed text not only read more but demonstrated deeper understanding of the story. These students

also felt more focused as they read and experienced success in actually completing the reading.

These findings support the use of audio, or translational text support, as an effective component for student learning. The proposed study will also examine whether adding this support along with strategy instruction enhances student comprehension.

Notational text support. A third type of text support is notational. Notational resources are used by readers to take notes on the text as they read in order to expand their understanding as well as make the information available at a later time. Note-taking helps students to organize what they've read and helps them improve their memory of the content (NRP, 2000a). The meta-analysis conducted by the National Reading Panel found four studies that reported student comprehension gains in content areas. Swanson and De La Paz (1998) also suggest that having students take notes or write summarization sentences assists them in increasing their reading comprehension. Hagaman and Reid (2008) utilized a summarization strategy that included a note-taking component. This study included three students who demonstrated up to a 700% increase in their recall of main ideas and details.

Providing a note-taking component appears to provide beneficial results for student comprehension. Therefore, this dissertation study provided instruction in how to use a note-taking form to reinforce the summarization reading comprehension strategy to students in the three treatment groups.

Types of Supported Text Used in This Study

Based on research and the applicability of the types of text support, this study incorporated three types of supported text. It included instructional eText resources in

two ways. First, students in the treatment groups received explicit summarization strategy instruction. Secondly, embedded instructional prompts were provided to the Notational + Instructional and Notational + Instructional + Translational treatment groups.

Students also had the opportunity to use a notational text support. Students in the intervention groups were instructed in how to use this support and all students, including those in the No Support comparison group, had access to the notational support throughout the study.

Translational supports, in the form of an audio version of the digitized text, were also incorporated in this study. Students who received this support could read as well as listen to the text. This audio support provides a more accessible format for the reader as they accessed the text.

Using iPod Technology to Deliver Reading Comprehension Strategy Instruction

Secondary students must receive explicit, targeted comprehension strategy instruction. Comprehension skills are essential throughout students' lives, not only as they encounter content-area reading material. Effective comprehension skills enable students to understand information, draw conclusions, make comparisons and have meaningful interactions with text. The National Reading Panel (2000b) explains that readers who are not taught explicit comprehension strategies and procedures will likely not learn them and certainly not learn to use them independently.

This dissertation study examined the efficacy of providing explicit reading strategy instruction while also taking advantage of the benefits of technology tools. The value and necessity of teaching secondary students how to use reading comprehension

strategies has been established (Biancarosa & Snow, 2006; Jitendra, Hoppes, & Xin, 2000; Kamil et al., 2008; NRP, 2000b) However, the use of current technology such as the iPod Touch for instruction is only beginning to be studied. This study utilized iPod Touches to deliver explicit reading comprehension strategy instruction with the intent to increase student's reading comprehension performance outcomes.

Explicit reading comprehension strategy instruction may include learning strategies such as paraphrasing, identifying the main idea or summarizing. This kind of instruction has been documented to improve reading comprehension (Gersten, Fuchs, Williams, & Baker, 2001; Hagaman & Reid, 2008; Jitendra, Cole, Hoppes, & Wilson, 1998; Rogevich & Perin, 2008). This study delivered summarization reading comprehension strategy instruction utilizing a widely available electronic device: the iPod Touch.

Explicit Instruction of a Summarization Strategy

When teaching reading comprehension strategies to students, there is an expectation that reading instruction will help students gather meaning from what they read. The National Reading Panel (NRP, 2000b) summarized the previous 30 years of research on reading comprehension and concluded that reading should be purposeful and active and that readers read for different purposes: to gather information, to learn, or to be entertained. The National Reading Panel recommends that students learn to use multiple strategies flexibly as they read. Specifically, two types of strategies have been emphasized: summarizing and question generating (NRP, 2000). When students summarize, they condense the information they read in to a single main idea. When they

generate questions, they become active consumers of the text and begin to internalize the process, relying less on teacher interaction and direction (Martin and Pressley, 1991). Included in the process of reading for meaning is the ability to make sense of the printed text and to utilize a schema that incorporates this knowledge with previous knowledge and experiences.

As students become more proficient readers, they normally learn these kinds of strategies. At times, however, these strategies need to be taught explicitly. Some readers who have not been taught these strategies will not learn them independently, nor will they use them spontaneously (National Reading Panel, 2000b). However, the National Reading Panel also found research evidence demonstrating that when students are given explicit cognitive strategy instruction, they do make significant gains when assessed on reading comprehension tasks. Additionally, students must be reminded that using these strategies is important and told why the strategy will be helpful to them (Jitendra, et al., 2000; Kamil et al., 2008). A 2008 meta-analysis reported strong research evidence for providing explicit comprehension strategy instruction (Kamil, et al., 2008). Specifically, the reading comprehension strategy instruction should include carefully chosen text, direct instruction in how to use the strategy, and guided practice. Finally, students must be provided with adequate practice time in order to master the strategy and make the effort to use it independently.

There is general agreement that teachers should be explicit in how they deliver comprehension strategy instruction. Research suggests that teachers should model the specific skill, give feedback to students, and give students opportunity for independent practice (Biancarosa, 2006; BNRP, 2000; Swanson, 1999). Teachers are also encouraged

to explicitly name and explain the strategy, giving reasons and situations for why and when the strategy might be used in reading.

This dissertation study focused on teaching students to utilize a summarization strategy to improve their reading comprehension. The goal of this strategy was for students to identify the important information in a passage and organize it into a single thought (Brown and Day, 1983). Once they have created this single thought, they will add two supporting details to the main idea. Students learned this strategy using text they normally encountered because instruction using unrelated material, such as workbooks, does not tend to generalize to other genres (Pressley, 1998).

Summarization Strategy Instruction Models

The literature clearly suggests that learning to summarize can be an effective reading comprehension strategy for students (Biancarosa and Snow, 2004; Kamil et al., 2008; NRP, 2000b; Sencibaugh, 2007). However, it is less clear on precisely what this instruction should look like. Generally speaking, a summary is a shortened version of a text that includes both the main idea and important details from the text (Kissner, 2007).

Summarization training may involve the use of questions to focus and clarify the student's attention on the important information in a passage. Malone and Mastropieri (1992) used two questions in their summarization intervention with middle school students: (a) "Who or what is the paragraph about?" and (b)"What is happening to them?" (pp. 273). Jitendra et al., (1998) expanded this questioning procedure to include: (a) who or what the paragraph was about, (b) why something happened, (c) where

something is or happened, (d) when something happened, and (e) how something looks or was done.

Summarization training may also teach students to follow a set of steps or rules. Gajria and Salvia (1992) included five steps taken from the work of Brown and Day (1983). These steps included: (a) superordination, (b) deletion of redundant information, (c) selection, (d) invention, and (e) deletion of unimportant information. The so-called 3-2-1 strategy required students to note 3 things they discovered, 2 interesting things and 1 question (Zygouris-Coe, Wiggins and Smith, 2005).

However the summarizing strategy is formatted, it is essential that students receive explicit focused instruction in how to use the strategy. In addition to learning the reading comprehension strategy, students also benefit from incorporating meta-cognitive strategies.

Self-Monitoring Strategy Use in Conjunction with Comprehension Strategies

Research also supports the use of self-monitoring strategies to improve reading comprehension. As noted by Gersten, Fuchs, Williams, and Baker (2001), students often do not monitor their comprehension and do not know when and how to use a particular strategy. They also have difficulty maintaining the use of a strategy when teacher mediation is removed. For example, Graves (1985) found that combining training in how to use a strategy in conjunction with self-monitoring was effective (ES = 2.70). These students received direct instruction in a comprehension strategy and learned how to self-question. Students who employed both strategies performed better than students in either the control group or the direct instruction group.

Building upon the findings of Malone and Mastropieri (1992), Jitendra, Hoppes and Xin (2000) investigated using a main idea strategy in conjunction with self-monitoring instruction and found that students in the experimental group outperformed the control group on reading comprehension measures (ES = 2.71). The study included 33 middle-school students with disabilities. These students had been identified as having a reading deficit and had scored at least two years below grade level on a standardized reading test. Students were stratified by grade level and randomly assigned to an experimental or control group. Students in the experimental group were taught to use a main idea identification strategy in conjunction with a self-monitoring procedure.

These students were explicitly taught to identify a main idea using a series of steps. These steps included generating a main idea sentence as well as selecting the main idea from a set of multiple-choice options. Students in the experimental group received main idea instruction in a small group of six to eight students during eight 30 to 40 minute sessions. Teachers presented the comprehension strategy, modeled the application and provided practice exercises. Students were taught to both identify a main idea sentence and to create their own. Students were also taught how to use a self-monitoring card to identify whether they had followed all the correct steps in the process.

The four-step self-monitoring process was used throughout the main idea strategy instruction. Students used this process to check on their use of the strategy and placed a checkmark on a card if they had done so. The four-step self-monitoring procedure contained the following steps: (1) read the paragraph, (2) use the prompt card to recall the specific strategy step, (3) apply the strategy in order to identify the main idea of the passage, and (4) choose or write the main idea (Jitendra et al, 2000).

Student learning was assessed using three equivalent test forms as a pretest, posttest, and delayed posttest. Each of these included 36 main idea comprehension items from either narrative (basal reading text) or expository (social studies text) passages. These tests required students to either choose the correct answer in a multiple choice format or generate their own main idea response. Additional measures assessed far transfer six weeks following completion of the instructional phase. A student satisfaction questionnaire was administered following the instructional intervention and scored using a 5-point scale.

Results of this study showed that students in the experimental group statistically outscored control group students. The effect size was larger on posttest multiple-choice items (ES = 2.71) than items requiring students to produce a response (ES = 1.28). Additionally, these results were maintained when students were tested six weeks later. The experimental group also outscored the control group on near and far multiple-choice transfer measures (ES = 2.13).

The research suggests that the most effective reading comprehension instruction should provide a model or explicit direction, scaffolds and cues, extended practice, and a meta-cognitive component. Self-monitoring assists students in transferring the learned comprehension strategy from teacher-directed to student-directed learning (Anderson-Inman, 1986; Graham, 2006). Ultimately, this will lead to increased independent learning for students and promote the use of learned comprehension strategies across content areas

Extended Learning and Differentiated Instruction

Typically, students who require more time on task to acquire academic skills such as math or reading receive instruction in an extended context such as additional class periods, before or after school sessions, or in summer classes. Although these interventions require physical space to meet, on-site teachers, and extended time, they can be effective in producing gains in reading or math achievement (Jacobsen, et al., 2002). Theoretically, this same kind of instruction and intervention could be accomplished using a mobile device such as an iPod. Rather than attending a class every day, students could receive individualized instruction via their iPod that they could listen to as many times as necessary. Once they had acquired the necessary skills or strategies, they would advance to new material.

Castellani (2001) of Johns Hopkins University, encourages teachers to use technology to differentiate instruction. He maintains that teachers are better able to scaffold instruction and meet individual student needs by incorporating technology. Technology may be used to provide strategic instruction, diversified material and to enhance reading comprehension by teaching students summarizing skills. Using a mobile device, such as an iPod, may make this scaffolding more accessible and appropriate for individual students.

Students and teachers alike have found that iPod technology, when founded on sound pedagogical principles and seated in thoughtfully established learning outcomes, produces increased motivation and learning opportunities. However, as with any technology there are issues to address such as accessibility, costs, and availability of appropriate instructional materials.

iPod Technology in Reading Comprehension Instruction Has Little Research Evidence

Despite the enthusiasm that iPod technology is generating in some arenas, it must be noted that there is a dearth of empirical research evidence to support the use of iPod technology in instruction. Educational forums such as Classroom 2.0 contain generally enthusiastic reports of incorporating this tool in instruction but these data or reports lack rigorous research designs. Additionally, there is little, if any, research supporting the efficacy of using this tool in reading comprehension instruction and intervention. For example, a journal search using the keywords, "reading comprehension" and "iPods" produced no results. However, research using other computer-based technology, while limited, does exist and the results may be applicable to this type of format (Gurganus, Boudah, & Fred, 2003; Kamil, Intrator, & Kim, 2000; Mioduser, Tur-Kaspa, & Leitner, 2000; Pearson, Ferdig, Blomeyer, & Moran, 2005). For example, Pearson, Ferdig, and Moran (2005) found only 20 studies that met their criteria to include in a meta-analysis on the effects of technology on reading performance in middle-school grades. Despite this small number, they concluded that technology can have a positive effect on reading comprehension.

Most researchers conclude that although there is some evidence of positive effects on reading comprehension when using technology, continued research on digital learning must be conducted. Biancarosa and Snow (2004) make the general statement that, "Effective adolescent literacy programs, therefore, should use technology as both an instructional tool and an instructional topic" (p. 19). Explicit reading comprehension strategy instruction has been shown to increase students' reading achievement. The

primary focus of this study is to determine whether reading comprehension strategy instruction can be effectively delivered utilizing a technology tool, the iPod Touch.

A current wave of thinking is to transform classrooms into "Digital Learning Environments" where students and teachers have on-demand access to the internet, educational software, and a variety of electronic tools that may include computers, cameras, MP3 players and other hand held devices. These classrooms ostensibly create environments where teachers and students work collaboratively to extend their learning and to develop higher level thinking and learning skills. A key component of this classroom is the constant availability and portability of electronic mobile resources. Students, and teachers, are free to collaborate and design their learning in ways that are most meaningful and effective for them. The iPod Touch combined with reading comprehension strategy instruction may serve as an example of this kind of classroom and learning environment. Research is necessary to determine the yet untapped potential of this device as an instructional and learning tool.

CHAPTER III

METHODOLOGY

This chapter includes the methodology that was used to conduct the dissertation study. It will describe: (a) the purpose of the study, (b) the setting (c) the research design, (d) treatment conditions and procedures, (e) measures, and (f) data analyses.

Purpose of the Study

The dissertation study was designed to answer the following research questions: (a) Does providing explicit reading comprehension strategy instruction via an iPod Touch increase students' reading comprehension outcomes based on standardized reading tests and multiple-choice probe measures when compared to a no-intervention control group, (b) Does providing different levels of electronic text support increase students' reading comprehension outcomes and if so, which type of support is most effective, and (c) Does providing different levels of electronic text support influence students' attitudes toward the use of comprehension strategies as well as using an iPod Touch for this task? This dissertation study included three treatment groups that incorporated three of the 11 types of resources for supported e-text: Instructional (I), Notational (N), and Translational (T) resources as found in the typology developed by Anderson-Inman and Horney (1999) as well as a comparison group.

Setting

This study was conducted at a grade 6-8 middle school in a city in the Pacific Northwest during the 2009 fall term. This Pacific Northwest city has an estimated population of 154,620. The city contains one school district that serves 16,724 students (J. D. Monaghan, personal communication, April 14, 2009) in 26 elementary school programs, 13 middle school programs (including a K–8 program), eight high school programs, and three charter schools (4J-Eugene District Web site, 2009). Middle school students in this district attend school 172 days per year.

As reported in Table 1, the School District has a total of 16,724 students attending its K-12 schools. Of these, the majority (72.9%) is White. The next largest group is Hispanic (9.41%) and the smallest identified group is Black (3.66%).

Table 3.1 presents the Eugene School District ethnicity data.

Table 3.1

Eugene School District Ethnicity Data

American Indian/Alaskan Native	Asian/Pacific Islander	Black	Hispanic	Unspecified	White	Total
574 (3.43%)	1049 (6.27%)	612 (3.66%)	1574 (9.41%)	724 (4.33%)	12191 (72.9%)	16724

The middle school that participated in this study has a population of 506 students in grades six through eight (school website). The daily school schedule is divided into six 55-minute periods. Language arts and social studies classes are 'blocked' together,

meaning that students remain with the same teacher for both periods. Sixth grade students are also blocked for science and math instruction. Students have two periods of the day in which to participate in elective classes such as physical education, band, art, etc.

The school is physically laid out in general grade-specific areas. That is, the sixth grade students have the majority of their classes in one of two buildings. All sixth-grade students receive language arts and social studies instruction in one of three classrooms in the same building. This study will be conducted in these three language arts and social studies classrooms; two of which are next door to each other with the other classroom located across the hall. Due to the random assignment of participants to treatment, students moved from their usual classroom to another classroom in the same building. Some students also had a different teacher during the intervention period of the day.

Participants

There are approximately 160 sixth-grade students at the participating middle school. Of those sixth grade students, approximately 88% are white, 9% are Hispanic, 5% are Black, 4% are Asian/Pacific Islander, 4% are unspecified, and 3.5% are American Indian/Alaskan Natives. The total enrollment for the sixth-grade also includes 23 students identified as special education (29% of the school's special education students), and 67 identified as economically disadvantaged (39% of the school's total). There are 78 males and 79 females in this class. Table 3.2 provides demographics of the four participating groups.

Table 3.2

Demographics of the Four Participating Groups

Group	N	Gender		Ethnicity						IEP
		F	M	White	Black	Hispanic	Amer. Indian	Asian	Un-specified	
Group 1 NO	34	14	19	27	3	2	1	0	0	6
Group 2 NI	34	18	16	24	1	4	2	1	1	10
Group 3 NIT	34	13	21	24	0	1	3	3	3	5
Group 4 NS	61	35	26	49	4	3	2	2	2	5

The sixth-grade student body at the participating middle school is divided into five sections for each academic subject area (language arts, social studies, math and science). Each section generally includes between 30 to 37 students. The schedule is devised so that three sixth-grade sections receive their language arts instruction in the morning and two sections receive instruction in the afternoon.

Participants in this study included all five sections of sixth-grade students; three sections of sixth-grade students who received their language arts/social studies instruction in the morning (n = 100-105) and two sections that received language arts/social studies instruction in the afternoon (n = 66). Students in the morning sections were randomly assigned to one of three groups. These three groups were then randomly assigned to one of the following conditions: (a) Notational Only (NO), (b) Notational + Instructional (NI), and (c) Notational + Instructional + Translational (NIT).

In addition to the three randomly assigned treatment groups, the two afternoon sections of students were not randomly assigned but served as an intact quasi-

experimental control group. They were not assigned to a treatment group nor did they receive instruction in the reading comprehension strategy. This group was included as a validity check sample in order to provide a basis for comparison of reading comprehension outcomes with the treatment groups as well as to compare the effectiveness of the three levels of supported electronic text resources against a group that did not receive any supports. The validity check sample (N = 64) was larger than the other treatment groups (N = 35). These students did not receive summarization strategy instruction nor did they receive instructional, notational, or translational text support.

Table 3.3 provides a graphic representation of the groups and the electronic text resources they received.

Table 3.3

Intervention and Comparison Groups

	N	Time	Strategy Instruction (Pre-practice phase)	Nota-tional Support (Note-taking sheet)	Instruc-tional Support (Embedded Prompts)	Trans-lational Support (Audio)	MC Meas.	Randomly Assigned
Notational Only (NO)	35	AM	Yes	Yes	No	No	Yes	Yes
Notational Instructional (NI)	35	AM	Yes	Yes	Yes	No	Yes	Yes
Notational Instructional Translationa (NIT)	35	AM	Yes	Yes	Yes	Yes	Yes	Yes
No Support (NS)	64	PM	No	Yes	No	No	Yes	No

Students were given general information about the study prior to their participation. This included a class presentation, a brochure that was handed out to be taken home, and email communication with parents/guardians who had chosen this method to receive school communications. Because the material and instruction was similar to what would normally be presented in their sixth-grade language arts classes, all student data were included. Parents/guardians were given the opportunity to indicate that they did not want their child to participate but no parents did so.

Three sixth-grade language arts/social studies block teachers also participated in the study. These were the regular teachers for these five sections of students. All teachers were licensed and had previous teaching experience ranging from three to 23 years. The teachers functioned primarily as managers ensuring that students had the necessary note-taking forms, multiple-choice response questions and answer forms as well as helping students with operating the iPods. They also maintained the iPods by charging and distributing them and keeping them secure. Teachers did not provide instruction in the summarization strategy as all strategy instruction was delivered via the iPod Touch.

Research Design

This study utilized a pretest-posttest comparison group design. All students completed identical pre and posttest measures. The between groups factor was the three levels or conditions of the format: (a) Notational Only (NO), (b) Notational + Instructional (NI), and (c) Notational + Instructional + Translational (NIT). This clearly defined variable indicated which type of text support was most effective at increasing students' reading comprehension.

The within group factors were the pretest (general reading comprehension measure), progress monitoring measure (researcher developed multiple choice probe measures) and posttest (general reading comprehension measure). In addition to providing a baseline, the pretest measures also established whether the groups were comparable in terms of reading comprehension levels. The progress monitoring measures were administered to students following completion of each assigned reading passage to determine content knowledge of the story.

Students were randomly assigned to treatment conditions thus minimizing extraneous variance that could include ability level, previous reading comprehension strategy instruction, and motivation. All student names were placed in a 'hat' and as each name was drawn, it was assigned to Treatment Group 1,Treatment Group 2 or, Treatment Group 3. After the three groups were created, each group was randomly assigned to a treatment protocol, i.e., Notational Only (NO), Notational + Instructional (NI), and Notational + Instructional + Translational (NIT).

Treatment Conditions and Procedures

Prior to the implementation of the study, all students completed two standardized reading comprehension measures with their usual language arts section. This testing occurred over the course of four days. All testing was administered via computers in the building's computer lab.

Students participated in this study during 20 minutes of their regularly scheduled 55-minute language arts class. Based on teacher preference, students went to their regularly scheduled classes at 9:00 am where attendance was taken and announcements

were given. At approximately 9:05 am, students were dismissed to their iPod Touch groups. The intervention was scheduled to occur five days per week over the course of three weeks and represent a total of 300 minutes of actual intervention. However, due to the school's schedule, there were some days when students were not scheduled to be in class. Students participated in the study for a total of 15 school days.

Initial Reading Comprehension Strategy Instruction

Initial strategy instruction for all conditions. Students in all the treatment conditions received summarization strategy instruction via their iPod Touch in a digital text as well as audio format. During the first session (Day 1) students were introduced to the "1-2 Strategy" as a means to help them remember and understand what they were reading. They were told that good readers use different ways to understand and remember what they read and that the summarization strategy could help them do this. Each step of the summarization process was described and its importance as a tool for improving their academic success was emphasized to provide motivation for students to use the strategy (Carr & Borkowski, 1989). Participants were told that using a summarization strategy is like a "trick" to help them remember what they read (Hagaman and Reid, 2008).

The instructional sequence for strategy instruction was based on the steps utilized by Jitendra et al. (2000). Lesson 1 taught students to identify the subject of a passage and tell who or what the text was about and to include two details (see Appendix A). After the strategy had been explained, students read a paragraph whose text had been modified to include modeled 'think aloud' instruction demonstrating how the strategy should be used (Pressley, 1998). Students also viewed a visual graphic organizer that identified each step (i.e., identify who or what the passage is about and two details) and provided a sample

response. The graphic organizer served as a tool for students to self-monitor their use of the strategy, with the goal that they would internalize the use of the strategy and then apply it to other situations (Malone & Mastropieri, 1992; Jitendra, Hoppes & Xin, 2000; Jitendra, Cole, Hoppes & Wilson, 1998; Rogevich & Perin, 2008).

Students then read a paragraph independently and were prompted to utilize the summarization steps by filling in a template that contained the steps (see Appendix B). After completing the worksheet independently, students were presented with a worksheet that had been completed correctly and encouraged to compare their responses with the sample to determine if they were using the strategy correctly. Finally, students were told that they would be expected to memorize these steps, identifying who or what the passage was about and finding two supporting details, and use them in their reading.

On Day 2, students were reminded that the strategy was to identify who or what the passage is about and two supporting details. Students were also reminded that it would be important for them to use the strategy. Students viewed a graphic organizer that outlined the steps and then read a longer passage. Students responded to the prompts by identifying the main ideas and two supporting details of the content of the passage and writing this on the paper template. The "1-2 Strategy" template contained boxes that students checked as they completed each step. This template form also acted as a self-monitoring checklist that students used to indicate whether they practiced the strategy (Malone & Mastropieri, 1992). Finally, they were reminded that they were expected to memorize this strategy and use it as they read. After reading the story and filling in the template, students were given a copy of a model answer and encouraged to compare their answers to the model.

Following the modeled instructional phase, students participated in the practice phase. During this phase, students practiced the "1-2 Strategy" using digital text taken from the students' sixth-grade language arts textbook (Pearson Prentice Hall, 2007). All students in the treatment groups received identical strategy instruction in order to ensure that all students had the same opportunity to learn the comprehension strategy. The components of the instructional phase were the same for all students assigned to treatment groups (NO, NI, NIT).

Practice Instruction Phase for NO, NI, and NIT Conditions

Practice phase for Notational Only (NO). The NO students read digital text taken from the sixth-grade language arts textbook but did not receive additional instruction nor were they prompted to use the summarization strategy. However, they were provided with a note-taking form that included the steps of the summarization strategy. Each time students completed an assigned story, they answered a set of ten researcher-created multiple-choice questions to determine their comprehension level of the story.

Practice phase for Notational + Instructional (NI). Students in the Notational + Instructional (NI) condition received instruction in how to use the strategy and read digital text that included embedded prompts. These prompts reminded the students to stop and apply the summarization strategy as they read by writing responses to the prompts on the provided note-taking form. They also completed a self-monitoring checklist that listed the steps of the strategy and they answered researcher-generated multiple-choice questions about the passage.

Practice phase for Notational + Instructional + Translational (NIT). The Notational + Instructional + Translational (NIT) condition received identical instruction

and text as the NO and NI conditions. However, during the practice phase, in addition to receiving embedded strategy prompts, they had both digital and audio versions of the text and prompts. Students were prompted to write responses to the summarization prompts as they read and listened to the text and completed a self-monitoring checklist. Upon completion of the reading task, students answered a researcher-generated multiple-choice measure.

Materials

All text for this study was drawn from the sixth-grade Pearson Prentice Hall Literature Textbook (2007). The texts included short stores, biographies and autobiographies. Oral reading of the chosen texts takes from eight minutes to 28 minutes. These stories are written by a number of authors including: Sandra Cisneros, Susan E. Quinlan, Ray Bradbury, Lensey Namioka, Russell Freedman, Paul Zindel, Roald Dahl, Joan Aiken. Fifteen stories were prepared and available to the students on the iPod Touches.

The prompts embedded in the texts were considered general and predictable. They prompted students to stop reading, think about the main idea and two details about what was happening in the section they just read, turn off their iPod Touch and record their thoughts on the paper protocol summarization form. These prompts were inserted at pivotal points in the stories during natural breaks in the narrative that occurred approximately every two to four paragraphs. Because these breaks occurred at different points in each story, there was not a predetermined or fixed number of prompts across all stories.

Students were allowed to take as much time as necessary to complete each selection. All text was numbered by paragraph and students were reminded to note the beginning and ending number of the paragraphs read each session in order to keep track of where they were reading. This also served as an indication to the researcher to determine how much a student read during a session. However, not all students recorded these data.

Each of the passages was modified according to one of the three conditions' parameters. All text was in a digital format in order to be uploaded to the iPod Touch. The NI and NIT conditions included text that had been modified to include written (NI) and written and verbal (NIT) prompts reminding students to use the summarization comprehension strategy. The audio for the (NIT) condition was taken from the audio discs provided with the Pearson-Prentice Hall materials. The researcher modified these by splitting the tracks, recording, and inserting the reading strategy prompts.

Reading Comprehension Outcome Measures

Pretest and Posttest Reading Comprehension Measures

General reading comprehension measures were used to accurately measure student's reading ability and to determine whether any significant difference existed between the four groups. Prior to the intervention, all students completed two standardized, norm-referenced pre-test measure, the Scholastic Reading Inventory (SRI) to establish their lexile (L) level and the easyCBM measure. The same tests were used as posttest measures.

The Scholastic Reading Inventory. The SRI is designed to measure reading ability on a scale ranging from beginning (200L) to advanced (1700L). It was first developed in 1984 as a result of a grant from the National Institute of Child Health and Human Development and is based on two predictors of text difficulty: semantic difficulty or word frequency and syntactic complexity or sentence length (MetaMetrics, 2008). Lexile measures are determined by dividing a text into 125-word sections. Each section is compared to the 600-million word Lexile corpus and the words in each sentence are counted. A Lexile equation is applied to the section and the resulting Lexile measure is applied to the Rasch psychometric model to determine the Lexile measure for the entire text (MetaMetrics, 2008).

Students who take this test read short paragraphs (3-5 sentences) and choose a response from four options. The measure adjusts the difficulty of the questions based on the student's responses. Once an accurate Lexile level is established the measure stops providing questions. The SRI was administered in addition to the easyCBM to provide another comparison of student scores and because its design measures smaller changes in reading comprehension outcomes. The SRI scores are represented in Lexiles employing numeric values between 200 and 1700 and provide a more precise reading comprehension student score. Lexile scores are based upon both the semantic (word choice) and syntactic (sentence complexity) dimensions of a passage. This standardized measure provided data that could be compared to confirm the potential existence of pretest and posttest differences in student's reading comprehension as well as differences among the groups.

The SRI technical guide states that this is a research-based comprehension measure with many validation studies. These include a norming study with a sample size of 512,244 students as well as disaggregated data analysis based on gender, race and ethnicity among 19,000 fourth through ninth grade students.

The easyCBM measure. All students also completed the sixth-grade easyCBM reading comprehension section as a standardized pre and post-test measure. Each test contains a story and 20 multiple-choice (MC) questions (see Appendix C). The computer scores the student responses and student performance is compared against grade-level performance goals. This measure was developed in response to a need for assessment measures that are similar to the typical material students read in school. The stories are original fiction and measure factual/literal, interpretive/inferential, and critical/evaluative comprehension. Title I Reading Specialists, a professional item writer, and the stories' author conducted the content reviews. The review included evaluating the stories and vocabulary words for grade appropriateness and addressing potential biases for students with special needs and diverse backgrounds.

The technical adequacy of the reading comprehension measures was evaluated in two ways: (a) content review of the stories and test items and (b) statistical analysis of the pilot data. Each item was also analyzed to for its estimated difficulty using a Rasch analysis that identifies each item's reliability. The easyCBM measure analysis indicated that the items functioned appropriately and represented an adequate range of difficulty. However, this measure is still under development and detailed technical adequacy data are not available at this time.

Multiple-choice Probe Measures

Students completed a researcher developed a 10-item multiple-choice reading comprehension probe measure after they finished reading each story. Items in this measure were drawn from the sixth-grade Pearson Language Arts textbook as well as created by the researcher. It contained both literal and inferential types of questions. The technical adequacy of the probes including the validity or reliability of this measure was not established. This tool was designed to measure the extent to which students understood and remembered the content of the passage and how well they utilized the summarization strategy (see Appendix E). These questions were delivered via a paper copy and students responded by filling out a Scantron form. All student responses from each treatment group were analyzed to determine students' overall understanding of the reading passages and to compare the comprehension levels among the groups.

Student Survey Measure

Finally, students were asked to complete an online survey. The student survey was designed to measure student's perception of four aspects of the study. These included their perception of: (a) the summarization strategy, (b) student use of a note-taking form, (c) student use of the iPod Touch, and (c) general benefit from participating in the study. Students responded using a five-point Likert scale where 1 = not at all and 5= very much. This measure contained the following items:

1. Please rank how easy it was to learn the 1-2 Summarization Strategy.
2. On a rating of 1-5 how much did the 1-2 Summarization Strategy help you remember the story better?

3. Please rank how often you used the note-taking sheet.

4. How often did you re-read sections of the story on your iPod Touch?

5. On a ranking of 1-5 how did you feel about reading on the iPod Touch screen?

6. How helpful would it be if you could have changed the font size on your iPod Touch screen?

7. On a scale of 1 -5 how much did you like reading on an iPod Touch instead of a paper copy of the story?

8. On a scale of 1-5 do you think you became a better reader by participating in this study?

9. On a scale of 1-5 how much do you think you will use the 1-2 Summarization Strategy in other classes?

The surveys were modified based on the type of supports a particular group received. For example, only students in the Notational + Instructional + Translational (NIT) group answered an additional question asking them if they mostly listened to the story or listened and read the story.

The student survey provided statistical data to support student preference of one text support over another, and was useful as additional information to determine further development of instructional protocols using the iPod Touch.

Classroom Observations

I observed each treatment group a minimum of six times over the 15 sessions. This was to ensure fidelity of implementation across groups. Additionally, the teacher in the Notational + Instructional + Translational (NIT) group was asked to observe whether students appeared to be listening and reading the text or simply listening to the text. Her observations identified six students who consistently did not look at the text on their iPod

Touch but did listen to the audio version of the story. Random checks showed that other than these six students, the remainder of the class was listening as well as reading the text.

Independent Variables

The primary independent variable in the dissertation study was the type and level of supported text resource (i.e., Notational Only, Notational + Instructional, Notational + Instructional + Translational) that students received. Instructional support was provided to the treatment groups during the initial phase of the study when the summarization strategy was taught, as well as during the practice phase of the study when the Notational + Instructional and Notational + Instructional + Translational groups read text that included embedded prompts. Analysis of the reading comprehension probe measure results and standardized reading comprehension assessments for each group indicated the type of support that was most effective in improving sixth grade students' reading comprehension ability.

CHAPTER IV

RESULTS

In this section, I report the results of the study and describe the strategies for analyzing the reading comprehension outcome data, the multiple-choice probe data, and the survey data. Results from these data were used to answer the main research questions: (a) Does providing explicit reading comprehension strategy instruction using an iPod Touch increase students' reading comprehension outcomes based on standardized reading comprehension tests and a multiple-choice probe measure when compared to a no-intervention control group? (b) Does providing different levels of electronic text support increase students' reading comprehension outcomes and if so, which type of support is most effective? and (c) What are students' attitudes toward the use of comprehension strategies and an iPod Touch as measured by a structured student survey given to all participants across the different levels of electronic text support, including the no-intervention control group? This analysis includes two parts: (a) reading comprehension outcomes including results from two standardized measures (e.g., easyCBM and SRI) and the researcher developed multiple-choice probe measures, and (b) results from a student survey measure.

The reading comprehension data for this study were drawn from three sources: (a) the easyCBM , (b) Scholastic Reading Inventory (SRI), and (c) researcher developed multiple-choice probe measures. The easyCBM and SRI assessments are standardized

reading comprehension measures. The multiple-choice probe measure was researcher developed and specific to the stories used in the study.

The survey results from this study included responses from students on their perceptions of using iPod Touches for reading comprehension strategy instruction. Students from all four groups (i.e., three intervention groups and one comparison group) completed the survey.

Reading Comprehension Outcomes

Data for this study included two standardized reading assessments administered before and after the intervention: the easyCBM and the SRI. Both assessments are designed to measure reading comprehension. In addition, a researcher developed multiple-choice probe measure was administered after each story read during the intervention. Data from the standardized reading tests were analyzed using an Analysis of Variance (ANOVA) with group assignment as the between-groups factor. Participants were randomly assigned to one of three intervention groups. In addition, an intact comparison group that did not receive treatment was included as part of the research design. The multiple-choice probe measures data were analyzed descriptively because of limitations in the data collected.

Analysis of easyCBM Data

The easyCBM measure was administered to all students prior to the study as a pretest, and at the end of the study as a posttest measure. The highest raw score available on this measure is 20 points. The easyCBM pretest scores across all groups ($N = 158$) ranged from 0 to 20 with a mean of 14.93 and a standard deviation of 2.99. Posttest

easyCBM scores across all groups ($N = 149$) ranged from 0 to 19 with a mean of 13.54 and a standard deviation of 3.35.

Descriptive statistics for the easyCBM data. Table 1 presents the descriptive statistics for pre- and posttest easyCBM scores. The Notational Only (NO) treatment group ($N = 32$) had a pretest mean score of 15.0 with a standard deviation of 2.71. The Notational + Instructional (NI) treatment group ($N = 33$) had a pretest mean score of 14.09 with a standard deviation of 3.22. The Notational + Instructional + Translational (NIT) treatment group ($N = 33$) had a pretest mean score of 15.00 and a standard deviation of 2.87. The No Support (NS) comparison group ($N = 60$) had a pretest mean score of 15.32 with a standard deviation of 3.05.

The descriptive data in Table 1 indicate that posttest scores decreased slightly in every group. The Notational Only (NO) treatment group ($N = 32$) had a posttest mean score of 13.94 with a standard deviation of 2.76. The Notational + Instructional (NI) treatment group ($N = 27$) had a posttest mean score of 12.63 with a standard deviation of 4.26. The Notational + Instructional + Translational (NIT) treatment group ($N = 32$) had a posttest mean score of 13.13 and a standard deviation of 3.54. The No Support (NS) group ($N = 58$) had a posttest mean score of 13.97 with a standard deviation of 3.02. Table 4.1 displays the descriptive results of the easyCBM pre and posttest assessment.

Table 4.1

easy*CBM Pre and Post Mean and SD Scores*

	Pre-easyCBM			Post-easyCBM		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
Group 1 Notational Only (NO)	32	15.00	2.71	32	13.94	2.76
Group 2 Notational + Instructional (NI)	33	14.09	3.22	27	12.63	4.26
Group 3 Notational + Instructional + Translational (NIT)	33	15.00	2.87	32	13.13	3.54
Group 4 No Support (NS)	60	15.32	3.05	58	13.97	3.02
Total	158	14.93	2.99	149	13.54	3.35

ANOVA and ANCOVA results. A one-way ANOVA was conducted on the easyCBM reading comprehension pretest scores to determine if there were any preexisting differences among the four groups on their reading comprehension performance before the intervention. The result from the pretest ANOVA indicated no statistically significant differences in easyCBM reading comprehension scores among the groups with different levels of text support ($F(3,154) = 1.22, p > .05$). Table 4.2 reports the easyCBM pretest ANOVA results.

Table 4.2

easyCBM Pretest ANOVA Results

	Sum of Squares	df	Mean Square	Group Difference	Sig
Between Groups	32.52	3	10.84	1.22	.306
Within Groups	1371.71	154	8.92		
Total	1406.23	157			

To examine the intervention effects on reading comprehension measured by the easyCBM, an Analysis of Covariance (ANCOVA) was conducted on posttest scores. Although there were no statistically significant group differences in pretest, students' pretest scores were used as a covariate in the analysis of posttest scores in order to increase statistical power by controlling for any possible between-group variation among the four groups in the study (Green & Salkind, 2005). The result of this analysis indicates that there were no statistically significant differences on the posttest easyCBM scores ($F(3, 142) = 0.78, p > .05$) among the four groups. Table 4.3 reports the results from the posttest easyCBM ANCOVA results.

Table 4.3

easyCBM Posttest ANCOVA Results

	Sum of Squares	df	Mean Square	Group Difference	Sig
Pre easyCBM	423.32	1	423.32	50.80***	<.001
Group	19.59	3	6.53	0.78	.505
Error	1183.32	142	8.33		
Corrected Total	1652.26	146			

***$p < .001$

Analysis of Scholastic Reading Inventory Data

The Scholastic Reading Inventory (SRI) was also administered to all students as a pretest and posttest measure to assess students' reading comprehension. The highest raw score available on this measure is 1700 Lexiles. The SRI pretest scores across all groups ($N = 150$) ranged from 117 to 1404 with a mean of 907.85 and standard deviation of 244.24. Posttest SRI scores across all groups ($N = 152$) ranged from 241 to 1440 with a mean of 931.07 and a standard deviation of 239.21.

Descriptive statistics for the Scholastic Reading Inventory. Table 4.4 reports the descriptive data for the Scholastic Reading Inventory (SRI) measure. The Notational Only (NO) treatment group ($N = 32$) had a pretest mean score of 888.81 with a standard deviation of 214.81. The Notational + Instructional (NI) treatment group ($N = 33$) had a pretest mean score of 837.15 with a standard deviation of 272.70. The Notational + Instructional + Translational (NIT) treatment group ($N = 29$) had a pretest mean score of

1071.21 and a standard deviation of 205.55. The No Support (NS) comparison group (N = 56) had a pretest mean score of 875.80 with a standard deviation of 229.13.

The descriptive data in Table 4.4 indicate that posttest scores increased slightly in every group except the Notational + Instructional + Translational (NIT) group. This change in scores was not statistically significant, however. The Notational Only (NO) treatment group (N = 33) had a posttest mean score of 904.15 SD = 202.49. The Notational + Instructional (NI) treatment group (N = 32) had a posttest mean score of 879.09, SD = 282.79. The Notational + Instructional + Translational (NIT) treatment group (N = 33) had a posttest mean score of 1047.70, SD = 203.21. The No Support (NS) group (N = 54) had a posttest mean score of 907.06, SD = 203.21.

Table 4.4

Scholastic Reading Inventory (SRI) Pre and Posttest Descriptive Statistics

	Pre-test SRI scores			Posttest SRI Scores		
	N	*Mean*	*SD*	*N*	*Mean*	*SD*
Group1 Notational Only (NO)	32	888.81	214.81	33	904.15	202.49
Group 2 Notational + Instructional (NI)	33	837.15	272.70	32	879.09	282.79
Group 3 Notational + Instructional + Translational (NIT)	29	1071.21	205.55	33	1047.70	203.21
Group 4 No Support (NS)	56	875.80	229.13	54	907.06	203.21
Total	150	907.85	244.24	152	931.07	239.21

ANOVA and post hoc analysis results for the SRI measure. An ANOVA was performed in order to determine whether statistically significant differences existed among the four groups in the pretest SRI scores. Statistically significant differences were found at pretest on the SRI scores ($F(3, 146) = 6.22$, $p < .01$). These findings contrast with the findings from the easyCBM pretest results that showed no group differences. Table 4.5 depicts the SRI pretest ANOVA results.

Table 4.5

Scholastic Reading Inventory (SRI) Pretest ANOVA

	Sum of Squares	df	Mean Square	Group Difference	Sig
Between Groups	1.01	3	335976.69	6.22**	.001
Within Groups	7.88	146	53977.19		
Total	8.89	149			

** $p < .01$

A post hoc analysis procedure was conducted to determine the differences between specific groups. The Scheffé post hoc method was utilized because it corrects alpha for multiple pair-wise or simple comparisons of means (Stevens, 1999). This post hoc analysis confirms that a statistically significant difference was found between Group 2 (NI) and Group 3 (NIT) in which the mean difference is 168.60 ($p < .05$). All other

between group comparisons were not statistically significant. Table 4.6 reports the post hoc analysis for the pretest SRI scores.

Table 4.6

Multiple Comparisons of the Pretest SRI Scores from the Scheffé Post hoc Analysis

(I) Group	(J) Group	Mean Difference (I-J)	Standard Error	Sig
1 Notational Only (NO)	2	25.06	57.86	.979
	3	-143.55	57.42	.105
	4	-2.90	51.53	1.00
2 Notational + Instructional (NI)	1	-25.06	57.86	.979
	3	-168.60*	57.86	.041
	4	-27.96	52.03	.962
3 Notational + Instructional + Translational (NIT)	1	143.55	57.41	.105
	2	168.60*	57.86	.041
	4	140.64	51.53	.063
4 No Support (NS)	1	2.90	51.53	1.00
	2	27.96	52.03	.962
	3	-140.64	51.53	.063

*$p < .05$

An ANCOVA was conducted to examine the intervention effect using the pretest score as a covariate. After controlling for differences on pretest scores, no statistically significant differences were found between groups on the posttest SRI measure (F(3, 136)

Table 4.7

Posttest SRI ANCOVA Results

	Sum of Squares	df	Mean Square	Group Difference	Sig
Pre SRI	3.92	1	3.92	156.79***	<.001
Group	35583.96	3	11861.32	0.47	.701
Error	3.40	136	25027.08		
Corrected Total	8.13	140			

*** $p < .001$

Analysis of Multiple-choice Probe Measure Data

Each story used in the study had a corresponding10-item multiple-choice reading comprehension probe measure that students completed after they finished reading each story during the study. This measure was designed to determine how well students in the different intervention groups comprehended and remembered the story while participating in the study. Students were given as much time as needed to read each story and answer the 10-item multiple-choice reading comprehension probe measure. Thus, this data set revealed a high degree of variation among students and resulted in a wide discrepancy among the number of stories that students completed during the study. In addition, the number of 10-item multiple-choice probe measures, specific to each story, that were completed also varied greatly. For example, a total of 95 participants across all four groups completed the first story and each associated 10-item multiple-choice probe measure. Likewise, a total of 30 participants completed the sixth story and associated

probes. Because of this variation and significant missing data, the available data did not allow for a statistical test of group differences at either one time point or across time.

Figure 4.1 shows the total number of students, by group, that completed each story-specific set of 10-item multiple-choice probe measures. Participants in Group 1 (Notational Only, $N = 32$) completed a total of 82 stories and the corresponding 10-item multiple-choice probe measures for each story. Participants in Group 2 (Notational + Instructional, $N = 33$) completed a total of 52 measures and the corresponding 10-item multiple-choice probe measures for each story. Participants in Group 3 (Notational + Instructional + Translational, $N = 33$) completed a total of 90 stories and the corresponding 10-item multiple-choice probe measures for each story and participants in Group 4 (No Support, $N = 60$) completed a total of 279 stories and the corresponding 10-item multiple-choice probe measures for each story. Figure 4.1 graphically displays the number of multiple-choice measures completed by each group for each story and the associated 10-item multiple-choice probe measures.

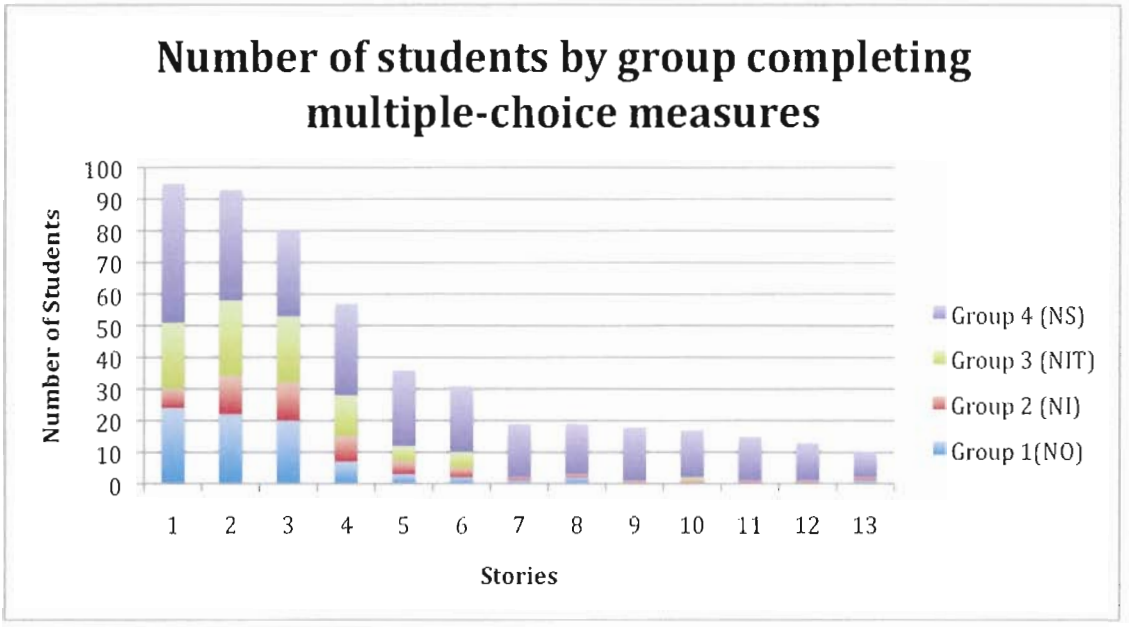

FIGURE 4.1. Number of students, by group, that completed each multiple-choice measure

Multiple-choice descriptive data. Multiple-choice probe measures were available for a total of 13 stories. Although the data set for this measure is incomplete, descriptive data are presented here. The complete table containing the mean scores, standard deviation, minimum and maximum scores of the multiple-choice probe measure data is available in Appendix E. Because of the high degree of performance variation on this measure, and the resulting missing data among the groups, only descriptive results are presented.

There were a total of 95 students across all groups that completed the 10-item multiple-choice probe measures for Story 1 (*Jackie Robinson*). Of these, the NO group (N = 24) had a mean score of 8.00 correct responses out of 10 total responses with a standard deviation of 1.29, the NI group (N = 6) had a mean score of 7.00 with a standard

deviation of 2.00, the NIT group ($N = 21$) had a mean score of 8.38 with a standard deviation of .74, and the NS group ($N = 44$) had a mean score of 7.68 with a standard deviation of 1.14.

There were 93 students who completed the 10-item multiple-choice probe measures for Story 2 (*Langston Terrace*). Of these, the NO group ($N = 22$) had a mean score of 7.64, with a standard deviation of 1.26, the NI group ($N = 12$) had a mean score of 7.17 with a standard deviation of 2.33, the NIT group ($N = 24$) had a mean score of 7.88 with a standard deviation of 1.78, and the NS group ($N = 35$) had a mean score of 7.03 with a standard deviation of 1.60.

There were 80 students who completed the 10-item multiple-choice probe measures for Story 3 (*Eleven*). Of these, the NO group ($N = 20$) had a mean score of 8.80, with a standard deviation of 1.36, the NI group ($N = 12$) had a mean score of 8.92 with a standard deviation of 1.51, the NIT group ($N = 21$) had a mean score of 9.05 with a standard deviation of 1.86, and the NS group ($N = 27$) had a mean score of 8.59 with a standard deviation of 1.78.

There were 57 students who completed the 10-item multiple-choice probe measures for Story 4 (*All American Slurp*). Of these, the NO group ($N = 7$) had a mean score of 6.57, with a standard deviation of 1.81, the NI group ($N = 8$) had a mean score of 9.13 with a standard deviation of 1.46, the NIT group ($N = 13$) had a mean score of 8.31 with a standard deviation of 2.90, and the NS group ($N = 29$) had a mean score of 7.14 with a standard deviation of 2.56.

There were 36 students who completed the 10-item multiple-choice probe measures for Story 5 (*The Pigman*). Of these, the NO group ($N = 3$) had a mean score of

8.33 with a standard deviation of 1.16, the NI group ($N = 4$) had a mean score of 9.25 with a standard deviation of .96, the NIT group ($N = 5$) had a mean score of 8.00 with a standard deviation of 2.00, and the NS group ($N = 24$) had a mean score of 7.33 with a standard deviation of 2.12.

There were 31 students who completed the 10-item multiple-choice probe measures for Story 6 (*James and the Giant Peach*). Of these, the NO group ($N = 2$) had a mean score of 9.00 with a standard deviation of 1.41, the NI group ($N = 3$) had a mean score of 9.00 with a standard deviation of 1.00, the NIT group ($N = 5$) had a mean score of 8.20 with a standard deviation of 1.30, and the NS group ($N = 21$) had a mean score of 7.81 with a standard deviation of 1.94.

There were 19 students who completed the 10-item multiple-choice probe measures for Story 7 (*Kinf of Mazy May*). Of these, the NO group ($N = 1$) had a mean score of 9.00, the NI group ($N = 1$) had a mean score of 8.00, the NIT group ($N = 0$) did not complete this measure, and the NS group ($N = 17$) had a mean score of 5.47 with a standard deviation of 2.18.

There were 19 students who completed the 10-item multiple-choice probe measures for Story 8 (*Black Cowboy Wild Horses*). Of these, the NO group ($N = 2$) had a mean score of 8.50 with a standard deviation of 2.12, the NI group ($N = 1$) had a mean score of 10.00, the NIT group ($N = 0$) did not complete this measure, and the NS group ($N = 16$) had a mean score of 6.56 with a standard deviation of 2.45.

There were 18 students who completed the 10-item multiple-choice probe measures for Story 9 (*The Case of Monkeys Falling From Trees).* Of these, the NO group did not complete the measure, the NI group ($N = 1$) had a mean score of 10.00, the NIT

group did not complete this measure, and the NS group ($N = 17$) had a mean score of 5.76 with a standard deviation of 3.35.

There were 17 students who completed 10-item multiple-choice probe measures for Story 10 (*Becky and the Wheels and Brakes Boys*). Of these, the NO group did not complete the measure, the NI group ($N = 1$) had a mean score of 9.00, the NIT group ($N = 1$) had a mean score of 9.00, and the NS group ($N = 15$) had a mean score of 5.47 with a standard deviation of 3.46.

There were 15 students who completed the 10-item multiple-choice probe measures for Story 11 (*Mowgli's Brothers*). Of these, the NO group did not complete the measure, the NI group ($N = 1$) had a mean score of 9.00, none of the members of the NIT group completed the measure, and the NS group ($N = 14$) had a mean score of 4.57 with a standard deviation of 2.85.

There were 13 students who completed the 10-item multiple-choice probe measures for Story 12 (*Jeremiah's Song*). Of these, the NO group ($N = 22$) did not complete the measure, the NI group ($N = 1$) had a mean score of 8.00, none of the NIT group members ($N = 24$) completed the measure, and the NS group ($N = 12$) had a mean score of 5.42 with a standard deviation of 3.18.

There were 10 students who completed the 10-item multiple-choice probe measures for Story 13 (*Lob's Girl*). Of these, the NO group ($N = 1$) had a mean score of 3.00, the NI group ($N = 1$) had a mean score of 8.00, none of the NIT group ($N = 24$) completed this measure, and the NS group ($N = 8$) had a mean score of 5.38 with a standard deviation of 3.74.

Student Survey Outcomes

Analysis of Likert Scale Item Survey Results

Upon completion of the study, all student participants were asked to complete a survey. This survey included five-point Likert scale items and open-ended questions. The Notational Only (NO) group survey included 10 Likert scale items and one open-ended question, the Notational + Instructional (NI) group survey included 11 Likert scale items and one open-ended question, the Notational + Instructional + Translational (NIT) group survey included 11 Likert scale items and one open-ended question. The No Support (NS) group survey included five Likert scale items and three open-ended items. Because not all groups received reading comprehension strategy instruction or the same level or type of electronic support, there was systematic variation in the questions included in the surveys given to each group. For example, Group 4 (No Support) was not asked how easy it was to learn the summarization strategy because they did not receive this instruction. Groups 1 (Notational Only), 2 (Notational + Instructional), and 4 (No Support) were not asked how often they listened to the story because these groups did not have the audio format of the stories.

The results are presented descriptively and also statistically for each item. Means and standard deviations are provided for each question and each group. Additionally, an ANOVA was conducted on the results of the survey to determine whether there were any statistically significant differences between the groups. For some variables, only two or three of the four groups were tested due to the differences in the surveys that were administered to the four individual groups. Statistically significant differences were

found in student responses to questions 1, 5, 8, and 10, and a Scheffé post hoc analysis procedure was conducted to determine specific group differences on these items.

Results from survey item 1. There were a total of 106 students that responded to survey item #1. This included participants from Group 1 (NO, $N = 32$), Group 2 (NI, $N = 37$), and Group 3 (NIT, $N = 37$). In general, students who received more instructional support responded more positively to the question that asked them to rate how easy it was to learn the summarization strategy. The mean for Group 1 was 3.12, and the standard deviation was 0.94. The mean for Group 2 was 3.59 with a standard deviation of 1.14, and the mean for Group 3 was 3.76 with a standard deviation of 0.93. The differences among these groups were statistically significant for this question ($F(2,103) = 3.55$, $p < .05$. Table 4.8 reports the descriptive and ANOVA results for survey item 1.

Table 4.8

Descriptive and ANOVA Results for Survey Item 1: "How easy was it to learn the summarization strategy?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	3.12	0.94		
Group 2 Notational + Instructional (NI)	37	3.59	1.14	$F(2,103) = 3.55$*	.032
Group 3 Notational + Instructional + Translational (NIT)	37	3.76	0.93		
Group 4 No Support (NS)	n/a	n/a	n/a		

* $p < .05$

Table 4.9 reports multiple group comparison results from the Scheffé post hoc analysis. A statistically significant difference was found between Group 1(NO) and Group 3 (NIT) for survey item 1 (mean difference = 0.63, $p < .05$). Students in Group 3 (NIT, $M = 3.76$, $SD = 0.93$) indicated that it was reportedly easier to learn the summarization strategy than students in Group 1 (NO, $M = 3.12$, $SD = 0.94$). No statistically significant difference was found between Group 1 (NO, $M = 3.12$) and Group 2 (NI, $M = 3.59$) or between Group 2 (NI, $M = 3.59$ and Group 3 (NIT, $M = 3.76$). Table 4.9 reports the post hoc analysis result of the comparison between these groups for survey item 1.

Table 4.9

Multiple Comparisons for Survey Item 1 from the Scheffé Post hoc Analysis

(I) Group	(J) Group	Difference (I-J)	Standard Error	Sig
1 Notational Only (NO)	2	-0.47	0.24	.162
	3	-0.63*	0.24	.039
2 Notational + Instructional (NI)	1	0.47	0.24	.162
	3	-0.16	0.24	.789
3 Notational + Instructional + Translational (NIT)	1	0.63*	0.24	.039
	2	0.16	0.26	.789

*$p < .05$

Results from survey item 2. A total of 106 students that responded to survey item #2 that included participants from Group 1(NO, $N = 32$), Group 2 (NI, $N = 37$), and Group 3 (NIT, $N = 37$). Of the three groups that answered this question, those who received instructional and notational supports responded the most positively when asked how much the summarization strategy helped them to remember the story. The mean for Group 1 (NO) was 2.66, with a standard deviation of 1.00, the mean for Group 2 (NI) was 3.05 with a standard deviation of 1.18, and the mean for Group 3 (NIT) was 2.57 with a standard deviation of 1.28. However, the differences among these three groups were not statistically significant for this question ($F(2,103) = 1.80$, $p > .05$). Table 4.10 reports the descriptive and ANOVA results for survey item 2.

Table 4.10

Descriptive and ANOVA Results for Survey Item 2: "How much did the summarization strategy help you remember the story?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	2.66	1.00		
Group 2 Notational + Instructional (NI)	37	3.05	1.18	$F(2,103) = 1.80$	.170
Group 3 Notational + Instructional + Translational (NIT)	37	2.57	1.28		
Group 4 No Support (NS)	n/a	n/a	n/a		

Results from survey item 3. A total of 106 students responded to survey item #3 and included participants from Group 1(NO, $N = 32$), Group 2 (NI, $N = 37$), and Group 3

(NIT, $N = 37$). In general, students who received the highest level of support (notational, instructional, and translational) responded more positively when asked how much the note-taking sheet helped them to remember the story. The mean for Group 1 was 2.66, with a standard deviation of 0.97, the mean for Group 2 was 2.97 with a standard deviation of 1.32, and the mean for Group 3 was 3.08 with a standard deviation of 1.32. However, these differences were not statistically significant ($F(2,103) = 1.09, p > .05$). Table 4.11 reports the descriptive and ANOVA results for survey item 3.

Table 4.11

Descriptive and ANOVA Results for Survey Item 3: "How much did the note-taking sheet help you remember the story?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	2.66	0.97		
Group 2 Notational + Instructional (NI)	37	2.97	1.32	$F(2,103) = 1.09$	.339
Group 3 Notational + Instructional + Translational (NIT)	37	3.08	1.32		
Group 4 No Support (NS)	n/a	n/a	n/a		

Results from survey item 4. A total of 74 students responded to survey item #4 and included participants from Group 2 (NI, $N = 37$), and Group 3 (NIT, $N = 37$). Group 1 (NO) and Group 4 (NS) were not asked this question as they did not receive reminders to use the note-taking sheet. Of the two groups who responded to this question, in general, Group 3 (NIT) responded the most positively to the question with a mean of 3.05 and a

standard deviation of 1.18. The mean for Group 2 was 2.76 with a standard deviation of 1.32. An independent-samples *t* test found no statistically significant differences between the groups ($t(72) = 1.02, p > .05$). Table 4.12 reports the descriptive results for survey item 4.

Table 4.12

Descriptive and ANOVA Results for Survey Item 4: "How helpful were the reminders to use the note-taking sheet?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	n/a	n/a	n/a		
Group 2 Notational + Instructional (NI)	37	2.76	1.32	$t(72) = 1.02$	.309
Group 3 Notational + Instructional + Translational (NIT)	37	3.05	1.18		
Group 4 No Support (NS)	n/a	n/a	n/a		

Results from survey item 5. A total of 159 students responded to survey item #5 and included participants from Group 1(NO, $N = 32$), Group 2 (NI, $N = 37$), Group 3 (NIT, $N = 37$), and Group 4 (NS, $N = 53$). Group 3 (NIT) responded the most positively to the question regarding the helpfulness of the note-taking sheet in remembering the story. The mean for Group 1 (NO) was 3.00, with a standard deviation of 1.16, the mean for Group 2 (NI) was 3.97 with a standard deviation of 1.04, the mean for Group 3 (NIT) was 4.04 with a standard deviation of 0.98, and the mean for Group 4 (NS) was 3.53 with a standard deviation of 1.38. The differences among the groups was statistically

significant for survey item 5 ($F(3, 155) = 5.19, p < .01$). Table 4.13 reports the descriptive and ANOVA results for survey item 5.

Table 4.13

Descriptive and ANOVA Results for Survey Item 5: "How often did you use the note-taking sheet?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	3.00	1.16		
Group 2 Notational + Instructional (NI)	37	3.97	1.04		
				$F(3, 155) = 5.19$**	.002
Group 3 Notational + Instructional + Translational (NIT)	37	4.04	0.98		
Group 4 No Support (NS)	53	3.53	1.38		

** $p < .01$

Because a statistically significant difference was found for Question 5, ($F(3,155) = 5.19, p < .01$), a post hoc analysis was performed. A statistically significant difference was found between Group 1 (Notational Only) and Group 2 (Notational + Instructional) where the mean difference was 0.97 ($p < .05$). Students in Group 2 ($M = 3.97$) showed significantly higher ratings on this survey question than students in Group 1 ($M = 3.00$). A statistically significant difference was also found between Group 1 (Notational Only) and Group 3 (Notational + Instructional + Translational) where the mean difference was 1.04 ($p < .05$). That is, students in Group 3 ($M = 4.04$) responded significantly higher on this survey question than students in Group 1 ($M = 3.00$). In general, Group 3 (Notational + Instructional + Translational) responded the most positively ($M = 4.04$) to

the item that asked how much they used the note-taking sheet and Group 2 (Notational + Instructional) had the second highest positive response (M = 3.97). The mean for Group 4 (No Support) was 3.53 and Group 1 (Notational Only) responded the least positively to this item with a mean of 3.00. Table 4.14 reports the result of the post hoc analysis for survey item 5.

Table 4.14

Multiple Comparisons for Survey Item 5 from the Scheffé Post hoc Analysis

(I) Group	(J) Group	Difference (I-J)	Standard Error	Sig
1 Notational Only (NO)	2	-0.97*	0.29	.011
	3	-1.04*	0.31	.013
	4	-0.53	0.27	.273
2 Notational + Instructional (NI)	1	0.97*	0.29	.011
	3	-0.06	0.30	.997
	4	0.44	0.26	.388
3 Notational + Instructional + Translational (NIT)	1	1.04*	0.31	.013
	2	0.06	0.30	.997
	4	0.51	0.28	.355
4 No Support (NS)	1	0.53	0.27	.273
	2	-0.44	0.26	.388
	3	-0.51	0.28	.355

*$p < .05$

Results from survey item 6. A total of 37 students responded to survey item #6 and included participants from Group 3 (Notational + Instructional + Translational) only. The mean for Group 3 was 4.05 with a standard deviation of 1.39. Table 4.15 reports the descriptive results for survey item 6.

Table 4.15

Descriptive Results for Survey Item 6: "How often did you just listen to the story?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	n/a	n/a	n/a		
Group 2 Notational + Instructional (NI)	n/a	n/a	n/a		
Group 3 Notational + Instructional + Translational (NIT)	37	4.05	1.39	n/a	n/a
Group 4 No Support (NS)	n/a	n/a	n/a		

Results from survey item 7. A total of 122 students responded to survey item #7 that included participants from Group 1(NO, $N = 32$), Group 2 (NI, $N = 37$), and Group 4 (NS, $N = 53$). In general, the No Support group (Group 4) responded the most positively to the question asking students how they felt about using the iPod Touch for this study. The mean for Group 1 was 2.97 with a standard deviation of 1.38, the mean for Group 2 was 3.35 with a standard deviation of 1.51, and the mean for Group 4 was 3.53 with a standard deviation of 1.38. The differences among the groups were not statistically

significant ($F(2, 119) = 1.55$, $p > .05$). Table 4.16 reports the descriptive and ANOVA results for survey item 7.

Table 4.16

Descriptive and ANOVA Results for Survey Item 7: "How did you feel about using the iPod Touch for this project?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	2.97	1.38		
Group 2 Notational + Instructional (NI)	37	3.35	1.51		
Group 3 Notational + Instructional + Translational (NIT)	n/a	n/a	n/a	$F(2, 119) = 1.55$	.216
Group 4 No Support (NS)	53	3.53	1.38		

Results from survey item 8. A total of 149 students responded to survey item #8 and included participants from Group 1 (NO, $N = 29$), Group 2 (NI, $N = 37$), Group 3 (NIT, $N = 37$), and Group 4 (NS, $N = 46$). In general, students who did not receive any support responded the most positively to this question asking how helpful it would have been to change the size of the font on the iPod Touch. The mean for Group 1 was 2.79 with a standard deviation of 1.32, the mean for Group 2 was 3.32 with a standard deviation of 1.44, the mean for Group 3 was 2.86 with a standard deviation of 1.44, and the mean for Group 4 was 3.72 with a standard deviation of 1.29. The differences among

the groups were statistically significant ($F(3, 145) = 3.85, p < .05$). Table 4.17 depicts the descriptive and ANOVA results for survey item 8.

Table 4.17

Descriptive and ANOVA Results for Survey Item 8: "How helpful would it have been to change the size of the font on the iPod Touch?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	29	2.79	1.32		
Group 2 Notational + Instructional (NI)	37	3.32	1.44		
Group 3 Notational + Instructional + Translational (NIT)	37	2.86	1.44	$F(3, 145) = 3.85$*	.011
Group 4 No Support (NS)	46	3.72	1.29		

* $p < .05$

Because statistically significant differences were found for survey item 8, ($F(3,145) = 3.85, p < .05$), a Scheffé post hoc procedure was used to evaluate pair-wise differences among the groups. A statistically significant difference was found between Group 1 (Notational Only) and Group 4 (No Support) (mean difference = 0.92, $p < .05$). That is, students in Group 4 ($M = 3.72$) had significantly higher ratings on this survey question than students in Group 1 ($M = 2.79$). There were no statistically significant differences between the other groups. Table 4.18 reports the Scheffé post hoc analysis for survey item 8.

Table 4.18

Multiple Comparisons for Survey Item 8 from the Scheffé Post hoc Analysis

(I) Group	(J) Group	Difference (I-J)	Standard Error	Sig
1 Notational Only (NO)	2	-0.53	0.34	.488
	3	-0.07	0.34	.998
	4	-0.92*	0.33	.048
2 Notational + Instructional (NI)	1	0.53	0.34	.488
	3	-0.46	0.32	.558
	4	-0.39	0.30	.641
3 Notational + Instructional + Translational (NIT)	1	0.07	0.34	.998
	2	-0.46	0.32	.558
	4	-0.85	0.30	.052
4 No Support (NS)	1	0.92*	0.33	.048
	2	0.39	0.30	.641
	3	0.85	0.30	.052

* $p < .05$

Results from survey item 9. A total of 159 students responded to survey item #9 and included participants from Group 1(NO, $N = 32$), Group 2 (NI, $N = 37$), Group 3 (NIT, $N = 37$), and Group 4 (NS, $N = 53$). Students in the group that received no support responded the most positively to the question asking how much they liked reading stories on the iPod Touch. The mean for Group 1 was 3.13 with a standard deviation of 1.53, the

mean for Group 2 was 3.54 with a standard deviation of 1.54, the mean for Group 3 was 3.41 with a standard deviation of 1.59, and the mean for Group 4 was 3.92 with a standard deviation of 1.21. However, the differences among the groups were not statistically significant for this question ($F(3, 155) = 2.14$, $p > .05$). Table 4.19 reports the descriptive and ANOVA results for survey item 9.

Table 4.19

Descriptive and ANOVA Results for Survey Item 9: "How much did you like reading the stories on an iPod Touch?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	32	3.13	1.53		
Group 2 Notational + Instructional (NI)	37	3.54	1.54		
Group 3 Notational + Instructional + Translational (NIT)	37	3.41	1.59	$F(3, 155) = 2.14$	.097
Group 4 No Support (NS)	53	3.92	1.21		

Results from survey item 10. A total of 157 students responded to survey item #10 and included participants from Group 1 (NO, $N = 30$), Group 2 (NI, $N = 37$), Group 3 (NIT, $N = 37$), and Group 4 (NS, $N = 53$). Students in the No Support group responded the most positively to the question asking students if they thought they became a better reader by participating in this study. The mean for Group 1 (Notational Only) was 1.73 with a standard deviation of 0.87, the mean for Group 2 (Notational + Instructional) was

2.84 with a standard deviation of 1.34, the mean for Group 3 (Notational + Instructional + Translational) was 2.32 with a standard deviation of 1.08, and the mean for Group 4 (No Support) was 2.80 with a standard deviation of 1.20. The differences among groups were statistically significant for this question ($F(3, 153) = 6.55, p < .001$). Table 4.20 reports the descriptive and ANOVA results for survey item 10.

Table 4.20

Descriptive and ANOVA Results for Survey Item 10: "Do you think you became a better reader by participating in this study?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	30	1.73	0.87		
Group 2 Notational + Instructional (NI)	37	2.84	1.34		
Group 3 Notational + Instructional + Translational (NIT)	37	2.32	1.08	$F(3, 153) = 6.65^{***}$	.000
Group 4 No Support (NS)	53	2.80	1.20		

$^{***} p < .001$

Because of a statistically significant difference in scores ($p < .001$) on survey item 10, a post hoc analysis was performed to examine specific group comparisons. This analysis revealed a statistically significant difference between Group 1 (Notational Only, $M = 1.73$) and Group 2 (Notational + Instructional, $M = 2.84$) where the mean difference was 1.10 ($p < .01$). Students in Group 2 (Notational + Instructional, $M = 2.84$) had

significantly higher ratings on this survey question than students in Group 1 (Notational Only, $M = 1.73$). A statistically significant difference also existed between Group 1 (Notational Only, $M = 1.73$) and Group 4 (No Support, $M = 2.80$) where the mean difference was 1.07 ($p < .01$). Students in Group 4 (No Support, $M = 2.80$) had significantly higher ratings on this survey question than students in Group 1 (Notational Only, $M = 1.73$). The post hoc analysis results for survey item 10 are shown in Table 4.21.

Table 4.21

Multiple Comparisons for Survey Item10 from the Scheffé Post hoc Analysis

(I) Group	(J) Group	Difference (I-J)	Standard Error	Sig
1 Notational Only (NO)	2	-1.10**	0.28	.002
	3	-0.59	0.28	.229
	4	-1.07**	0.28	.003
2 Notational + Instructional (NI)	1	1.10**	0.28	.002
	3	0.51	0.27	.302
	4	0.04	0.26	.999
3 Notational + Instructional + Translational (NIT)	1	0.59	0.28	.229
	2	-0.51	0.27	.302
	4	-0.48	0.26	.354
4 No Support (NS)	1	1.07*	0.28	.003
	2	-0.04	0.26	.999
	3	0.48	0.26	.354

** $p < .0$

Results from survey item 11. A total of 104 students responded to survey item #10 and included participants from Group 1(NO, $N = 30$), Group 2 (NI, $N = 37$), and Group 3 (NIT, $N = 37$). In general, students who received the most text support responded more positively to the question asking how often they thought they would use the summarization strategy in other classes. The mean for Group 1(Notational Only) was

1.73 with a standard deviation of 0.87, the mean for Group 2 (Notational + Instructional) was 2.41 with a standard deviation of 1.67, and the mean for Group 3 (Notational + Instructional + Translational) was 2.11 with a standard deviation of 1.24. The differences among the groups was not statistically significant ($F(2, 101) = 2.99, p > .05$). Table 4.22 reports the descriptive and ANOVA results for survey item 11.

Table 4.22

Descriptive and ANOVA Results for Survey Item 11: "How much do you think you will use the summarization strategy in other classes?"

Groups	N	Mean	SD	Group Difference	*p*
Group 1 Notational Only (NO)	30	1.73	0.87		
Group 2 Notational + Instructional (NI)	37	2.41	1.67		
Group 3 Notational + Instructional + Translational (NIT)	37	2.11	1.24	$F(2, 101) = 2.99$	.055
Group 4 No Support (NS)	n/a	n/a	n/a		

Results from survey items specific to the No Support (NS) group The No Support (NS) group did not receive instruction on the summarization strategy. However, they were provided with the note-taking sheets and given the instruction that they could use the sheet if they desired but they were not given instruction on how to use the sheet or an explanation of its purpose. This group permitted an examination of the effectiveness of the summarization strategy instruction for the intervention groups as well as to examine the benefit of providing a form of notational text support for all groups.

In addition to the questions asked of all the groups, the NS group responded to the following items: (1) Please rank how often you used the note-taking sheet, (2) If you did NOT use the note-taking sheet, please explain why and, (3) If you did use the note-taking sheet, how helpful to do you think it was? The first question asked participants to rank how often they used the note-taking sheet on a scale of 1 = not at all, to 5 = all the time. Of the participants in the NS group ($N = 53$), 28 indicated that they did not use the note-taking sheet at all by choosing 1 as their response, 3 students chose 2 indicating that they used the note-taking sheet very little. Six students chose 3 indicating that they used the note-taking sheet sometimes, six students chose 4 indicating that they used the note-taking sheet fairly often, and 10 students chose 5 indicating that they used the note-taking sheet all the time. Table 4.23 reports the responses from the NS group to the survey item asking how often they used the note-taking sheet.

Table 4.23

No Support Comparison Group Survey Response about the Frequency of Note Taking

Total Number of students	1 = not at all	2	3	4	5 = all the time
53	28	3	6	6	10

The NS group was also asked to explain why they did or did not use the note-taking sheet in an open-ended question format. Students who did not use the note-taking sheet, as indicated by a response of 1 or 2, wrote that: (a) they did not know how to use it ($N = 3$), (b) they could remember the stories easily without the support ($N = 6$), (c) the

sheet confused them ($N = 1$), (d) the note-taking sheet was not helpful ($N = 7$), and (c) they did not want to use it ($N = 1$). Students who sometimes used the note-taking sheet as indicated by a response of 3, wrote that: (a) they could remember the stories easily without the support ($N = 1$), (b) it wasn't helpful ($N = 1$), and (c) it helped them to remember ($N = 1$). Students who mostly used the note-taking sheet as indicated by a response of 4 or 5 responded that: (a) they did not know how to use the sheet ($N = 4$), (b) they could remember the stories easily ($N = 2$), (c) it wasn't helpful ($N = 2$), (d) it helped them to remember the story ($N = 2$). Table 4.24 reports student responses to the open-ended survey item asking them why they did or did not use the note-taking sheet.

Table 4.24

Student Responses by Category as to Why They Did or Did Not Use the Note-taking Sheet

Responses by category	Students who did NOT use the note-taking sheet (responded 1 or 2)	Students who sometimes used the note-taking sheet (responded with a 3)	Students who mostly used the note-taking sheet (responded with a 4 or 5)
Did not know how to use	3	0	4
Can remember stories easily	6	1	2
Confused me	1	0	0
Wasn't helpful	7	1	2
Didn't want to use	1	0	0
Helped me to remember	0	1	2

Survey Responses Regarding the Efficacy of Using iPod Touches in School

The student survey also included an open-ended question for all groups. Students were asked to respond to the following question, "What are some other ways iPod Touches could be used in school?" These responses were categorized and the results are reported in Table 24. The categories are somewhat general so if a student indicated that the iPod Touch could be used as a calculator, that response was categorized as a 'Math' response. If students responded that they could "find out things on the internet", that was categorized as Research regardless of the subject area. Similarly, any task that was related to writing, such as spelling, was included in the writing category. Using a dictionary and studying vocabulary were grouped in the Writing category, although they could have also been included in the Reading category. Responses that had to do with calendars, maps, schedules or assignments were included in the Organization category. Any responses that were related to the idea of having a mobile tool or not having to go to the computer lab or use a laptop were included in the Accessibility category. In some cases, the total number of responses may be greater than the total number of students because students may have given more than one answer.

Overall, the Math category received the largest number of responses ($N = 30$), followed by Taking Tests ($N = 25$), Research ($N = 24$), and Reading ($N = 24$). The next highest number of responses fell in the Accessibility category ($N = 9$), followed by Writing ($N = 7$), Educational Games ($N = 7$), and Organization ($N = 6$). Categories receiving five or fewer responses included Note taking ($N = 5$), Sharing Information ($N = 5$), Replace a Textbook ($N = 4$), Watch Video ($N = 4$), Science ($N = 3$), and Music ($N =$

3). Table 4.25 reports the student responses to the open-ended question of how students could use iPod Touches in other ways at school.

Table 4.25

Survey Responses to "Other Ways to Use iPod Touches in School" Item Responses by Group

Response Categories	Group 1 (Notational Only) NO	Group 2 (Notational + Instructional) NI	Group 3 (Notational + Instructional + Translational) NIT	Group 4 (No Support) NS	Total Number of Responses
Math	7	6	8	9	30
Science	0	1	1	1	3
Research	6	9	5	4	24
Sharing Information	1	2	1	1	5
Take tests	6	4	8	7	25
Educational Games	0	3	1	3	7
Reading	4	3	6	7	20
Video	0	1	1	2	4
Writing (spelling, vocabulary, dictionary)	0	4	3	0	7
Note taking	0	1	2	2	5
Music	1	0	0	2	3
Organization	0	2	1	3	6
Accessibility	0	2	2	5	9
Instead of a textbook	1	0	0	3	4

CHAPTER V

DISCUSSION

I designed this study to examine the following research questions: (a) Does providing explicit reading comprehension strategy instruction using an iPod Touch increase students' reading comprehension outcomes based on standardized reading comprehension tests and a multiple-choice probe measure when compared to a No Support comparison group? (b) Does providing different types of electronic text support increase students' reading comprehension outcomes and if so, which type of support is most effective? (c) Do students' attitudes toward learning a comprehension strategy and receiving different types of text support using an iPod Touch vary significantly as measured by a structured student survey given to all participants across the different levels of electronic text support, including the No Support comparison group? This section reviews the findings of the reading comprehension and student survey measures and discusses the research questions.

Reading Comprehension Outcome Differences Between Intervention and Comparison Groups

The results of this study indicate that providing explicit reading comprehension strategy instruction to sixth-grade students using an iPod Touch did not demonstrate a statistically significant difference in their reading comprehension scores as measured by

standardized reading comprehension tests when compared to the No Support comparison group. This study utilized two standardized quantitative reading comprehension measures, the easyCBM and the Scholastic Reading Inventory (SRI) to determine if there were statistically significant differences between the groups at pretest and to determine if there was an intervention effect among the four groups. Both measures are specifically designed to measure reading comprehension outcomes. Students in each of the four groups completed a pretest and posttest for each reading comprehension measure.

Group Differences on the easyCBM Measure

Students' reading comprehension scores in all groups decreased from pretest to posttest as measured by the easyCBM. This was an unexpected result as I anticipated that the reading comprehension scores for students in all participating groups would have, at a minimum, remained approximately the same and that the intervention groups would experience an overall increase in their reading comprehension scores.

It is possible that the standardized measure was not the most appropriate assessment instrument for this intervention. The easyCBM measure is generally utilized for benchmarking approximately three times a year. The fall reading passage was 1764 words in length and included 20 multiple-choice reading comprehension questions. Students report anecdotally that they dislike this assessment because it can take up to two class periods to finish. Because students had to complete this assessment twice within a five-week period, there is a possibility that students did not put forth their best effort.

Pearson, Ferdig, Blomeyer, and Moran (2005) conducted a meta-analysis of 20 research articles related to the use of digital tools and the learning environment for the purpose of enhancing literacy. They suggest that, in general, standardized tests are not

instructionally valid as they do not adequately measure the efficacy of instructional interventions that utilize technology. Standardized tests must include large sample sizes and be reliable across a range of populations and are not generally designed to measure specific instructional interventions. Conversely, researcher-developed measures are specifically designed to determine differences in student achievement based on instructional interventions.

Research suggests that providing explicit reading comprehension instruction (Biancarosa & Snow, 2000; Kamil et al, 2008; NRP, 2000a) improves student's reading comprehension outcomes. However, there were no statistically significant differences between any of the intervention groups (i.e, NO, NI, NIT) and the No Support comparison group on the reading comprehension scores as measured by the easyCBM reading comprehension assessment to indicate that the summarization strategy instruction was effective. Although the No Support Group used the iPod Touch, it did not receive training on the summarization strategy, nor did they utilize any of the text-based supports.

Group Differences on the Scholastic Reading Inventory Measure

Although the SRI posttest results showed small reading comprehension mean score increases in the Notational Only, Notational + Instructional, and No Support groups, they were not statistically significant nor was the decrease in the Notational + Instructional + Translational (NIT) group's mean score statistically significant. The four groups' (NO, NI, NIT, and NS) SRI results did not produce statistically significant differences to indicate that the summarization strategy instruction was effective.

The SRI was chosen as one of the standardized measures for this study because it is expected to be more sensitive to smaller changes in student's reading comprehension than the easyCBM measure. This measure is also more 'text friendly' to students as each question consists of a single paragraph with a corresponding multiple-choice question. Students continue to read paragraphs and answer questions as the measure adjusts to make the questions more or less difficult based on a student's response. Because of the SRI's increased sensitivity to reading comprehension instruction, I expected that students would improve their reading comprehension outcome scores. The lack of statistically significant differences in reading comprehension scores indicates that the summarization strategy instruction was not sufficiently effective to increase the reading comprehension scores among the intervention groups.

Group Differences on the Multiple-choice Probe Measure

This data set revealed a high degree of performance variation among students and resulted in a wide discrepancy in the number of measures that students completed during the study. Due to the lack of sufficient data, inferential statistics analysis could not be conducted.

The probe measure results were unexpected. This measure was intended to provide more intervention sensitive data on student's reading comprehension of the stories they read and replicate what typically happens during comprehension instruction in a classroom. According to Pearson, Ferdig, Blomeyer, and Moran (2005), researcher-developed measures tend to be more sensitive to intervention effects. The original intent was to have specific point in time data as well as data on the time it took each student to read each story that could be compared across the intervention and No Support groups.

However, the students took much longer to read the individual stories and complete the accompanying probe measure than anticipated and this limited the amount of probe measure data that were available for analysis. Moreover, the logistics of gathering time data for each student's story reading became difficult to manage and labor intensive. The large amount of missing data, especially from the Notational + Instructional group, was problematic. Students were given as much time as they required to read each story and essentially read and worked at their own pace. Students may have been able to complete more stories if they had received teacher direction and encouragement to finish the task.

The reading probe measures were researcher-developed and did not have established reliability or validity. It may have been helpful if other teachers and researchers evaluated the questions prior to the study's implementation in order to determine their appropriateness. It also would have been helpful if the questions had been piloted prior to their use in this study. Results from a pilot study would help establish some degree of validity and reliability.

Reading Comprehension Outcomes Summary

Research suggests that providing explicit reading comprehension instruction (Biancarosa & Snow, 2000; Kamil et al, 2008; NRP, 2000a) improves student's reading comprehension outcomes. However, the data from the reading comprehension measures did not reveal any statistically significant differences between the intervention groups that received this kind of instruction and the No Support group that did not receive instruction. While it is difficult to identify a particular reason for this outcome, the results suggest that no text support is as effective as receiving text-based support. Thus, one could argue that the results of this study suggest that explicit summarization instruction

and text support are not necessary. In fact, a more efficient strategy that does not require instructional time and teacher training is equally effective; that is, the use of an iPod Touch only.

Differences in Reading Comprehension Outcomes and Type of Text Support

The efficacy of supported text is supported by research (Anderson-Inman & Horney, 2007; Boyle et al., 2003; Silver-Pacuilla, Ruedel & Mistrett, 2004) and this study incorporated three types of text support: instructional, notational, and translational. However, the results of this study did not indicate any statistically significant differences on reading comprehension outcomes between the three intervention groups and the No Support comparison group based on the type of text support they received.

Completion of the story probes during intervention varied widely between the No Support group and the intervention groups and among the Notational Only, Notational + Instructional, and Notational + Instructional + Translational groups. The No Support group completed the most stories ($n = 279$), and had a mean score of 6.42 across all stories. The Notational Only group completed 82 stories and had a mean score of 8.12 across all stories. The Notational + Instructional group completed 52 stories and had a mean score of 8.3 across all stories. The Notational + Instructional + Translational group completed 90 stories and had a mean score of 8.3 across all stories.

As a group, the Notational + Instructional students completed approximately 30 fewer stories than the other intervention groups. Although there is no readily apparent reason to explain this outcome, it is possible that being prompted to fill out the note-taking sheet and stopping their reading to do this, resulted in increased fatigue and a

lower completion rate. The repetitive nature of the task may have contributed to this group's lower completion rate as well. The Notational Only group was given the note-taking sheet but not prompted to use it at regular intervals so its use was entirely student determined. The Notational + Instructional + Translational group also had audio support and this may have mitigated the cognitive load they had to expend on the actual decoding and comprehension of the reading process. This group also completed the largest number of stories and multiple-choice measures among the intervention groups. Finally, based on the number of multiple-choice measures that were completed, it appears the No Support group read more stories than the other groups.

The instructional, notational, and translational text supports were included in this study because it would be fairly manageable for a classroom teacher to incorporate them. It is possible that other types of support may have been more effective. From an instructional viewpoint, it may be more beneficial to provide specific types of text support tailored to a student's particular learning needs and styles (Manset-Williamson & Nelson, 2005).

Group Differences in Student Survey Responses

The student survey was administered in order to examine whether students' attitudes toward learning the summarization reading comprehension strategy and receiving different types of text support using an iPod Touch varied significantly. Statistically significant differences among survey responses were found for four of the 11 survey items.

Student Survey Items with Significant Differences Among Groups

Students indicated that providing additional text support increased their perception that learning the reading comprehension strategy was easy. Survey item 1 asked students to respond to the question of how easy it was to learn the summarization strategy. For this item, the Notational + Instructional + Translational (NIT) group responded most positively ($M = 3.76$), followed by the Notational + Instructional (NI) group ($M = 3.59$) and the Notational Only (NO) group ($M = 3.12$). There was a statistically significant difference ($p < .05$) between Group 1 (Notational Only) and Group 3 (Notational + Instructional + Translational) only on this item. From a student's perspective it appears that providing additional text support as they learn and practice reading comprehension strategies may help them to learn the strategy more easily.

The groups that received the highest level of text support (NIT and NI) responded the most positively to the survey question asking them to rank how often they used the note-taking sheet (survey item #5). Students in the Notational + Instructional + Translational group responded the most positively to this item ($M = 4.04$), followed by the Notational + Instructional group ($M = 3.97$), the No Support group ($M = 3.53$) and the Notational Only group ($M = 3.00$). A statistically significant difference ($p < .05$) was found between Group 1(NO) and Group 2 (NI) as well as between Group1 (NO) and Group 3 (NIT) ($p < .05$).

Providing instructional support in the form of embedded prompts as well as translational support in the form of an audio version of the story and the prompts resulted in higher positive responses from students in the group that received this support. Providing instructional text support to students as they learned and practiced reading

comprehension strategies was perceived by students to improve their reading comprehension.

Students in the No Support (NS) group responded most positively ($M = 3.72$) to survey item 8 that asked how helpful it would have been to change the font size on the iPod Touch. Students in the Notational + Instructional group ($M = 3.32$) responded with the next highest rating, followed by the Notational + Instructional + Translational group ($M = 2.86$), and the Notational Only group ($M = 2.79$). A significant difference ($p < .05$) was found between Group 1 (NO) and Group 4 (NIT) for this survey item.

Providing translational support to students appears to lessen their perceived need to adjust the font size of the text as they read using an iPod Touch. Teachers who use a similar format to deliver reading comprehension strategy should be aware of font adjustment limitations but also realize that providing translational, or audio, support may assist in overcoming this constraint.

Students in the Notational + Instructional (NI) group responded the most positively ($M = 2.84$) to survey item 10 that asked students whether they thought they became a better reader by participating in the study. Students in the No Support group ($M = 2.80$), provided the next highest ranking, followed by the Notational + Instructional + Translational group ($M = 2.32$), and the Notational Only group ($M = 1.73$). Thus, of the four groups, it appears that the group that received the most support (notational, instructional and translational) was ranked last in their perception of being a better reader by virtue of participating in the study.

For survey questions #1, 5, 8, 10, the Notational Only (NO) group provided the least positive responses. This group received the same reading comprehension strategy

instruction as the other intervention groups as well as the notational support but their story text did not include prompts reminding them to use the notational support. Providing the prompts appeared to increase the perception of students in the Notational + Instructional (NI) and Notational + Instructional + Translational (NIT) groups that the note-taking summarization strategy was a useful reading comprehension strategy.

It appears that providing instruction in a specific reading comprehension strategy instruction does not necessarily mean that students will utilize the accompanying notational support. Providing instructional support in the form of embedded prompts in conjunction with notational support may be more effective in helping students utilize a reading comprehension strategy.

Student Survey Responses Differences Summary

Providing text support was perceived as being positive as indicated by the student survey response data. From the available data, the NIT group appeared to increase their reading comprehension strategy use more than students in the other three groups as indicated by their higher responses on the student survey. This group, as a whole, gave the highest positive rankings regarding the use of the summarization strategy, the note-taking sheet, and the embedded reminders perhaps indicating that providing additional text support may prove to be beneficial in some cases.

Limitations

Threats to Internal and External Validity

The design of this study incorporated the following components in order to address potential internal and external validity threats: (a) participant selection and

assignment, and (b) fidelity of implementation. Although these components were designed to mitigate validity threats, unexpected circumstances did affect the results. These unexpected circumstances involved: (a) the length of the study and (b) the ability of students to complete the reading passages.

Group selection. All sixth-grade students at this middle school participated in the study. The students in the morning intervention groups were randomly assigned to groups. Then, these groups were randomly assigned to type of intervention. Due to constraints imposed by the school schedule, it was not feasible to randomly assign the afternoon students to an intervention group thus these participants were included as an intact group and functioned as a comparison group, which created a quasi-experimental group.

The participants in this study included five sections of demographically similar sixth-grade students who comprised three intervention groups and one intact quasi-experimental comparison group. However, the afternoon comparison group was larger (N = 67) than the morning intervention groups (N = 34). The three morning intervention groups had more special education (SPED) identified students (N = 21) than the afternoon group (N = 6). This difference occurred because of the school's math class schedule as the Special Education students' assigned math class occurred in the afternoon. These students are typical of the overall population of their sixth through eighth grade middle school and representative of the district where the school is located. However, the results of this study should be applied carefully to other schools and settings. Table 5.1 displays the demographics of the participating students.

Table 5.1

Student Participant Demographics Among Groups

	N	Gender		Ethnicity						IEP
		F	M	White	Black	Hispanic	American Indian	Asian	Unspecified	
Group 1 – NO	34	14	19	27	3	2	1	0	0	6
Group 2 – NI	34	18	16	24	1	4	2	1	1	10
Group 3 – NIT	34	13	21	24	0	1	3	3	3	5
Group 4 - NS	61	35	26	49	4	3	2	2	2	5

Fidelity of implementation. A serious threat to validity can occur due to variation between teachers and their individual methods and styles of instruction. To mitigate this confound all summarization strategy instruction was delivered via recorded lessons on the iPod Touch. All students in the three intervention groups received this instruction during the first two days of implementation. Teachers acted as classroom managers to ensure that the physical needs of the study were met: charging the devices, distributing and collecting the multiple-choice measures, and providing note-taking forms. They did not provide summarization strategy instruction nor did they assist students in completing the note-taking forms. Teachers of the No Support group were carefully instructed to not provide any assistance to students regarding the use of the note-taking sheet beyond being told that they could use the form if they wanted to.

Although teachers acted primarily as classroom managers during this study, expanding their role could have improved the data collection process, as the lack of usable probe measure data was problematic. It was found that most students required more than one session to complete each story and the corresponding probe measure. More data could have been collected if each story had been read within one session and the accompanying probe measure administered. This would entail modifying the reading passages so they could be completed during one session. More consistent and comparable data could be gathered if teachers monitored each student's progress and ensured that each student submitted a probe measure at the conclusion of each session.

I observed each classroom at least six times over the course of the study. In each classroom students followed a similar protocol of finding their seats, receiving their iPod Touch and note-taking form and beginning to read and/or listen to the stories. Students also received a form that listed the order they should follow when reading the stories. This was done to help students follow a consistent progression through the stories in order to accurately compare their multiple-choice measure scores. A potential threat to internal validity could arise if students had received additional instruction on the summarization strategy or prompting in how to complete the note-taking form. However, there were no observed instances of this occurring.

Unexpected Circumstances

This research study was designed for a three-week intervention period consisting of a daily 20-minute session and resulting in 15 sessions overall. Due to unanticipated changes in the school schedule, the 15 sessions were interrupted by shortened days and other release days in which students were not at school. Therefore, the 15 sessions were

spread out over a four and half week period rather than the originally planned three weeks.

In addition to the disruptions in the schedule, there was a high degree of performance variation among the number of multiple-choice probe measures completed across groups. Although it was expected that the stories would be read in one or two sessions, many students required longer periods of time to complete them. This limited the amount of data that could be collected. In order to collect valid repeated measures data, the stories need to be shorter in length so they could be read within a single intervention session and the accompanying probe measure data collected. This may have yielded a larger number of valid data points and allowed a statistical analysis of the outcomes.

Appropriateness of the Summarization Strategy Instructional Support

Providing reading comprehension strategy instruction to middle school students is challenging as it is generally expected that students have already learned these skills. However, some of these students continue to struggle with reading comprehension. Providing explicit reading comprehension strategy instruction to these students is recommended by a number of sources (Biancarosa & Snow, 2006; Kamil et al., 2008; NRP, 2000, 2006). However, choosing the specific reading comprehension strategy for a specific group of students can be difficult.

The "1-2 Summarization Strategy" was chosen as the reading comprehension strategy for this study based on research from a variety of sources (Jitendra, Hoppes, & Xin, 2000; Malone & Mastropieri, 1992; Pressley, 1998). However, the strategy was applied in a general manner to the entire group of participating students. Increased

student reading comprehension growth may have occurred if students had been assessed to determine their specific skill level and need and this information used to determine the most appropriate strategy instruction to deliver.

Implications for Practice

As an educator with experience teaching middle school students who struggle with reading comprehension, I focus a great deal of attention on potential tools and strategies that might be beneficial for this group. Because the iPod Touch is a socially acceptable device that has shown to be advantageous in action research (Becker & Finnegan, 2005; Patten & Craig, 2007; Vess, 2005) and because reading comprehension research demonstrates the importance of explicit reading comprehension strategy instruction (Biancarosa & Snow, 2004; Kamil et al, 2008, National Reading Panel, 200b), my goal was to provide reading comprehension strategy instruction with electronic text supports (Anderson-Inman & Horney, 2007) using iPod Touches to determine whether this would result in higher reading comprehension outcomes as measured by standardized and researcher-developed measures. I hypothesized that providing instructional, notational, and translational electronic text supports would improve student's reading comprehension outcomes.

This study, however, did not produce any statistically significant differences among groups. Based on applicable research and teacher reports, the use of the iPod Touch to deliver this kind of instruction and text support continues to hold some promise as a teaching tool. It is noteworthy that the results did indicate that students enjoyed using the iPod Touch. Students also suggested numbers of ways in which an iPod Touch could

be used for other school-related activities such as research, taking notes, organizing, as well as reading. This response may indicate that there may be wider applications of this tool in educational settings.

Providing Supported eText Resources

This study incorporated three of the eleven suggested eText resources that Anderson-Inman and Horney (2000) identified. These three were chosen because of their potential for supporting students in improving their reading comprehension and their adaptability to the iPod Touch format.

There is potential for incorporating more or a different combination of digital text supports on this portable handheld device. For example, the video capabilities of the iPod Touch would be useful when providing Illustrative resources (i.e., pictures or video). Students could also have access to Explanatory or Enrichment resources.

Future Research

Technology use, across North America and around the world, is increasing. Devices that once were exorbitantly priced and available to a limited clientele have become relatively inexpensive and commonly used. Educational organizations are also beginning to use technology for tasks as diverse as taking online assessments to creating multi-media. Technology has long been viewed as having great potential for learning and as the software and hardware become more usable and available, its applications become more widespread as well. However, continued research into its efficacy and benefits is needed in order to ensure appropriate and applicable pedagogical use. This study was an

initial attempt to determine a specific niche use of the iPod Touch to provide reading comprehension strategy instruction and electronic text support.

Schools from pre-Kindergarten to universities are finding new and innovative ways to utilize iPod Touches in education. Despite enthusiastic anecdotal reports of the benefits of utilizing the iPod Touch, empirical research using this device is scarce. There is a need for further research to determine the most effective ways to use this device and the reading comprehension strategies and electronic text supports that will be most beneficial to improve student's reading comprehension outcomes. This study suggests that the use of the iPod Touch coupled with form of notional, instructional and translational electronic text supports is no more effective than simply using the iPod Touch alone.

APPENDIX A

SCRIPT FOR INSTRUCTIONAL PHASE – DAY 1

The following is the instructional script that will be used when students first begin the intervention. The italicized text is the researcher's instruction and the regular text is the story itself.

I'm going to read a story called, "The Fall of the Hindenburg". While I read it, I'm going to use the "1-2 Reading Strategy" to help me remember what I read. This strategy is like a trick to help me remember what the story is about. I know that good readers do this when they read.

When I use the strategy I'm going to figure out who or what the part I just read is about and then find 2 details about that. I'll do this while I read and then when I finish the story, I'll write a sentence or 2 that tells about the while story.

Okay, here goes.

On May 6, 1937, the German airship Hindenburg burst into flames 200 feet over its intended landing spot at New Jersey's Lakehurst Naval Air Station. Thirty-five people on board were killed (13 passengers and 22 crewmen), along with one crewman on the ground.

I need to use the "1-2 Strategy".

Step 1: Ask myself, who or what is this story about?
I think it's about a German airship called the Hindenburg.

Now I'll do Step 2 and find 2 details.

Step 2: Find 2 details that tell more about the who or what.
Detail 1: It happened in 1937 in New Jersey
Detail 2: about 35 people died.

Now I'll keep reading.

803 Feet Long and 242 Tons. The giant flying vessel measured 803.8 feet in length and weighed approximately 242 tons. Its mostly metal frame was filled with hydrogen. It

came complete with sleeping quarters, a library, dining room, and a magnificent lounge, but still managed a top speed of just over 80 miles per hour. The zeppelin had just crossed the Atlantic Ocean after taking off from Frankfurt, Germany 2 1/2 days prior on its first transatlantic voyage of the season. Thirty-six passengers and a crew of 61 were on board.

I'll use the "1-2 Strategy" again.

Step 1: I'm going to ask myself, "Who or what is this paragraph about?" My answer is that this paragraph gives me details about the Hindenburg.

Step 2: I need to find 2 details
Detail 1: it was 803 feet long
Detail 2: it had places to sleep, a library, and dining room.

Okay, I'll keep reading.
Disaster Strikes. As it reached its final destination in New Jersey, it hovered over its landing spot and was beginning to be pulled down to the ground by landing lines by over 200 crewmen when disaster struck. A burst of flame started just forward of the upper fin, then blossomed into an inferno that engulfed the Hindenburg's tail.
"Oh the Humanity!" Many jumped from the burning craft, landed on the soft sand of the naval base below, and lived to tell about it; others weren't so lucky. Herb Morrison, a reporter for WLS Radio in Chicago, happened to be covering the event and cried out the now famous words, "Oh, the Humanity!" The majestic ship turned into a ball of flames on the ground in only 34 seconds.

So, I'm going to use the "1-2 Strategy" again.

Step 1: I'll ask myself, "Who or what is this paragraph about?"
I think it's mostly about how the Hindenburg crashed and burned.

So, now I'll do Step 2 and ask myself, "What are 2 details?"
Detail 1: this happened just when it was being pulled down
Detail 2: it exploded in 34 seconds.

Unknown Cause. The cause of the disaster is still uncertain. At the time, many thought the ship had been hit by lightning. Many still believe that the highly flammable hydrogen was the cause. Some Germans even cried foul play, suspecting sabotage intended to sully the reputation of the Nazi regime. NASA research, however, has shown that the highly combustible varnish treating the fabric on the outside of the vessel most likely caused the tragedy.
I finished reading the story so I'm going to use the "1-2 Strategy" one more time.
Step 1: Who or what is this section about?

The main idea in this section is that nobody really knows why the disaster happened.
Step 2: Find 2 details
Detail 1: maybe it was the hydrogen
Detail 2: most likely it was the varnish on the fabric.

Now that I've finished reading the whole story and practicing the "1-2 Strategy" I'm going to write a sentence or two that tell the main idea and includes 2 details.
Here's my sentence: The German airship called the Hindenburg exploded when it was going to land in New Jersey and many people died. Nobody knows why it exploded but some people think it was the fabric.
Step 1 (who or what the story was about): the Hindenburg exploded
Step 2: Find w details
Detail One: it was going to land in New Jersey
Detail Two: many people died
Other details I could have used: nobody knows why it exploded, some people think it exploded because of its fabric.

APPENDIX B

1-2 STRATEGY TEMPLATE

Remember that you're finding out what the section is about and 2 details.
Place a checkmark in the box when you've finished each step.
Your Name:
Story: Langston Terrace

☐ Step 1: Ask yourself who or what is this section about?

☐ Step 2: Find 2 details that tell more about who or what in the section.
Detail 1:

Detail 2:

Did you do both of the steps?

APPENDIX C

easyCBM READING COMPREHENSION MEASURE EXAMPLE

Student Copy Form 6-3

Directions: Please read the story and then answer the questions that come after it.

ON THE ICE

As everyone knows, a person has a slim chance of surviving for more than a few minutes in very cold water. A strong person may have about a fifty-fifty chance of surviving a short swim in fifty-degree water. If you are in water below fifty degrees for any amount of time, you are in great danger of freezing.

Jules was a smart boy, well aware of the danger of freezing water when he went out on a sledding trip with his team of dogs. Jules grew up in the icy regions of the Yukon, learning from his community about how to survive in the wintry wilderness. He knew how to hunt for food, fish under the ice, build a snow cave, huddle with his dogs for warmth, and even navigate home using either a compass or a Global Positioning System. Jules was well prepared for many different emergencies and even for being completely lost in the wilderness.

This knowledge helped him survive many times. He had been out with his friend Sara looking for wild carrots to eat one autumn when they got trapped in a sudden early blizzard. They made a snow cave and ate the carrots they had dug up earlier while they waited out the storm, even playing and making carvings on the cave walls to pass the time. Another time, Jules had traveled to the next village to invite them to a summer party in his own village, and on his way home realized he had not brought enough food for the two-day journey. Jules easily managed to catch a fish and find some nutritious plants to eat - and it ended up being one of the best meals he had ever eaten.

One spring, Jules was sledding across the Great Lake near his home. He had gone to town to buy some groceries and supplies for his whole village. Mr. Tom wanted a box of nails for a doghouse he was building. Mrs. Nancy wanted some candy to give to her students at the community school. Jules' friend Sara wanted some new long underwear because she had outgrown her old set.

Jules had lots of things to carry for all of the neighbors and friends who asked him to bring them something. He packed his sled tight, filled his pockets, and even had to wear the long underwear for Sara to save space! He felt a little silly wearing her clothes, but every bit of room on the sled was taken up by other supplies. Jules was on his way home and decided to cut across the lake to save some time. It was springtime, and the ice would soon melt, but surely it was still plenty cold enough to cross the lake. Jules set out over the Great Lake, miles wide, enjoying the open expanse of white ice all around him and the sun that had just come out to warm the day.

As Jules went farther and farther over the Great Lake, the sun kept getting brighter. He grew warm, loosened his thick cap and jacket, and let his sled dogs slow down a little bit. Suddenly, off in the distance he heard a thunderous CRAAAACK! The ice was definitely breaking up early!

Jules yelled to his sled dogs to speed up again, top speed, to race across the ice before it broke up under them. They went faster and faster, and the opposite shoreline grew near. All at once, the ice just below the sled broke, and the sled plunged into the water and bobbed back up, as the dogs slid to a stop and Jules went flying and sliding well past them all. Jules slid to a stop on his back, lifted his head slowly and glanced back to see his dogs resting and the sled easily floating in a small hole in the ice. He breathed a sigh of relief for his dogs and the supplies they were pulling.

All of a sudden, he heard another crack right below him, and the icy water wrapped him up and closed around him! He came up for air, freezing cold, and tried to remember what he had to do in this situation. What if he didn't make it out? Would his mother ever learn what had happened to him? Would Sara ever be able to look at the lake without feeling sad? Jules shook his head to clear his thoughts. There wasn't time for them now.

Jules turned back the way he had come, knowing that the ice was most likely strongest there where it had supported him before. He slowly, slowly lifted his arms up out of the water and onto the ice. He was shivering intensely already, but he managed to remain calm. Jules knew he was going to be much heavier with his wet clothes now, so he needed to let some water run out of his sleeves and his jacket before he tried to climb back on the ice. Thankfully, he was wearing Sara's new long underwear which would help keep him warm even in the water.

Under the sun, the surface of the ice was smooth and wet, and Jules knew it was going to be hard to pull himself up. The sled dogs were not strong enough, and he did not want to risk their falling in with him. Jules had to figure out a way to do this on his own. Suddenly, he remembered the box of nails for Mr. Tom. It was in his chest pocket! He slowly reached inside and found only candy. It was some of Mrs. Nancy's candy. He remembered Sara telling him about how candy could help keep a person's energy up in an emergency situation, and he put some in his mouth and spit out the wrapper. It tasted wonderful, and he felt a good surge of energy!

He concentrated on the memory of his mom's voice telling him stories about courageous people from the village, and he knew he couldn't give up. The nails must be in the other pocket, he thought. Jules slowly reached in and took out two nails. He grabbed one nail in each hand, and jammed them into the ice. Little by little, he pulled and poked the nails into the ice, moving himself slowly out of the water.

Pull... poke... pull... poke... It seemed like it would take forever, but Jules knew that he had to move slowly and carefully so as not to break the ice again. His legs hung relaxed, and he used only his hands and arms to slowly pull himself along. Suddenly, he felt a quick nudge and a swish against his leg! Jules almost panicked and dropped himself right back in, when he realized it must just be a big fish swimming by. Maybe I'll eat that fish for dinner by the end of this summer, he thought, and laughed himself along some more.

Once Jules had pulled himself all the way out, he stopped to rest, and stayed laying flat with his arms and legs spread out. He let more of the water drain out of his clothes. He was close to his dogs, and they happily reached over to lick him and nuzzle his head. This reassured Jules more than ever, and he knew they all had to act fast to get off the ice.

Jules ordered the dogs to move forward a little bit, staying flat as he did so, and he saw that they could pull the sled right out of the water. He directed them around the hole he had made, and just as the sled passed him by he grabbed onto it, staying flat on the ice, and told the dogs to run for it!

Jules' dogs bolted forward, barking and charging ahead. Jules held on tight to the sled and went for the ride of his life, holding onto the back of the sled while he slid along on his belly at top dog-speed! Faster and faster they went, flying over the melting ice with Jules gripping tightly and staying flat on the ice that swished speedily under him!

When they finally arrived on the other side of the Great Lake, Jules breathed a heavy sigh and broke out laughing at the wild adventure they had just survived! Even better, they still had everything his village had asked for - almost

everything, that is. Jules grinned as he told himself that surely his on-the-ice story would bring plenty of forgiveness for two missing nails and a piece of candy.

1. What danger did Jules know about when sledding across a frozen lake?

A. There was a good chance that the dog teams would tire out.

B. There was always a chance that you could slide out of control.

C. There was only a slim chance of surviving in very cold water.

2. How did Jules learn about how to survive in the icy regions where he lived?

A. He went out on his own and learned from experience.

B. He learned from the people in his community.

C. His parents sent him to the community survival school.

3. What concern did Jules have about the time of year that he went sledding?

A. He knew that in springtime the ice starts to melt.

B. He knew that animals come out in the spring.

C. He needed to know how much daylight he would have.

4. Why was it good for Jules that he had to wear the underwear he had bought for Sara?

A. It gave him more padding when he slipped and fell on the ice.

B. It gave him traction so he could pull himself out of the water.

C. It helped keep him warm when he was in the icy water.

5. Why did Jules decide to cross the lake on his way back home?

A. He wanted to enjoy the warmth of the sun.

B. He thought it would save some travel time.

C. He was tired of traveling through the forest.

6. What happened right after Jules heard the ice crack in the distance?

A. He told the dogs to run at top speed to get across the lake quickly.

B. He loosened his thick cap and jacket as he thought about what to do.

C. The sled plunged into the water and pulled Jules into the water with it.

7. How did Jules act when his sled fell into the water and he went flying across the ice?

A. He remained calm and was more concerned about his dogs and sled than about himself.

B. He started to panic but then calmed down when he saw that his dogs were still on top of the ice.

C. He forgot about everything except how he was going to get back home alive and in one piece.

8. How did Jules pull himself out of the hole in the ice?

A. He ate candy and got strong enough to pull himself out.

B. He held onto the sled as his dog team pulled him out.

C. He jammed nails into the ice to hold on to and pulled.

9. What was on Jules' mind when he first fell through the ice?

A. He immediately analyzed his situation and thought about how to survive.

B. He couldn't think about anything except his mother, Sara, and dying.

C. He thought about holding onto the sled and having the dogs pull him out.

10. What was the main problem in this story?

A. Jules made a mistake when he thought the ice on the lake was safe to travel on.

B. The ice on the lake was beginning to melt early because spring was warmer than usual.

C. Jules didn't cross the lake fast enough because he slowed down to loosen his jacket.

11. Why was Jules sledding in this story?

A. He went to town to get some building materials for his parents.

B. He was taking things to town for his neighbors and friends.

C. He went to town to get groceries and supplies for his village.

12. Why did Jules lie flat on the ice when he hung onto the sled as the dogs pulled it to safety?

A. He didn't think he had enough strength to climb back up onto the sled.

B. It would be harder to fall through the ice when his weight was spread out.

C. The ice had gotten too slippery for him to stand or to crawl onto the sled.

13. What will Jules probably do the next time he is sledding in the springtime and is thinking about crossing a frozen lake?

A. He will remember what happened to him and go around the lake.

B. He will go around the lake looking for a place that can be safely crossed.

C. He will walk out onto the ice to test it to see if it is safe for the sled.

14. What made it so hard for Jules to pull himself out of the water?

A. He was so cold that he had trouble moving his arms.

B. The heat from the sun had made the ice smooth and wet.

C. The ice kept cracking under him because it was so thin.

15. How did memories about his mother help Jules survive?

A. He knew his mother would want him to come back safe.

B. He thought about how his mother would feel if he died.

C. He remembered her stories about courageous people.

16. What was this story mostly about?

A. What can happen when you make a wrong decision in a dangerous situation.

B. How dangerous life can be in a place where the weather is always cold.

C. How using knowledge and remaining calm can save your life in an emergency.

17. Why did Jules drain the water out of his clothes?

A. He wanted to reduce his weight on the ice.

B. It was cold and he didn't want it to freeze.

C. The water made the ice under him slippery.

18. Which of the following is an example of how Jules reacted in the middle of a potentially deadly situation?

A. After he was off the ice and safe, he thought it would be funny to tell Sara that her underwear had saved him from freezing.

B. He laughed when he thought about eating the fish that had scared him and almost caused him to fall back into the water.

C. He laughed and thoroughly enjoyed flying over the ice when the dogs were pulling him to safety after he almost drowned.

19. What was the first example in the story that showed that Jules knew how to survive on his own?

A. He caught fish and ate plants when he ran out of food.

B. He made a snow cave when he got caught in a snow storm.

C. He traveled on a two-day journey and didn't get lost.

20. What was Jules like at the end of the story?

A. He was relieved he was safe and thought about how great it would be to see his mom and Sara.

B. He was mostly thinking about his wild adventure and about the best way to tell about it.

C. He was as happy about saving the supplies he had bought as he was about being safe.

APPENDIX D

MULTIPLE-CHOICE PROBE MEASURE EXAMPLE

Jackie Robinson: Justice at Last Geoffrey C. Ward and Ken Burns

Please think carefully about the answers to the questions below. Fill in the circle for the answer you choose on the Scantron sheet. When you are finished, turn in your note-taking sheet and your Scantron sheet to your teacher.

1. When did this story take place?
    a. After the Vietnam War
    b. After the Korean War
    c. After World War II
    d. After the Gulf War

2. What did Branch Rickey think about having blacks and whites play together on a baseball team?
    a. He thought it should happen
    b. He thought it should not happen
    c. He never thought about it
    d. He thought someone else should do it

3. Why would Jackie Robinson have to avoid fighting?
    a. If he had a fight people would say he was mean
    b. If he had a fight people wouldn't want to watch him play
    c. If he had a fight, people would call him names
    d. If he had a fight, people would say integration didn't work

4. Why would it be difficult for Jackie Robinson to avoid fighting?
    a. He had always stood up for his rights
    b. He was much stronger than other people
    c. He liked to fight
    d. Other people would want to fight him

5. What team did Robinson play for?
    a. The Dodgers

b. The Yankees
c. The Braves
d. The Mets

6. Robinson's first season was difficult because:
   a. People threatened to kill him
   b. Players tried to hurt him
   c. Other teams threatened to strike if he played
   d. All of the above

7. Why did his teammates eventually accept him?
   a. The coach told them they had to
   b. The fans wanted him to play
   c. The owners wouldn't pay them if they didn't accept him
   d. They realized he was an excellent baseball player

8. What made Robinson a great baseball player?
   a. He could hit the ball anywhere
   b. He had more home runs than other players
   c. He caught more fly balls than other players
   d. He had the nicest uniform

9. Why was Jackie Robinson making history?
   a. He was such a good baseball player
   b. He made more money than other baseball players
   c. He was the first African American player in the major leagues
   d. He was the first player to play for the Dodgers

10. How did Jackie Robinson's situation change baseball?
   a. People realized that blacks and whites could play together
   b. People realized that he should be paid more
   c. People realized that only whites should play baseball
   d. People realized that the Dodgers were a great team

APPENDIX E

MULTIPLE-CHOICE PROBE MEASURE DESCRIPTIVE DATA FOR ALL GROUPS

		N	Mean	Std. Deviation	Minimum	Maximum
Story 01 Jackie Robinson	1 NO	24	8.00	1.29	5	10
	2 NI	6	7.00	2.00	4	9
	3 NIT	21	8.38	.74	7	9
	4 Control	44	7.68	1.14	4	9
	Total	95	7.87	1.21	4	10
Story 02 Langston Terrace	1 NO	22	7.64	1.26	5	10
	2 NI	12	7.17	2.33	3	10
	3 NIT	24	7.88	1.78	2	10
	4 Control	35	7.03	1.60	4	9
	Total	93	7.41	1.70	2	10
Story 03 Eleven	1 NO	20	8.80	1.36	5	10
	2 NI	12	8.92	1.51	5	10
	3 NIT	21	9.05	1.86	2	10
	4 Control	27	7.93	2.00	4	10
	Total	80	8.59	1.78	2	10
Story 04 All American Slurp	1 NO	7	6.57	1.81	4	9

	2 NI	8	9.13	1.46	6	10
	3 NIT	13	8.31	2.90	0	10
	4 Control	29	7.14	2.56	1	10
	Total	57	7.61	2.53	0	10
Story 05 The Pigman	1 NO	3	8.33	1.16	7	9
	2 NI	4	9.25	.96	8	10
	3 NIT	5	8.00	2.00	5	10
	4 Control	24	7.33	2.12	3	10
	Total	36	7.72	1.99	3	10
Story 06 James and the Giant Peach	1 NO	2	9.00	1.41	8	10
	2 NI	3	9.00	1.00	8	10
	3 NIT	5	8.20	1.30	7	10
	4 Control	21	7.81	1.94	3	10
	Total	31	8.06	1.75	3	10
Story 07 King of Mazy May	1 NO	1	9.00		9	9
	2 NI	1	8.00		8	8
	3 NIT	0				
	4 Control	17	5.47	2.18	2	9
	Total	19	5.79	2.28	2	9
Story 08 Black Cowboy Wild Horses	1 NO	2	8.50	2.12	7	10
	2 NI	1	10.00		10	10
	3 NIT	0				
	4 Control	16	6.56	2.45	1	9

	Total	19	6.95	2.48	1	10
Story 09 Case of Monkeys Falling from Trees	1 NO	0				
	2 NI	1	10.00		10	10
	3 NIT	0				
	4 Control	17	5.76	3.35	0	10
	Total	18	6.00	3.40	0	10
Story 10 Becky and the Wheels and Brakes Boys	1 NO	0				
	2 NI	1	9.00		9	9
	3 NIT	1	9.00		9	9
	4 Control	15	5.47	3.46	0	10
	Total	17	5.88	3.44	0	10
Story 11 Mowgli's Brothers	1 NO	0				
	2 NI	1	9.00		9	9
	3 NIT	0				
	4 Control	14	4.57	2.85	1	9
	Total	15	4.87	2.97	1	9
Story 12 Jeremiah's Song	1 NO	0				
	2 NI	1	8.00		8	8
	3 NIT	0				
	4 Control	12	5.42	3.18	0	10
	Total	13	5.62	3.12	0	10
Story 13 Lob's Girl	1 NO	1	3.00		3	3
	2 NI	1	8.00		8	8

3 NIT	0				
4 Control	8	5.38	3.74	1	10
Total	10	5.40	3.50	1	10

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