THE EFFECTS OF SQ3R ON FIFTH GRADE STUDENTS' COMPREHENSION LEVELS

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ABSTRACT

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Comprehension is the ultimate goal of reading and affects the understanding of all content areas. Students are successful readers when they are able to pull important information from texts and connect the new information with previously stored schemata. In the science content area, new information is very difficult to acquire because of the difficult concepts and vocabulary. For students to connect previously learned materials with schemata, prior knowledge must be activated. When prior knowledge is activated, students begin to prepare for reading.

However, it is equally as important that students have a reading strategy in place when they begin reading science materials. The reading strategy SQ3R is a systematic strategy that can be used to aid students in comprehending expository materials.

This research study was conducted with the purpose of determining whether integrating SQ3R into fifth grade students’ science reading strategies would improve their overall comprehension. The study also investigated students’ preexisting reading strategies and their thoughts on whether they would continue to implement SQ3R into their reading habits.

The results of the study indicated that SQ3R significantly improved fifth grade students’ overall comprehension scores of expository texts. The study also indicated that 46.9% of the students used in the study had a preexisting reading strategy. The most common preexisting reading strategy was note taking. It was found that 68.7% of the students used in the study would use the reading strategy SQ3R in the future.

It is recommended that teachers as well as administrators recognize the importance of reading strategies and educate the students and parents on possible strategies that can be used to improve comprehension.
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CHAPTER I: INTRODUCTION

When students are asked to read science textbooks or materials, overwhelming groans are often heard throughout the classroom. Students lack an appreciation for reading, which is only compounded by their inability to comprehend the material. During silent in-class reading time, it is likely that educators can look around the room and observe students doing everything but reading. Those students who are attempting to do the reading are often doing so with no direction or goals. It is likely that most students begin reading their text without having a pre-set plan to guide them while reading. This is also true in content reading, including science. Students are expected to read in the content areas without explicit instruction in how to be successful. Therefore, in addition to instructing students to read certain texts, educators should also provide instruction on how to read those texts if they expect the students to comprehend and retain information from expository texts.

Statement of the Problem

Expository texts, regularly used in science classrooms, are very difficult for students to understand due to the arduous vocabulary and new concepts (Gear, 2008). However, student knowledge on how to approach and begin reading expository texts is also lacking. Students are assigned difficult readings without any knowledge of how to extract relevant and significant information. This under-preparedness is hindering students’ ability to develop as readers and significantly impacts their ability to read and retain information from their science textbooks.

Content educators must take it upon themselves to teach students not only how to read in their particular content area, but also how to learn while they are reading. Unfortunately, most content educators do not have the knowledge, the appropriate training to aid their students in
reading these challenging texts, or the confidence to teach literacy successfully (Armbruster, 1993; Cantrell, Burns, & Callaway, 2009).

Science materials present students with new information and abstract ideas on which they may have very little prior knowledge, making it imperative for students to have some sort of approach or plan about how to complete reading assignments. With budgeted time periods and a wealth of information to cover, educators do not spend the appropriate amount of time teaching their students how to read their texts. Students may appear to be uninterested and inattentive, although the actual problem may be they do not know how to approach reading their materials.

Educators expect students to take materials home to read for class the following day, and become overwhelmingly frustrated when students do not return to class with knowledge of the material. Educators depend on their students’ knowledge of the reading to spark class conversation or catapult the students into a new topic. When students come to class unprepared or lacking knowledge of the reading, the educator often jumps to the conclusion that the students are lazy. However, the students may simply be unable to read and comprehend the text, or they may not be equipped with appropriate strategies to assist them in their reading and retention of the content. This causes students to either read the material but retain very little, or turn away from reading the text entirely. It has also been used as a reason why some teachers toss the textbook aside and have no expectations for students reading or learning from their textbooks.

Research Question

Students interact with books on a regular basis throughout the school day because reading is incorporated into all content area classrooms, not just the language arts classroom. It is, therefore, imperative that content area educators assume the responsibility for teaching their students how to effectively approach unknown reading material in their content areas. This is
vital in science classrooms as students are introduced to new vocabulary and content, compounding the problem of even more difficulties with reading and comprehension. Teachers must educate their students on effective reading by using multiple potential study skills, or they will be unable to adequately learn new concepts. Because science is one of the content areas where reading and learning from text are especially difficult for students, this study was designed to explore the effectiveness of the systematic study strategy, SQ3R (Robinson, 1941) on fifth grade students’ comprehension of expository science materials. The purpose of the study was to determine whether the implementation of SQ3R in fifth grade students’ study strategies improves their comprehension of science material. Subquestions of the study included determining what preexisting study strategies students were using, as well as the students’ thoughts about whether they would use SQ3R in the future.

Rationale

If educators want to guide their students toward success, then they must become familiar with various study strategies, and their use must be incorporated into classroom instruction. Study strategies are not learned automatically. For students to successfully integrate study strategies into reading, the strategies must be taught, modeled, and reinforced (Rafoth, Leal, & DeFabo, 1993). Thus, a significant amount of time must be used to instruct, show, and provide support for the development of these strategies. A balanced, comprehensive approach to the teaching of science materials, including reading, direct instruction, and investigative skills creates a successful science program (California Department of Education, 2004). When students are better able to read and comprehend expository materials, their attitude toward non-fiction texts may change. This study provided a detailed account of the SQ3R study strategy and its effect on students’ overall comprehension. If SQ3R does facilitate reading and understanding
science as well as increased retention of the information, then the time spent in science classrooms to teach this particular study strategy would be beneficial for students.

Definition of Terms

The following terms have been defined to allow for a greater understanding of the study:

1. Metacognition: Thinking about thinking. This refers to a person’s awareness about what he/she is thinking and feeling when he/she reads. For this particular study, metacognition can be analyzed by the student’s ability to reflect on the SQ3R strategy used when reading expository texts.

2. Reading Comprehension: The process by which a person is able to create meaning while reading written language (Lapp, Flood, & Farnan, 1996).

3. Schema: a person’s ability to pull from prior knowledge to assimilate new information and evoke previously learned information (Mayer, 1998).

4. Study strategy: “a systematic process for the intensive study of a selection for retention and recall” (Harris & Hodges, 1995, p. 245)

5. Readability: “an objective estimate or prediction of reading comprehension of material, usually in terms of reading grade level, based on selected and quantified variables in text, especially some index of vocabulary difficult and of sentence difficulty” (Harris & Hodges, 1995, p. 203)

6. Reading Comprehension: The process by which a person is able to create meaning while reading written language (Lapp, Flood, & Farnan, 1996).

7. Schema: a person’s ability to pull from prior knowledge to assimilate new information and evoke previously learned information (Mayer, 1998)
8. Study strategy: “a systematic process for the intensive study of a selection for retention and recall” (Harris & Hodges, 1995, p. 245)

Limitations

This study had limitations that may restrict it from being generalized to a larger population. The study was conducted in an economically disadvantaged urban school, and the classroom in which the study was completed had a wide range of reading levels. The reading levels of the students were not addressed or taken into consideration when selecting the reading passages, selected from the *National Geographic Explorer Magazine*. If the passages were at the student’s frustration level, it is likely that he/she would not have been successful with the SQ3R strategy because he/she would not have been able to successfully read the passage or comprehend anything gleaned from the text during reading.

Another limitation was the exposure to SQ3R. The researcher did not record student attendance, and was therefore unable to determine whether class absences impacted a student’s ability to correctly incorporate SQ3R into his/her study habits. This could yield different results from different students because of the amount of practice.
CHAPTER II: REVIEW OF LITERATURE

Students have an aversion to expository texts because they are hard to read and contain a great deal of information. Science materials can be extremely intimidating to middle level students because of their abstract ideas and complex vocabulary; therefore, students are likely to avoid reading science materials because they are either unable to comprehend the meaning of the text or the process is long and tedious so they quit trying to comprehend the text. Science educators must be cognizant of this problem and be constantly searching for strategies and techniques that will help them support their students in their quest to read and comprehend new material from their science textbook. One option is to teach, model, and reinforce the use of study strategies so students have an organized plan of attack when it comes to difficult materials.

The purpose of this study was to determine whether the implementation of SQ3R in fifth grade students’ study strategies improves their comprehension of science material. Subquestions of the study included determining what preexisting study strategies students were using, as well as the students’ thoughts about whether they would use SQ3R in the future. Chapter II contains a review of literature related to schema theory, expository texts, comprehension, and study skills. Finally, the chapter presents a review of SQ3R and related research investigations.

Theoretical Orientation

Schema Theory addresses the idea that comprehension is dependent on a person’s ability to combine a wealth of preexisting knowledge with newly acquired information (International Reading Association [IRA], 1995). Schema theory is often described as a filing system for learned information. People absorb information and categorize it into their brains to be pulled back out at a later time (Lapp, Flood, & Farnan, 1996). The categories are then shuffled into hierarchies and used when necessary. The files are not placed in one file forever; they are
constantly being reorganized with new and old information (Pearson, Roehler, Dole, & Duffy, 1992). Ganske and Fisher (2010) argue that schema theory “is not a theory of reading comprehension but rather a theory about the structure of human knowledge as it is represented in memory” (p. 293).

The idea of schema and schema theory are not new ideas. Jean Piaget coined the term schema in 1926. In 1977, R. C. Anderson expanded on the idea of schema and introduced schema theory. Anderson elaborated on how schema should be implemented in the education realm and also presented possible ideas on how to improve instruction within education to address the schema theory (Mayer, 1999).

It is difficult to discuss schema theory without a thorough knowledge of schema. Schema is a person’s ability to pull from prior knowledge to assimilate new information and evoke previously learned information (Mayer, 1998). Santrock (2008) describes schema as “actions or mental representations that organize knowledge” (p. 37). The knowledge students have can then be used when learning new information.

To be successful in content reading, students must have a great deal of schema and prior knowledge. When teaching content area literacy using the schema theory, it is vital that instructors address three aspects that will affect student learning: (a) students’ background knowledge must be fitting and precise, (b) students must have a well-rounded basis of prior knowledge on the subject, and (c) the instructor must trigger the students’ prior knowledge (Lapp, Flood, & Farnan, 1996). Anderson (1977) states the experiences a learner brings to a particular situation are as important as the presentation of information. If inaccurate schemata are brought to the surface of students’ memory, students will be unable to create the connection between prior knowledge and new knowledge, which will prohibit them from learning (Lapp,
Flood, & Farnan). Chi, Hutchinson, and Robin (1989) believe the amount of a person’s background knowledge is equally as important as the quality of the knowledge. When a student has a wider amount of knowledge on a particular topic, learning will be more easily facilitated. Bransford (1979) also states the importance of content area teachers activating prior knowledge before introducing students to new information. According to Bransford, “Previous knowledge must be activated in order to facilitate one’s current abilities to understand and learn” (p. 135). Content teachers cannot sit back and expect students to pull information from their schema. Teachers must be sure students have accurate prior knowledge, an adequate amount of prior knowledge, and activate students’ prior knowledge if they expect students to learn using the schema theory.

Comprehension

There are many interpretations of comprehension; however, there are specific attributes that exist in all definitions. All interpretations include the reader’s interaction with the text and his/her ability to extract meaning. RAND, the Reading Study Group (2002) defined comprehension as “the process of simultaneously extracting and constructing meaning through interaction and involvement with written language” (p. 11). Pardo (2004) defines comprehension as “a process in which readers construct meaning by interacting with text through the combination of prior knowledge and previous experience, information in the text, and the stance the reader takes in relationship to the text ” (p. 272). Comprehension is an aspect of reading that cannot be overlooked. It is equally important to teach students comprehension and decoding (Gear, 2008). Gambrell, Block, and Pressley (2002) believe that comprehension is the most important aspect of reading.
Comprehension is largely dependent upon the reader’s prior knowledge, also known as schema. Knowledge of both the content being read and the text format play an integral role in the student’s prior knowledge (Pardo, 2004). If a student has a greater amount of prior knowledge (schema), he/she will be better able to understand and make meaning of the text (Butcher & Kintsch, 2003). If a student does not have a foundation of prior knowledge about the content he/she is reading, comprehension is much more difficult.

By connecting the prior knowledge of the reader with new information presented in the text, schema is formed. Schema Theory involves the reader organizing his/her known knowledge into sectors to quickly recall the information (Pardo, 2004). Information is constantly being sorted and organized when new information is gained. The connection and organization of schema then allows the reader to form meaning from the text (Pardo).

Teachers should work with students to activate and build their prior knowledge before they begin reading. By activating prior knowledge, students are prepared to read and can more easily recall and retrieve information from their schema (Keene & Zimmermann, 1997; Miller, 2002). Keene and Zimmermann, as well as Miller, suggest teachers use graphic organizers and visuals to build background knowledge. Graphic organizers and visuals will help the students relate and form connections between different information and texts.

In Lipson’s study (1983), she found that students with more prior knowledge were better able to recall larger amounts of text-explicit information, made fewer mistakes, and made stronger inferences than students who lacked prior knowledge. In another study conducted by Bransford and Johnson (1972), the authors concluded that prior knowledge allowed students to retain more information. A group of students was given the title of a passage before they read the material; a second group was given the title after the reading was completed, and a third group
was never given the title. The group that was given the title of the material before they read had a much higher comprehension level and recalled nearly two times the amount of the other groups. Bransford and Johnson concluded that the students given the title before they read were able to relate the new information to their prior knowledge. The other groups were unable to relate the readings to any prior knowledge, thus lowering their comprehension scores (Bransford & Johnson).

Metacognition

Prior knowledge is not the only aspect of comprehension that should be considered when thinking about improving students’ abilities to read and understand their science textbooks. Readers must also engage in metacognitive activities to effectively comprehend texts and retain information learned from the text (Brown, Camione, & Day, 1981). Pressley, Wharton-McDonald, Mistretta-Hampston, and Echevarria (1998) determined that reading comprehension is not improved by simply reading more, while Boulware-Goode, Careker, Thornhill, and Joshi (2007) provided some guidance as to what else needed to be done while reading. They stated that proficient readers comprehend text by using metacognitive methods. Metacognition is knowledge and awareness of one’s own cognitive processes (Mayer, 1999). When readers engage in metacognitive behaviors, they are able to reflect on their reading progress and their desired learning outcomes (Joseph, 2010). According to Joseph, “It is evident that metacognitive awareness creates self-regulated learning, allowing students to develop greater intellectual maturity” (p. 100). When metacognitive strategies are incorporated into the instruction and process of reading, comprehension is largely improved.

Nash-Ditzel (2010) taught developmental reading to college freshman through the use of metacognitive strategies. The strategies taught to the students were “connecting personal
schemata (background knowledge) to text, implementing fix-up strategies for unknown word meanings or confusing sentences, asking questions of the text, drawing inferences from the text, summarizing/synthesizing, and determining importance of a text through the use of marginal notes (annotating)” (Nash-Ditzel, p. 48). Nash-Ditzel found that all students participating in the study dramatically improved their overall comprehension.

Boulware-Gooden, Careker, Thornhill, and Joshi (2007) designed a study to determine whether metacognitive strategies had an effect on students’ comprehension. Metacognitive strategies were taught using a direct instruction strategy. A total of 119 third-grade students were tested to determine whether comprehension could be improved if students were trained how to use metacognitive strategies. The group of students was split into two groups, including an intervention group and a control group. The groups were taught reading comprehension strategies for 30 minutes daily for 25 days. The intervention group was also taught to use metacognitive strategies (Careker, 2004). The study found that with the intervention of metacognitive strategies, vocabulary and comprehension dramatically improved. The academic achievement of the intervention group was also much greater than that of the control group (Boulware-Gooden, et al.).

Joseph (2010) argues that good teachers know that when thinking and metacognitive strategies are incorporated into classrooms on a long-term basis, students’ academic achievement improves as well as their understanding of effective learning. Joseph adds, “Through metacognitive instruction, students can practice these skills over time, increasing the chance that these valuable thinking strategies will strengthen their practical intelligence and become part of their repertoire as learners” (p. 102). When students are consciously thinking while reading, academic achievement, retention, and vocabulary can be improved.
Comprehension Through The Use Of Study Skills

The distinct goal when reading is comprehension. According to Boulware-Gooden et al. (2007), “Reading instruction does not end when students can decode the words. They continue to need instruction that will support their understanding of what they are reading” (p. 71). According to Gough, Hoover, and Peterson (1996), comprehension is usually seen as coming naturally, if a student has adequate decoding skills and average oral language comprehension; however, that is not always the case.

The National Reading Panel (National Institute of Child Health and Human Development [NICHHD], 2000) stated that the instruction of comprehension strategies is the most widely accepted tactic for improving comprehension skills. The Panel states, “The idea behind explicit instruction of text comprehension is that comprehension can be improved by teaching students to use specific cognitive strategies or to reason strategically when they encounter barriers to comprehension when reading” (p. 439). Pearson and Gallagher (1983) determined that proficient readers incorporate strategies to aid their comprehension. The strategies used by readers allow the readers to interact with their texts and better interpret its meaning (Gear, 2008). However, comprehension strategies are not being taught to students. Durkin (1978-79) found in her study of elementary classrooms that comprehension strategies were taught less than 1% of instructional time. Forgan and Mangrum (1989) add, “If you want your students to read textual materials effectively and efficiently, you must teach the appropriate study skills and study strategies” (1989). Ness (2009) found that reading comprehension strategies were not taught in social studies and science classrooms because teachers believed it took too much time out of their content instruction or created more responsibility than they were willing to accept. Educators as
well as pre-service educators must begin to think about teaching their students how to effectively read their textbooks and materials.

Study skills instruction is often lacking because many teachers feel inadequately prepared to provide such instruction. Heller and Greenleaf (2007) found that most states only require teachers to take one literacy course to fulfill licensure mandates. Equipped with minimal skills to teach comprehension, teachers understandably feel uncomfortable teaching such skills.

Educators fail to see the importance of study skills and reading instruction in content classrooms unless methods are taught to pre-service teachers (Moje, 1996). Teachers do not become proficient in the instruction of study skills until they have had approximately one year of instruction and implementation (Pressley & El-Dinary, 1997). In-service teachers must also be given the same opportunities to learn comprehension skills through professional development conferences or sessions (Ness, 2009). It is simply not enough to present teachers with information and strategies; they must be given time to incorporate the strategies in their classrooms and reflect upon their effectiveness. Teachers are provided with strategies in professional development sessions; however, requirements for teachers in thoroughly analyzing how reading is incorporated in classrooms to support learning outcomes is severely lacking (Jacobs, 2002). Ness explains, “Unless avenues of teacher training and professional development convince teachers of the value of reading comprehension instruction, content coverage may trump the explicit strategy instruction which promotes students’ understanding of text” (p. 161).

Educators as well as administrators must acknowledge the grave importance of instructing students through the use of comprehension strategies.

Study skills cannot be taught to students in one day with expectations that they will be retained for an extended period of time. The instruction of comprehension strategies must be
taught to students repeatedly (Duke & Pearson, 2000) through middle school and high school (Pressley & Block, 2002). Students need to know exactly what is expected and how to use a specific study skill or comprehension strategy. They must be given an explanation of how and when to use a strategy. Teachers must model, and time must be set aside for practice until the students feel comfortable using the strategy without guidance (Dole, 2000). According to Gear (2008), “In effective literacy instruction, teachers choose the strategy to model and scaffold the students’ learning by supporting and guiding the class” (p. 45). Through the use of guided practice, students begin to feel more comfortable using the strategy, at which time the students should be released to integrate the strategy into their independent reading (Pearson & Gallagher, 1983). If students are asked to use the strategy without a complete understanding, it is likely that they will not incorporate it into their study habits. However, teachers must acknowledge preexisting reading strategies used by students. Teachers must explain to students that they should adapt the strategy being taught to meet their individual needs (Pearson & Gallagher, 1983). If a teacher thrusts a new strategy upon the students and requires them to use it, cognitive confusion may occur. Cognitive confusion occurs when students combine old and new strategies-get rid of in their head, causing them to be confused and unsuccessful at using the new strategy. Teachers must be conscious of this problem.

Students of all ages can be taught to use comprehension strategies. Although elementary grades often focus on teaching students to develop their ability to decode words (Robers & Duke). Pearson and Duke (2002) believe that comprehension should be taught to students at very early ages. They point out evidence supporting children’s ability to use higher-level thinking strategies in reference to books they read. By instructing students on how to effectively use higher order thinking, decoding skills can be enhanced.
Expository Texts

When the focus of reading switches from decoding words to gaining information from text, this usually involves a transfer from narrative text reading to expository text reading. Expository texts introduce students to new vocabulary, concepts, and writing structure. Narrative texts, stories, and materials are easier for children to read than expository texts (Feathers, 2004). For this reason, Feathers argues that fiction has become the focus of elementary schools.

Unsworth (1999) argues that narrative texts are easier to read than expository texts because narrative texts more closely resemble oral language. Kent (1984) points out three fundamental differences between narrative texts and expository texts, which make narrative texts easier for students to read. First, the point of view of the authors of expository texts is not easily identifiable, whereas narrative texts are written from a first or third-person point of view. Establishing the point of view allows the reader to develop expectations for the text (Kent). Kent’s second argument is that narrative texts are developed around one or multiple characters. The characters are relatable and familiar to the reader because they experience relationships and interactions with others. Expository texts center on topics or ideas. This forms a disconnect with readers because it is not often discussed in daily conversation and requires an exchange of facts. Lastly, Kent (2004) argues expository texts do not have a chronological focus, making the material very difficult to read. Expository texts require the reader to relate, compare, or support main ideas of different concepts, techniques, and ideas. Narrative texts are generally written in chronological order that takes place over a certain time period, making them easier to read than expository texts (Kent, 1984).

Expository texts have been thought to be too difficult for early elementary students for many years. Feathers (2004) states, “Overall, there has been strong support for the belief that
children cannot cope with the logical organization, complex sentence structures, and abstract concepts associated with informational texts” (p. 17). Therefore, rather than depending on educators to teach students how to read and comprehend expository texts successfully, non-fiction material is beginning to appear in narrative texts. Feathers uses the example of a family traveling to France, with information about France integrated into the book. This is creating a lack of experience and familiarity with informational texts. When students are finally introduced to true expository and informational texts around third and fourth grade, they find the material very difficult to read and comprehend (Feathers).

The content being addressed is not the only aspect that should be examined when analyzing whether children will be able to comprehend a text. Feathers (2004) explains, “Only when we know the strengths and weaknesses of the texts we plan to use and the students’ ability to deal with these texts can we plan instruction to help students cope with the material” (p. 42). When students enter the middle grades, a transition from narrative texts to expository texts occurs. This movement to reading for information proves to be very difficult for students (Carrier, 2005). Feathers (1999) argues that students should not be introduced to expository texts at a particular age, and that the main focus should lie in the readability of the material. If a student is able to read the material at his/her instructional or independent reading level, whether the text is non-fiction or fiction, the student should be able to handle the text.

Science texts present abstract ideas, giving readers a great deal of difficulty reading and comprehending the material. Montelongo and Herter (2010) believe, “Most textbooks provide few literacy exercises for developing students’ reading and writing in science” (p. 89). Science textbooks force students to use comprehension strategies differently (Montelongo & Herter). Manzo and Manzo (1990) outline five problem areas for students reading science materials:
1. Inadequate background knowledge
2. Misconceptions about the physical world
3. Inconsiderate (assumptive or inadequately explained and technically overwhelming) text
4. Difficulty in handling esoteric terms
5. Inadequate preparation of teacher, particularly at the elementary level, in the basic sciences (pp. 398-399)

Inadequate background knowledge proves to be an obstacle for students reading expository science material. Educators must be aware of this deficiency in student learning, and assess students’ prior knowledge before a new topic is introduced (Ganske & Fisher, 2010). If educators intend to build prior knowledge, students must be presented with the information on many different occasions, the material must be analyzed in detail, and the new information needs to connect with previously learned information (Marzano, 2004). Connections to students’ schema must be made if students are expected to learn new information.

Expository texts are organized in structures different from most other forms of writing. This unfamiliarity is one cause of difficulty for readers when interpreting informational and expository texts. Unlike narrative books, non-fiction books are often written in a manner in which students read small parcels of text instead of reading the book cover-to-cover (Gear, 2008). Montelong and Herter (2010) state, “Some of the most common types of expository paragraphs in science texts are problem–solution, compare–contrast, cause–effect, and generalization. The main ideas and supporting details for different expository paragraphs require different strategies and new vocabulary to be understood and analyzed” (p. 90). Internal and external text structures such as charts, graphs, heading and subheadings are also frequently found
in expository texts (Moss, 2005). If the titles, heading, and graphs are not clear, students will be unable to determine the most important information. However, if the headings and titles are helpful, it can give readers a great deal of insight as to what the section is about and what the important facts are (Bluestein, 2010). Learning to read, analyze and choose a specific strategy to approach expository texts is vital. To become proficient readers, students need to be introduced to and practice reading different text structures as well as be taught new terminology (Graesser, 2007). The more experience students have with different texts and text structures, the more successful readers they will become.

Science materials are written abruptly and exactly, failing to embed an appropriate number of examples and explanations necessary for immediate comprehension (Weidler, 1984). Many difficulties arise because students do not understand the concepts, or the vocabulary (Feathers, 2004). It therefore becomes even more imperative that students are given examples and detailed explanations of ideas.

Expository texts have many challenging content-specific vocabulary words that cause difficulty for students. Readers have likely not previously encountered the robust vocabulary words found in expository texts. The book may also offer little prior knowledge of the vocabulary, making it difficult for readers to fully understand the information (Beck, McKeown, Sinatra, & Loxterman, 1991; Engelmann, Carnine, & Steely, 1991; Graesser, Leon, & Otero, 2002). Educators must find a way to connect some of the students’ prior knowledge to help them understand new vocabulary.

Manzo and Manzo (1990) suggest teaching students vocabulary terms individually rather than introducing them to new vocabulary by comparing the terms to similar or opposite terms. If students are taught terms in parallel, vocabulary terms form an inappropriate partnership that is
difficult to break (Manzo & Manzo). When the students have a concrete definition and understanding for a vocabulary term, it is then appropriate to introduce a new term into the students’ vocabulary (Manzo & Manzo). Feathers (2004) suggests introducing students to concepts and creating an understanding before introducing the explicit vocabulary word associated with the idea.

It is also important to consider which vocabulary words are being taught to students. Using the bolded words that are predetermined by the textbook is not necessarily the best approach. Feathers (2004) cautions educators not to choose vocabulary based on the material, as the vocabulary is not always selected by the author but possibly an editor or a consultant. Educators should choose terminology that corresponds with the instructional goals of the lesson or unit and with the needs of the students, as the author does not know the students in the class or the desired outcomes (Feathers).

Addressing students’ prior knowledge and the challenging vocabulary used in expository texts will help increase improve students’ overall comprehension. It is also vital that the readability of the material is checked. Students of any age will be unable to read any text if the readability is not within their independent or instructional reading range.

Study Skills

Once students have moved to reading predominately expository text, it becomes necessary to equip them with tools that allow them to not only read the text, but to comprehend the information and to retain it as well. Study strategies are one solution to reading, comprehending and retaining material gleaned from textbooks. Various study skills, study strategies, and study techniques have been examined for the greater part of the twentieth century. Although the majority of research was conducted in the latter half of the century, empirical
reports were written sparking interest in study skills in the beginning of the century. Reports were written proposing students did not have a solid foundation of effective study techniques (Baldwin, 1909; Gates, 1917; Newlun, 1930). Gates suggested that educators review readings in both oral and written forms. He placed an emphasis on the instruction of reading and methods to improve reading comprehension rather than the instruction of course content. Gerald Yoakam (1928) also examined study skills and the effects of study skills on student success at the elementary, high school, and collegiate levels. Yoakam’s study concluded college students had developed and manipulated their study techniques from younger grades as opposed to creating new study strategies throughout their education. Most elementary and junior high students demonstrate similar study skills and habits.

McCallister (1930; 1932) observed student study activities and participation in the content areas of science, mathematics, and social studies. He concluded that seventh and eighth grade students require direct instruction of reading and study skills (McCallister, 1930; 1932). Shores (1943) conducted a study to determine the correlation between ninth grade science and social studies students’ reading and study skills. He, too, concluded that direct instruction of specific study skills would improve student performance in content subjects.

SQ3R

Francis P. Robinson’s (1941) landmark publication of *Diagnostic and Remedial Techniques for Effective Study* advocated a new study technique he referred to as SQ3R. Robinson found a strong need for the study skills of those in the military to be addressed. An effective method needed to be implemented to help military men and women in special programs (Roberts, 2004). Robinson (1961) claimed, “Contrary to the opinion of many students, the way to achieve effective study is not by more study or more determined concentration, but by changing
Acting on his belief that students needed an effective study skill method, Robinson (1941) created the SQ3R technique. He used the psychological results from a multitude of experiments focused on identifying single isolated methods conducted for improving overall comprehension and retention (Robinson, 1961). An abbreviation was used to enable easier retention, as well as for allowing a quick and simple reference. SQ3R presents a detailed step-by-step outline of what a reader should complete and accomplish while reading.

The S in SQ3R represents the word survey. This portion of the study skill is meant to be done first and should take no longer than a few minutes (Robinson, 1961). Robinson based this study skill on the work of McCluskey (as cited in Robinson). The reader should begin “surveying” or browsing through the title and main heading of the selection to form ideas as to the main points of the material. It is also suggested that the reader take a moment to read the concluding paragraph at the end of the reading if one is offered (Robinson, 1961). Robinson argues that by “surveying” the text before it is read, the reader will have a greater understanding of the main ideas. This enables the reader to organize as he/she is reading.

The second step of the SQ3R method is to question (Q). Robinson (1961) supports the use of questioning by citing Washburne’s and Holmes’ work (as cited in Robinson). This “questioning” step begins by converting headings of the selection into questions (Robinson). This can be done very quickly and easily, but it must be a conscious effort on the part of the reader. Neglect of this step results in a breakdown of the entire SQ3R method. The question formed by the student aids the reading process by causing the reader to search for the answer to
the question. Robinson argued, “This will arouse your curiosity and so increase comprehension” (p. 29). By sparking the curiosity of the reader, prior knowledge scaffolding will occur and understanding will occur at a quicker pace (Robinson).

Following the completion the “questioning” step, actual reading should occur (R-1). Reading should be geared toward answering the questions created from the headings. Robinson (1961) describes the reading portion of SQ3R as “an active search for the answer” (p. 29).

The second R represents reciting (R-2). The goal of the “reciting” step is to establish an answer to the question asked before reading. The reader should not scan or read through the text to find the appropriate answers (Robinson, 1961). If the reader is able to provide an answer and a possible example, reading should continue. However, if the reader is unable to present the answer to the question, scanning through the material in search for the answer should occur. The reader should take brief notes with headings and subheadings while reading (Robinson).

Robinson supports the use of note-taking and outlining. The Q, R-1, and R-2 should be repeated with each heading until the selection has been completely read (Robinson).

The final step of the SQ3R method is review (R-3), and is justified by Spitzer’s work supporting the technique (as cited in Robinson, 1961). When the selection has been completed, the reader should glance over the notes taken and observe the relationship between both the main points and the details (Robinson). Robinson suggests doing this by first trying to recall all main points, followed by recalling the details associated with the main points.

Robinson (1961) cautions that this is a process that needs to be practiced before it can be perfected. However, once the reader has worked through outstanding issues, the reader should be able to read at a quicker pace, identify the important ideas, and retain information.
Robinson (1970) cites two experiments conducted to determine the effectiveness of the SQ3R method. One study was conducted with a group of students enrolled in a “how to study” course. The students determined their individual reading abilities by having their reading rates and comprehension abilities assessed with a pre-test. At the beginning of the study, the students’ reading rates were in the 34th percentile, and the average comprehension level was in the 43rd percentile. The students were instructed on how to use the SQ3R method and given several days to practice using the method. The students were then given a second assessment to compare to the original results. The final assessment showed a significant increase in both student reading rate and comprehension. The reading rate increased 22 percentiles, placing the students in the 56th percentile, and the comprehension accuracy increased 10 percentiles, placing students in the 53rd percentile (Robinson).

The second experiment Robinson (1970) cites was used to examine the effectiveness of the study skill when used to prepare for an examination. The students were told to use their own pre-established study habits to prepare for a quiz. The students were given a quiz, in which the average number of incorrect responses was 15. The students were then taught the SQ3R study skill method and given a second quiz of equal difficulty. After students were given the second quiz, the average amount of incorrect responses dropped to six (Robinson).

Another study that supports Robinson’s (1941) claim that SQ3R is an effective study skill is Adams’, Carnin’s, and Gersten’s study (1982), which was conducted with 45 fifth graders. The students had developed decoding skills, but inadequate study skills. The students were then split into three groups of 15, and each was instructed using a different technique. Students were taught using systematic instruction through the use of SQ3R, independent study with feedback, or given no instruction. Students who were instructed with SQ3R were individually instructed four times
for 30-to-40 minutes. The technique was taught to and recited by the student for two days using a social studies passage; a new passage was selected to complete the instruction after the two days. The assessments were composed of a short retell and a 10-question short answer assessment. Students participating in the independent study with feedback were given passages to read. When the students completed the passages and believed they had adequately studied the material, they were given questions to answer. The instructor would then score the students’ work. Students were assessed on the short-term result of the instructed technique the following day, and again two weeks after the instruction of the technique to determine its long-term effectiveness.

The results indicated that students who participated in the systematic instruction achieved higher scores on the short answer assessments than those students who participated in the independent study and feedback, or who were given no instruction. Scores appeared to be greater on both short and long-term assessments. The group that was taught SQ3R spent a significantly longer period of time preparing and studying for the assessments. Although the SQ3R group’s preparation for the test decreased from the immediate test to the delayed test, there was no change in the overall scores.

Harris and Trujillo (1975) conducted a study to determine if academic achievement increased in junior high students through the implementation of self-management and group discussion study groups. The self-management group was instructed to reflect individually on their study habits, while the group discussion study group reflected on problems and concerns with other students in the study. The students’ overall grades were the basis of academic achievement in the study. A total of 36 students were selected for the self-management group and 41 were selected for the group discussion, all ranging from seventh to ninth grade. The study
took place over a 12-week period with a one-week break for vacation. One lesson was taught per week.

The self-management group was given a pretest questionnaire inquiring about students’ concerns and awareness of their own study habits at the start of all self-management classes. Lesson one required students to complete a data sheet with the amount of time spent on task for each day of the study. It addressed the importance of acknowledging and reflecting on study habits and behaviors. The remainder of the lessons addressed components of SQ3R, note taking, test taking skills, and reasons for studying, among others. Students were then given post-tests upon the conclusion of the intervention (Harris & Trujillo, 1975).

The group discussion section was also given a pre and a post-test, similar to those in the self-management group. Their lessons consisted of small group discussions on issues the students found difficult related to study habits (Harris & Trujillo, 1975).

The study’s results suggested both the self-management group and the group discussion sections showed an improvement in academic achievement. Both groups’ grades improved a statistically significant amount, whereas the control group’s grades decreased. There was no statistical difference in the grades between the two groups, but the self-monitoring group reported more positive feelings on the questionnaire. The study suggests self-management strategies including the instruction of SQ3R can have positive effects on the attitudes and grades of junior high students (Harris & Trujillo, 1975).

Artis (2008) discusses the importance and effectiveness of SQ3R with marketing students: “Because students can independently learn the basics of the course via reading, it reduces the need for instructor monologues (passive learning) to cover that information”
He argues that by doing this, students are able to be more active and hands-on in their learning. He also suggests that SQ3R causes students to change their negative thoughts on reading textbooks. Artis also believes, “SQ3R introduces a diverse set of megacognitive reading techniques in a way students can easily understand and implement” (p. 134).

Although Bakken, Mastropieri, and Scrugg (1997) do not believe SQ3R is an effective technique to teach students, they do find some advantages to the method. They point out that SQ3R is a valuable source for students when they are working independently. Many other study skill strategies have the student depend on the instructor for guidance, whereas SQ3R is a step-by-step process allowing students to be self-sufficient.

Some critics believe the method is ineffective and useless. Shepherd (1978) argues the study skill is not effective because it is too time consuming. The process is long and laborious, affecting students’ desire and willingness to participate and utilize the strategy. Further, not all studies conducted using SQ3R have shown that the study skill is an effective method. Pressley and McCormick (1995) add, “Although recommended in many study skills courses, [SQ3R] does not have a track record of exceptional effectiveness” (p. 374).

Huber (2004) argues that SQ3R is simply a variety of strategies placed together in the hope of gaining a comprehensive effect. She questions whether SQ3R has any positive effect on students and their comprehension of expository texts. Huber further states SQ3R is not comprehensive enough and that it does not address students’ lack of prior knowledge and experiences with the ideas…the main reason students struggle with expository texts.

Wooster (1953) conducted a study in an effort to determine the effectiveness of SQ3R. He administered the study after hearing students’ concerns that the method was ineffective. A total of 29 college freshmen at The Ohio State University enrolled in a reading improvement
course were selected to participate in the study. SQ3R was taught daily for one week to the students. The students then practiced using the strategy for the following nine weeks. The students were given an objective test over a textbook each week. They were given 20 minutes to prepare for the test using the SQ3R method (Wooster).

Wooster (1953) assessed the students on three different criteria. The criteria were the number of correct answers on a comprehension test, the number of words studied per minute, and the students’ thoughts on the quality of the notes taken. At the conclusion of the 10-week study, the results of the criteria were analyzed. It was found the students’ comprehension did not statistically change. The number of words studied per minute decreased from week two to four, and did not begin to rise back to the original number until week five. However, the notes taken by the students did improve.

The students were then questioned to determine why their comprehension level and number of words studied per minute did not increase. Approximately 45% of the students admitted to not completing the survey step of SQ3R. One-third of the students did not complete the questioning stage, citing their desire for more specific questions as the reason. Not a single student recited after reading, rather taking notes while reading, and 27 out of the 29 students did not review their notes after reading. Wooster (1953) then concluded students were not using the SQ3R study skill strategy, which was the cause of the lack of comprehension. He believed students should be taught each step of SQ3R separately. One step should be taught and students should be given ample time to practice the step before the following is taught. This process should be repeated with each step until all have been learned. When students have mastered each step separately, the steps may be combined and taught as a single unit. Students should then practice using the entire study skill.
Niple (1972) also conducted a study to determine the effectiveness of SQ3R if it was practiced regularly for an extended period of time. He used 140 students enrolled in an Introductory Psychology course at The Ohio State University. The students were split into four study groups. The first group read the material only one time, the second group used their self-proclaimed best study method, the third group used SQ3R without any practice, and the fourth group used SQ3R after receiving six weeks to practice the method. Niple was unable to determine if students who were given time to practice SQ3R had higher comprehension and retention levels, as only 50% of the participants actually practiced using the method.

Niple (1972) assessed the students immediately after reading the material, and again two days later. The immediate results showed no significant difference between any of the groups. The delayed results concluded that the four groups retained approximately the same amount. Niple then determined that none of the methods were effective in enabling students to retain information over an extended period of time. On the first assessment, the SQ3R group with six weeks of practice scored significantly higher on main idea questions; however, there was no significant difference between any of the groups on detail questions. Main idea and detail questions were not compared on the second assessment two days later.

Niple’s (1972) results showed SQ3R with six weeks of practice to be the most effective of the four study strategies because the group was able to comprehend more main ideas than the other three groups. However, Niple’s results came under question when it was found that he did not monitor the amount of time each group took to study in preparation for the assessments.

SQ3R has served as the basis for many other reading strategies and modifications. Thomas and Robinson (1972) created SQ4R, incorporating a reflection step. Roberts (2004) discusses the flexibility of SQ3R and its ability to be adapted to all content areas. For
mathematics she suggests reviewing first, as math is constantly building on previously learned material (Roberts). SQRQCQ is another mathematics modification to SQ3R (Fay, 1965). The student begins by surveying (S) the question to get a better idea of the problem, and then questions (Q) themselves about the problem, followed by reading (R) the problem and focusing on all the details. Next, the student must question (Q) what mathematical formula should be performed, and compute (C) the mathematical formula. Finally the student should question (Q) the answer obtained by checking their work and reviewing the process (Fay).

Another systematic strategy spawned from SQ3R is EVOKER. This study method is used to analyze literature, whereas SQ3R is primarily used for expository texts (Pauk, 1963). This method can also be used to teach poetry or drama. The strategy begins with exploring the material (E) by completely reading through the text to gain a greater understanding of the overall message. Then, the reader should locate any places, people, events, or terms they are unfamiliar with to fulfill the vocabulary (V) portion of the study skill. Next, is oral reading (O). This aspect of the method is simply reading the selection aloud with expression. K represents the key ideas, which includes the theme, events, and characters. E represents the evaluation step of the study skill. Through this portion of the study skill, the key words and sentences are evaluated and related to the affect the words and sentences play on the entire selection. EVOKER concludes with recapitulation (R) which requires the reader to reread the passage or selection (Roberts, 2004).

More recently, a writing strategy was created by Betty Roe (1993). ROWAC stands for read, organize, write, active reading, and correct predictions. While completing the reading step (R), the headings and subheadings should be examined to gain a greater idea of the topics presented. By reading the headings and subheadings, prior knowledge is also activated. When
completing the organizing stage (O), the reader outlines, creates a chart, or some sort of format to list the headings and subheadings. The format is then filled out with the readers’ predictions of the texts in the writing stage (W). Active reading (A) follows the writing stage. In this stage, many things take place simultaneously. The reader is reading, checking predictions, analyzing connections, and writing new information in the formatted chart or outline. Correcting the predictions (C) is the final stage of the strategy. The original predictions are then analyzed and corrected to make the final version accurate (Roberts, 2004).

Summary

Reading instruction has been evolving and changing for many years. Educators must improve their students’ comprehension if they hope to improve their students’ reading abilities. Science content teachers must also tackle the feat of instructing students on how to successfully read expository texts. The use of expository texts in the classroom and on academic achievement assessments becomes prevalent in the middle grades. In the middle grades, students are asked to read informational text and retain information for the first time. It is an adjustment for students as they begin to address abstract topics and issues that can be very confusing. The instructors must teach students how to successfully read the text, understand the material, and retain the information.

Educators are expected to incorporate many techniques and strategies into their content classrooms to aid students in their development. One way to do this is through the use of direct instruction of study strategies. SQ3R is a direct instruction technique used to raise student comprehension and retention of expository texts. SQ3R has been analyzed from its beginnings in 1941. Research has found the strategy to be both effective and ineffective. However, there is not a great deal of research on the effectiveness of the strategy with middle level learners. One
particular study conducted by Adams, Carnin, and Gersten (1982) found SQ3R to be effective in improving fifth grade students’ comprehension. One advantage the strategy has is that students can use and modify the strategy as they continue their education through high school, college, and beyond.
CHAPTER III: METHODS AND PROCEDURES

Students often dread reading expository texts because of the different formats and difficult concepts. Through the teaching and use of a direct instruction study strategy, students may feel more confident and comfortable approaching expository texts. They may also become more willing to engage in non-fiction reading materials if they have a strategy that will improve their comprehension. The purpose of the study was to determine whether the implementation of SQ3R in fifth grade students’ study strategies improves their comprehension of science material. Subquestions of the study included determining what preexisting study strategies students were using, as well as the students’ thoughts about whether they would use SQ3R in the future.

Methods

Research Design

This research study was conducted as both a qualitative and quantitative study. The first portion of the study addressed the students’ reading strategies of expository texts. The purpose of this piece of the study was to gather quantitative data through the use of a survey. The survey consisted of four questions, using a Likert-type Scale. Mertler (2008) states, “The ultimate goal of survey research is to learn more about the current status of a reasonably large population either by surveying a subset (known as a sample) from the population or by surveying the entire population” (p. 83). The survey was conducted with the intention of determining the thoughts and habits of the general population of fifth grade science students.

The purpose of the second piece of the study was to gather quantitative data on the students’ comprehension levels. The study used a one-group pretest-posttest design (Mertler, 2008). A pre-experimental design was chosen to allow the teacher to ultimately determine whether any change occurred (Leedy & Ormrod, 2005).
Upon the completion of the second assessment, the students were given a final survey to gather qualitative and quantitative data. Students responded to questions in reference to the SQ3R study method. This allowed the researcher to observe the students’ beliefs on the effectiveness and practicality of the strategy. Questions were asked to determine if students used the entire SQ3R study skill, parts of the study strategy, or none of the skill. Students were then asked why they did or did not use the study strategy. The why or why not piece of the survey was used as the qualitative data. This also allowed the researcher to identify a relationship between comprehension scores and the SQ3R study strategy.

*Participants*

The study was conducted in a classroom in which the researcher had previously taught. The participants included 32 fifth grade students. The school was a convenience sample selection, as it was relatively close to the university where the researcher was completing graduate school. The students were chosen based on the willingness of the classroom instructor to allow the researcher to conduct the study. These students were also chosen because fourth and fifth grades mark a transition from narrative texts to expository texts, which appear to present the most difficulty for students. Expository texts present students with unfamiliar concepts, formats, and vocabulary, thus resulting in low comprehension levels. It was the belief of the researcher and classroom teacher that students need a structured research-based strategy to aid the students’ learning process.

The school within which the researcher conducted the study was located in an urban community, with 68.2% of the students living in economically disadvantaged homes. Of the population, 56.2% of the students were Caucasian; 15.1% were Hispanic; 14.9% were multi-racial, and 8.6% were Black, non-Hispanic. A total of 11.5% of the students were limited in the
English language, and 18.5% were categorized as students with disabilities. The median income for the district was $28,047.

*Instrumentation*

Assessment

Two assessments were given to students to monitor their comprehension (See Appendix A). The first assessment was given before they were introduced to the study strategy SQ3R. Students were given a passage and had 30 minutes to read and study the passage using study strategies and methods of their choice. The students were then asked to clear their desks and prepare for a brief assessment. Students were given time to complete their assessments, which were used as quantitative data. The results of the first assessment provided the researcher with an idea of students’ individual and overall comprehension scores.

A second assessment was administered after students had been taught the SQ3R method for one week. A second passage of equal difficulty and readability was administered to the students. Flesch-Kincaid readability levels were used to ensure the passages were of equal difficulty. The students were given 30 minutes to read and prepare for a 10-question assessment using the SQ3R method. This quantitative data was used to compare the students’ first set of comprehension scores with the second.

Each assessment contained four literal questions, four inferential questions, and two interpretive questions. The assessment questions were chosen to activate the different levels of thinking. The goal of the assessments was to determine if the implementation of SQ3R was more effective than the students previous study strategies, or more effective than no study skills.
Survey

The next instrument utilized in this study was a survey (See Appendix B). The survey was used to determine students’ current reading strategies when reading expository texts. The survey consisted of four questions, three of which were multiple-choice and one utilized a format similar to the Likert Scale. The possible answers for the Likert-type Scale were as follows: Always, Most of the time, Sometimes, Hardly ever, and Never. The survey was constructed and administered to the class by the researcher. The researcher read each question to the students and provided them ample time to respond.

A second survey (See Appendix B) was given to students upon the completion of the instruction, implementation, and comprehension assessment of SQ3R. The survey called on students to engage in metacognitive behaviors by reflecting on the effectiveness and usefulness of the study strategy. The survey included five multiple-choice questions. Students were asked which steps of the method they utilized in their reading strategies, how often they practiced the study strategy, if they believed the strategy improved their comprehension, and if they planned on using the strategy in the future. The survey was also constructed and administered by the researcher. The researcher read each question to the students and allowed ample time for response.

Procedures

The researcher submitted a proposal to the Human Subject Review Board (HSRB) in January. After HSRB approved the proposal, and the researcher contacted school administrators, the parents of the participating students and the students (See Appendix C). Following the completion of the initial survey, the researcher administered the first assessment. The assessment consisted of 10 multiple-choice questions to determine baseline comprehension scores. Students
were given 30 minutes to complete their reading and answer the multiple-choice assessment. The students used their own pre-established study strategy to prepare for the assessment. The researcher then taught the students how to incorporate the SQ3R strategy into their reading for one week. The students were taught for five consecutive days in February during one-hour class sessions. The first day, students were taught how to use the survey (S) and question (Q) portion of SQ3R. On the second day, students were taught how to complete the read (R) portion of the strategy, and on the third day, the students were taught how to complete the recite (R) and review (R) portions of the strategy. On the fourth day of intervention, the class completed a whole-group guided practice activity. The final day of intervention was used to allow students to complete an individual practice activity using all of SQ3R.

The researcher returned to the classroom following the five days of intervention and administered the second assessment. Students were told to use the SQ3R strategy to read and study a new passage. The students were then given a 10-question multiple-choice assessment to determine the new comprehension scores with the implementation of SQ3R. The same day, the researcher administered the final survey consisting of five questions.

Data Collection

The data collected were triangulated, consisting of two surveys, two assessments, and the materials showing the students’ preparation. The first survey was used as qualitative data, and the second supplied both qualitative and quantitative data. The purpose of the surveys was to determine students’ behaviors when reading expository texts and the SQ3R method. The assessments were used as quantitative data to determine comprehension scores. The assessments were compared and analyzed to determine whether there was a relationship between implementation of SQ3R and comprehension scores.
Data Analysis

Qualitative and quantitative data were analyzed for this study. The students’ behaviors and habits in reference to reading expository texts were analyzed on the first survey. The students’ previous reading strategies were also analyzed. Using the first survey, the researcher analyzed which reading methods, if any, were used most often by students.

The data from the second survey were analyzed using a descriptive summary to determine the student’s attitudes and thoughts on the effectiveness of the study strategy SQ3R. It was determined whether students planned to utilize SQ3R in the future and if they found the method to be helpful in comprehending and retaining information from expository texts. The survey’s data were analyzed using the descriptive summary to determine which steps of the method were used and which were not.

The results collected from the two assessments were used as quantitative data. The data was converted into percentages and used as baseline and final comprehension scores. The data were analyzed using individually-based frequency counts. The purpose of the assessments was to determine whether there was a relationship between the comprehension scores of students who used a different study strategy before the instruction of SQ3R and those who did not.

Summary

This study was conducted in a fifth grade classroom with 46 participants in February of 2011. The study’s purpose was to determine if the implementation of SQ3R in fifth grade students’ study strategies improved their comprehension. Subquestions of the study included determining what preexisting study strategies students were using, as well as the students’ thoughts about whether they would use SQ3R in the future.
The student’s comprehension scores were determined using two 10-question multiple-choice assessments. Their attitudes toward expository texts and the SQ3R study strategy were assessed using two surveys. The students were given a survey that corresponded with an expository passage as well as an assessment of their comprehension of that passage. They were then taught using the direct instruction study strategy SQ3R, given a second assessment in correspondence with a second expository passage, and given a final survey. The results of the surveys and assessments were used to determine if a change in the students’ comprehension and attitudes occurred.
CHAPTER IV: DATA ANALYSIS AND DISCUSSION OF RESULTS

This research study was designed to determine whether the study strategy SQ3R had an effect on fifth grade students’ comprehension scores in science. This study also investigated whether students had preexisting study strategies and their thoughts on whether they would use the strategy in the future. Data were collected from 32 fifth grade students over a period of seven days. The students were given a pre-survey and pre-assessment on day one, followed by five consecutive days of instruction and intervention, and concluded with a final post-survey and post-assessment. On teaching day one students learned how to use the S (survey) and Q (question) portion of the strategy. On day two, students were taught how to read (R) with the purpose of answering the questions. On day three, students were instructed on the recite (R) and review (R) pieces of the strategy. Day four was used to combine what the students had learned from the previous three days to complete a guided practice activity. Finally, the fifth day of teaching was used to allow students to practice using the entire strategy individually. After students had been given intervention and instruction on the SQ3R strategy, they were given a post-assessment and post-survey. The data collected from the pre and post-survey as well as the data from the pre and post-assessments were analyzed upon the completion of the study.

Data Analysis

The data collected over the seven days of the study were analyzed to determine whether a relationship existed between the use of SQ3R and improved comprehension. When students were instructed how to use SQ3R for five days, the average of the entire class’ overall comprehension score improved $(t = -2.41, p = .01)$. There was a significant difference between students’ overall pre-assessment scores and post-assessment scores.
The pre-assessment scores and post-assessment scores of the 32 participants were first analyzed separately. The pre-assessment was administered, followed by five days of intervention and instruction using SQ3R were given, and a final post-assessment was given. The mean overall comprehension score on the pre-assessment was a 5.44 out of 10 or 54.4% (see Appendix D). After the students were taught SQ3R, their overall comprehension score on the post-assessment was 6.41 out of 10 or 64.1% (see Appendix D).

The data were then split and analyzed based on the results of the pre-survey. Students self-identified whether they did or did not currently use a reading strategy. Of the 32 students, 15 of the participants identified themselves as having a preexisting reading strategy, and 17 of the participants indicated they did not use a strategy while reading (see Appendix E). Of those students who claimed to be using a reading strategy, 40% said they took notes, 6.7% said they outlined, and 33.3% said they underlined important information, while 20% said they used a different strategy (See Appendix E). The mean score of students who had a preexisting reading strategy on the pre-assessment was 5 out of 10 or 50%. Students were then given five days of intervention and instruction. The mean score of students who had a preexisting reading strategy on the post-assessment was 5.73 out of 10 or 57.3% (see Table 1).

The strategy user’s data were then further broken down into those who used all of SQ3R, those who used pieces of SQ3R, and those who chose not to use any of SQ3R on their post-assessment. Ten of the participants who identified having a reading strategy in place used all of SQ3R on their post-assessment. The mean comprehension score of students with a preexisting reading strategy was 5.2 out of 10 or 52%. After five days of instruction, their mean post-assessment comprehension score when using all of SQ3R was a 5.6 out of 10 or a 56% (see Table 2). Of the students who identified having a reading strategy, five used part of SQ3R on
<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment Score</th>
<th>Post Assessment Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>4</td>
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<tr>
<td>7</td>
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<td>8</td>
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<tr>
<td>8</td>
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<td>6</td>
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<tr>
<td>10</td>
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<td>4</td>
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<tr>
<td>12</td>
<td>2</td>
<td>5</td>
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<tr>
<td>13</td>
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<td>10</td>
</tr>
<tr>
<td>14</td>
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<td>10</td>
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<td>25</td>
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<td>28</td>
<td>5</td>
<td>7</td>
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<td>32</td>
<td>5</td>
<td>8</td>
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<tr>
<td><strong>Average</strong></td>
<td><strong>5</strong></td>
<td><strong>5.7</strong></td>
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</tbody>
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<tbody>
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</tbody>
</table>

Table 1

Self-Identified Strategy Users Pre-Assessment and Post-Assessment Comprehension Scores

their post-assessment. Students who used portions of SQ3R on the post-assessment had a pre-assessment mean score of 4.9 out of 10 or 49%, and a mean post-assessment score of 5.8 out of 10 or 58% (see Table 3). All of the students with preexisting reading strategies either used all of SQ3R or pieces of the strategy on their post-assessments.
### Table 2

**Self-Identified Preexisting Reading Strategy Post-Assessment Full SQ3R Users**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post Assessment</th>
<th>Parts of SQ3R Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>4</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>6</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>3</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>19</td>
<td>7</td>
<td>10</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>25</td>
<td>6</td>
<td>5</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>5.2</strong></td>
<td><strong>5.6</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Table 3

**Self-Identified Preexisting Reading Strategy Post-Assessment Partial SQ3R Users**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
<th>Pieces of SQ3R Used on Post-Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td>3</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
<td>R1, R2</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>8</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>4</td>
<td>Q,R1</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>5</td>
<td>S,Q,R1,R2</td>
</tr>
<tr>
<td>13</td>
<td>8</td>
<td>10</td>
<td>S,Q,R1,R3</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>4</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>8</td>
<td>Q,R1</td>
</tr>
<tr>
<td>28</td>
<td>5</td>
<td>7</td>
<td>Q,R1</td>
</tr>
<tr>
<td>32</td>
<td>5</td>
<td>8</td>
<td>R2,R3</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4.9</strong></td>
<td><strong>5.8</strong></td>
<td></td>
</tr>
</tbody>
</table>
Data were then analyzed from students who did not have preexisting reading strategies.

The mean score of students who did not possess a previous reading strategy on the pre-assessment was 5.82 out of 10 or 58.2%. After five days of intervention and instruction, their mean post-assessment score was a 7 out of 10 or 70% (see Table 4).

Table 4

No Preexisting Strategy Pre-Assessment and Post-Assessment Comprehension Scores

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>8</td>
<td>8</td>
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<tr>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>8</td>
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<tr>
<td>9</td>
<td>6</td>
<td>6</td>
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<tr>
<td>11</td>
<td>5</td>
<td>4</td>
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<tr>
<td>15</td>
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<td>8</td>
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<tr>
<td>16</td>
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<td>9</td>
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<tr>
<td>17</td>
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<td>20</td>
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<tr>
<td>21</td>
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<tr>
<td>22</td>
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<td>23</td>
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<td>10</td>
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<tr>
<td>24</td>
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<td>9</td>
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<td>27</td>
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<tr>
<td>29</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>30</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>31</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Average 5.8 7
Like the data from the students who had preexisting reading strategies, the data from the students without preexisting strategies were broken into those students who used all of SQ3R, pieces of SQ3R, and those who did not use any SQ3R on their post-assessments. Five of the 17 participants without a preexisting reading strategy used all of SQ3R on their post-assessments. The mean pre-assessment score of the students was 7.4 out of 10 or 74%. After intervention and instruction, their mean post-assessment score using all of SQ3R was 8.6 out of 10 or an 86% (see Table 5).

Table 5

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
<th>SQ3R Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>8</td>
<td>9</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>29</td>
<td>6</td>
<td>8</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>23</td>
<td>6</td>
<td>10</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>15</td>
<td>9</td>
<td>8</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>8</td>
<td>S,Q,R1,R2,R3</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>7.4</strong></td>
<td><strong>8.6</strong></td>
<td></td>
</tr>
</tbody>
</table>

Eight non-strategy participants used parts of SQ3R on their post-assessment. The mean score of students who were partial users of SQ3R on their post-assessment had a pre-assessment score 5.75 out of 10 or 57.5%. The mean post-assessment score after five days of intervention was a 6.75% out of 10 or 67.5% (see Table 6).

Four of the students without a previous reading strategy did not use any of SQ3R on the post-assessment. The mean pre-assessment score of students who did not have a preexisting reading strategy and did not incorporate any of SQ3R into their post-assessment was 4 out of 10.
Table 6
No Preexisting Reading Strategy Post-Assessment Partial SQ3R Used

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
<th>Pieces of SQ3R Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>4</td>
<td>8</td>
<td>Q,R1,R2,R3</td>
</tr>
<tr>
<td>9</td>
<td>6</td>
<td>6</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>4</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>16</td>
<td>6</td>
<td>9</td>
<td>S,Q,R1,R3</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
<td>2</td>
<td>S,Q,R1,R3</td>
</tr>
<tr>
<td>22</td>
<td>8</td>
<td>10</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td>27</td>
<td>5</td>
<td>8</td>
<td>Q,R1</td>
</tr>
<tr>
<td>31</td>
<td>7</td>
<td>7</td>
<td>S,Q,R1</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>5.7</strong></td>
<td><strong>6.7</strong></td>
<td></td>
</tr>
</tbody>
</table>

or 40. Their mean post-assessment score after intervention was a 5.5 out of 10 or 55% (see Table 7).

Table 7
No Preexisting Reading Strategy Post-Assessment No SQ3R Used

<table>
<thead>
<tr>
<th>Participant</th>
<th>Pre-Assessment</th>
<th>Post-Assessment</th>
<th>SQ3R Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>5</td>
<td>4</td>
<td>None</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>8</td>
<td>None</td>
</tr>
<tr>
<td>21</td>
<td>1</td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>24</td>
<td>5</td>
<td>9</td>
<td>None</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>4</strong></td>
<td><strong>5.5</strong></td>
<td></td>
</tr>
</tbody>
</table>
The post survey was analyzed qualitatively. Students were asked if they would use SQ3R in the future. Ten of the 32 students or 31.25% of students stated they would not use SQ3R in the future. Some of the reasons cited were that students had preexisting reading strategies in place; the strategy was too hard; they did not think the strategy helped them, and it took too much time. One participant stated, “No, because you would have to do a lot of steps.” Another participant stated, “No, because I have other strategy to help me.”

Twenty-two of 32 or 68.75% of students stated they would use SQ3R in the future. Reasons most commonly cited were their belief the strategy helped them read better and their belief they could improve their grades by using the strategy. Students also stated they believed the strategy helped them understand the text better and it helped them remember material better. One student stated, “Yes because the answers are rite [sic] there.” A second student who scored a 6 out of 10 on his pre-assessment and after learning how to use SQ3R, scored a 10 out of 10 on his post-assessment said, “Yes because then I could gratuate [sic] and get good grades. Also because it’s a good method.” Another student stated, “Yes, because the older I get the harder the words become.” A student who improved from a four on the pre-assessment to an eight on the post-assessment when using SQ3R stated, “Yes. I think it helped me remember information.”

Discussion of Results

This research study was designed to determine whether fifth grade students’ comprehension scores improved when instructed how to use SQ3R. Subquestions of the study include determining the preexisting reading strategies of the students, as well as the students thoughts on whether they would use SQ3R in the future.

Based on the results from this study, when students were instructed how to use SQ3R for five days, their overall comprehension scores showed significant improvement (t = -2.41, p =
.01) between students’ overall pre-assessment scores and post assessment scores. Overall, students who did not have a preexisting reading strategy improved their comprehension scores more than students who had a preexisting reading strategy. Students who did not have preexisting reading strategy improved .7 points from their pre-assessment to their post assessment, and students who did not have a preexisting reading strategy improved 1.2 points from their pre-assessment to their post assessment.

Of the 28 students who incorporated SQ3R into their reading strategies after five days of intervention and instruction, 14 improved their reading comprehension score. Students who had a preexisting study strategy improved their overall reading comprehension scores after five days of intervention from a 5 to a 5.73. Students who did not have a preexisting study strategy improved their overall score from a 5.8 to 7.

After analyzing the data, the study showed that the group of students who had the greatest amount of improvement was the group of students who did not have a previous reading strategy and did not use SQ3R on the post-assessment. The students improved their score from a 4 out of 10 to a 5.5 out of a 10. However, this group of students had the lowest pre-assessment score and post-assessment score. The group of students who had the second highest overall improvement and the highest post-assessment mean was the group who did not have a preexisting reading strategy and after five days of intervention used all of SQ3R on the post-assessment. The students improved their comprehension scores from 7.4 on the pre-assessment to an 8.6 on the post-assessment. One particular student in the group improved from a 6 out of 10 on the pre-assessment to a 10 out of 10 on the post-assessment. The group of students who showed the least improvement were the students who had a preexisting reading strategy and used all of SQ3R.
The results of this study indicate the nearly half of the students used a reading strategy to aid their comprehension. A total of 46.88% of students stated they used a reading strategy. The most commonly cited study strategy of student was note taking. Of the students who identified using a reading strategy, 40% used note taking. The least common reading strategy used by students was outlining. Only 6.7% of students stated they used outlining as a reading strategy. Additionally, based on the results of this study, it can be determined the majority of students would continue to use SQ3R in the future. Of the students, 68.75% stated they would continue to use SQ3R on expository materials in the future.

Summary

This purpose of this research study was to determine whether fifth grade students’ expository text comprehension scores improved when instructed how to use the study strategy SQ3R. When students were instructed how to use SQ3R for five days, their overall comprehension scores showed significant improvement (t = -2.41, p = .01) between students’ overall pre-assessment scores and post assessment scores. This study also investigated students preexisting reading strategies; 53.12% of students’ did not have a preexisting reading strategy, and 46.88% self-identified having a preexisting reading strategy. The most common reading strategy used by the students was taking notes. The third aspect of this study was to determine if after five days of instruction and intervention, students would use SQ3R in the future. The results indicated that 68.75% of students would use SQ3R in future. The most common cited reason for this was students’ belief that the strategy helped them learn better.
CHAPTER V: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The ultimate goal when reading is comprehension, but the comprehension of expository texts continues to prove to be an area of difficulty for students throughout their education. Fifth grade continues the transition from primarily fiction texts to expository texts, but strategies needed to successfully read expository texts are rarely addressed. Reading expository texts is significantly different from reading fiction texts, and it is essential that educators are introducing reading strategies to their students.

If all students are not introduced to various study strategies, it is likely many of them will continue to struggle reading and comprehending expository texts. SQ3R is a systematic study strategy that can be used to aid in comprehending expository texts. This chapter includes a summary of the completed study, conclusions formulated by data and results collected throughout the study, recommendations for teachers and administrators, and thoughts for further research.

Summary

This research study was designed to determine if SQ3R improved fifth grade students’ expository text reading comprehension. This study also investigated the preexisting reading strategies of the students and their thoughts as to whether they would continue to use SQ3R in the future. This study found that when students were instructed how to use SQ3R for five days, their overall comprehension scores showed significant improvement ($t = -2.41, p = .01$) between students’ overall pre-assessment scores and post assessment scores. Of the 28 students who incorporated SQ3R into their reading strategies after five days of intervention and instruction, 14 improved their reading comprehension scores. Students who had a preexisting study strategy improved their overall reading comprehension scores after five days of intervention from a 5 to a
5.73. Students who did not have a preexisting study strategy improved their overall score from a 5.8 to 7.

After analyzing the data, the study showed that the group of students who had the greatest amount of improvement was the group of students who did not have a previous reading strategy and did not use SQ3R on the post-assessment. This could be because students may have been using a reading strategy but were not metacognitive of their reading processes. The post-survey was also student self-reporting, which could have skewed the results. The students improved their score from a 4 out of 10 to a 5.5 out of a 10. However, this group of students had the lowest pre-assessment score and post-assessment score. The group of students who had the second highest overall improvement and the highest post-assessment mean was the group who did not have a preexisting reading strategy and after five days of intervention used all of SQ3R on the post-assessment. The students improved their comprehension scores from 7.4 on the pre-assessment to an 8.6 on the post-assessment. One particular student in the group improved from a 6 out of 10 on the pre-assessment to a 10 out of 10 on the post-assessment. The group of students who showed the least improvement were the students who had a preexisting reading strategy and used all of SQ3R.

This study investigated whether students used a preexisting reading strategy when reading expository texts. The results of the study indicated that 46.9% of students had a self-identified preexisting reading strategy and 53.1% did not identify using a reading strategy. Of the 46.9% of students who did possess a preexisting reading strategy, 40% said they took notes, 6.7% said they outlined, 33.3% said they underlined important information, while 20% said they used a different strategy.
The third question the study addressed was whether students would use the SQ3R reading strategy method in the future. 68.7% of students stated they would use the strategy in the future and 31.3% stated they would not use SQ3R in the future.

**Conclusions**

One conclusion that can be made from the results of this study is that any reading strategy is better than none. This supports previous research claiming students improve their reading comprehension when they use reading strategies (Shores, 1943; Pearson & Gallagher, 1983; Forgan & Mangrum, 1989, National Institute of Child Health and Human Development [NICHHD], 2000). The group that had the highest post-assessment comprehension mean was the group of students who did not have a preexisting reading strategy and used all of SQ3R on their post-assessment. The group of students who had the second highest post-assessment mean was the group of students who did not have a preexisting study strategy and used pieces SQ3R on the post-assessment. The students who did not have a previous reading strategy and after five days of intervention, did not use any part of SQ3R on the post-assessment had the lowest pre-assessment comprehension score and post-assessment comprehension score. By being actively engaged with the reading process through a study strategy, students can comprehend more as defined by RAND (2002) as “the process of simultaneously extracting and constructing meaning through interaction and involvement with written language” (p. 11). Study strategies allow students to be involved with the written text. This would appear to suggest if students do not have a reading strategy and begin to use a strategy or pieces of a strategy, they would improve their comprehension.

A second conclusion might be that integrating a new study strategy into a student’s study habits may create cognitive confusion for the students. The data show there may have been a
conflict between students’ preexisting reading strategies and SQ3R, which may have prohibited them from performing at their highest ability level. Students who had the smallest amount of improvement were students who had preexisting reading strategies and used all of SQ3R on their post-assessments. This could be caused by cognitive confusion. Students who had a preexisting reading strategy successfully in place may have been confused because the preexisting strategy and SQ3R were conflicting, causing their habits to be disrupted. If students were successful using their previous strategy, they may have been at a disadvantage when attempting to incorporate an additional strategy.

Another conclusion might be that study strategies, such as SQ3R, may need to be adapted by students to better meet their existing study habits. Students who had a previous reading strategy and used pieces of SQ3R improved more than students who had a preexisting reading strategy and used all of SQ3R on their post-assessments; this could be because students were able to incorporate different pieces of SQ3R into their preexisting reading strategy as they saw fit. However, much like the students who had preexisting reading strategies and used all of SQ3R on their post-assessments, cognitive confusion may have placed the students at a disadvantage. If the students were comfortable, confident, and successful using a strategy, trying to incorporate SQ3R may have conflicted with the preexisting reading strategy, causing confusion.

Another conclusion that can be drawn is that it may take time to integrate a study strategy into a student’s study habits. This supports previous research claiming students need time to master a study strategy (Dole, 2000; Duke & Pearson, 2000; Gear, 2008). If students were given more time to incorporate SQ3R into their reading strategies, reading comprehension scores may have shown greater growth. The students were only taught how to use the strategy SQ3R for five days before being given a post-assessment. Had the students been instructed for a longer period
of time or given time to independently integrate SQ3R into their study habits, they may have become more comfortable and confident using the strategy, leading to different results. Robinson (1961) cautioned that students may need to be patient when learning a study skill. He added that study skills may be learned quickly; however, they must be worked with, molded, and practiced before they are mastered.

Recommendations

For Teachers

It is recommended that teachers instruct students how to use different reading strategies, including SQ3R, based on the results of this study. It is vital that teachers take the time to educate their students how to use different strategies. Reading strategies do not come naturally to students; they must be taught from an early age and monitored in order to be successful. As seen from the results of this study, any reading strategy is better than no strategy. Teachers should also encourage their students to use a strategy that the students feel most comfortable using. Students may perform better academically if they incorporate a strategy into their reading habits. Teachers should encourage their students to try different strategies and find one they feel confident and comfortable using. Teachers should also encourage students to use the reading strategy regularly. When students create a routine using the strategy while reading, they will become more confident in comprehending their reading.

For Administrators

Administrators should discuss the importance of using reading strategies with faculty members as well as family members. Administrators should encourage faculty and families to monitor student work to ensure they are incorporating a study strategy into their reading regularly. Administrators should also educate faculty on the different types of reading strategies
by providing professional development sessions and resources that can be used in the classroom. Administrators should promote reading strategies from the early grades through high school. The longer a student uses a reading strategy, the more comfortable they become, allowing them to adjust the strategy to fit their individual needs.

For Further Study

Due to the small amount of time students were given to learn and incorporate SQ3R into their study strategies, it may be beneficial to conduct the study over a longer period of time. By extending the time students were taught the method and by giving students a few weeks or months to perfect the use of SQ3R and become comfortable incorporating the strategy into their habits, the results may differ.

It is also recommended that the reading levels of the students be assessed before the pre-assessments and post-assessments are given. If the passages are above the students reading level, it will not matter what reading strategy they are taught or incorporate into their reading habits, they will be unsuccessful. By using students that are all at the same reading level, a more accurate depiction of the effectiveness of SQ3R will be found.

It is also recommended that for future research, the researcher interview students after they are given a pre-assessment, instructed on how to use the method, and given a post-assessment. This will be beneficial because this will give insight to students’ metacognition and reasons for their thoughts on the strategy.

Summary

Science reading material continues to cause problems for many students from kindergarten to twelfth grade. The robust vocabulary and abstract ideas prove to be very difficult for students. Without begin given any direction on how to approach difficult materials, students
are put at a disadvantage. It is essential that students are instructed how to use reading strategies when encountering difficult material. According to the research from this study, the study strategy SQ3R significantly improves students’ overall expository text comprehension scores. Further research is recommended and encouraged to examine the relationship between SQ3R and reading comprehension scores.
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APPENDIX A

Pre-Assessment and Post Assessment Reading Materials and Assessments
The JR bobbed in the Pacific Ocean. The boat's drill spun deeper and deeper into the ocean floor. It pounded away at rock under the seabed.

The geologists on the ship were excited. If they could drill deep enough, they just might discover new details about Earth's story.

Cool Planet

And what a long, long story it is. Earth is over 4.5 billion years old! When Earth first formed, it didn't have different layers. It didn't have oceans or mountains, either. In fact, you might not have recognized our cool, blue planet. It was just a big, sizzling blob of melted rock.

Slowly, Earth cooled. As it cooled, the heaviest materials, such as iron, sank down. Lighter materials, such as the mineral silica, rose to the surface. Over hundreds of millions of years, the materials settled into three layers.

No one has drilled to Earth's deepest layers yet. Even so, geologists have an idea of what those layers are like from studying seismic waves. Those are waves of energy caused by earthquakes. As they travel through Earth, the waves move quickly through some layers and more slowly through others. Geologists know some layers are made of liquid metal, such as iron. They know others are solid rock.
Core to Crust

To picture Earth's layers, think of a hard-boiled egg. Picture the yolk, the egg white, and the eggshell. Earth's "yolk" is called the core. It's thousands of miles below your feet—and it's hotter than hot! Temperatures in the core can reach over 6,650°C (12,000°F). The core is made of metals—mostly iron and nickel.

Above the core, like an egg white, is Earth's thick mantle. The mantle is made of partially melted rock. Finally, above the mantle is Earth's cool crust—the eggshell.

The crust is our home sweet home. All you can see is part of it—canyons, fields, even oceans. The crust varies in thickness from 5 to 100 kilometers (3 to 62 miles). That may sound thick, but compared to Earth's other layers, the crust is thinner than that eggshell.

Giant Jigsaw

The crust may seem rock-solid to you. In fact, it's cracked! Like a jigsaw puzzle, the crust is broken into huge pieces, called tectonic plates. These plates don't stay put. They are always on the move. At first, scientists weren't sure what pushed the plates around. They now believe the answer comes from Earth's core.

The core is like a hot burner. It heats the mantle above. Rock in the mantle gets lighter as it heats up. That causes the partially melted rock to rise. As it moves farther from the core's heat, the rock cools down and then sinks again. This constant rising and sinking makes a slow, circular current.

The plates float on top of it all. The currents push and pull at the plates from below, causing them to move. As the plates shift, they take the continents along for a bumpy ride!
Slow Going

The plates don't exactly zoom along quickly. The fastest-moving plate only moves about 15 centimeters (6 inches) per year. Yet over time, those inches start to add up. Inch by inch, continents are pulled apart and oceans are split.

About 225 million years ago, all the continents were nestled together in a mass called Pangaea. As the plates moved, they slowly pulled the continents apart. Look closely at the east coast of South America and the west coast of Africa. You'll see that it's almost a perfect fit!

That's no coincidence. These continents were once joined. At one point in time, Antarctica was in the tropics. And Australia was in the Antarctic! Talk about topsy-turvy. In 100 million years, Earth's map will look quite different than it does today.

Collision!

As the plates move, they crash into each other like bumper cars. We see and feel the shifting in many ways: earthquakes, volcanoes, mountain ranges—even hot springs!

Most of this action happens at the edges of the plates, where they meet. Plates can meet at convergent, divergent, or transform boundaries. A convergent boundary is where two plates collide. A collision between two continents is a real head-banger. It causes the plates to push upward.

That's what's been happening as India crunches into the Asian plate. The plate carrying Asia has been pushed up. Way up. In fact, the collision has created the towering Himalaya mountains! This huge collision is still going on. As it does, the Himalaya grow taller.

Something different happens when an ocean plate collides with a continental plate. Instead of rising up, the heavier ocean plate takes a dive. The deeper into Earth, the hotter it gets.
Pull and Push

The second type of boundary is called a divergent boundary. That's where two plates move apart. As they split, deep rift valleys form. Volcanoes sizzle as magma, or molten rock, oozes into the gap.

The East African Rift Zone, for example, is filled with volcanoes. Iceland straddles two plates, too. In places, you can peer right into the gap between the plates.

The third type of boundary is a transform fault. That's where two plates slide past each other. This is happening in California. There, the land is split by a deep fracture called the San Andreas Fault.

On the west side of this fault, the Pacific plate creeps north. Earthquakes rattle and shake California as the Pacific plate jerks and grinds along. Guess what's riding on top of it. The city of Los Angeles! In about 29 million years, Los Angeles will slide right past San Francisco.

Ring of Fire

If you really want to catch some plate boundary action, head for the Ring of Fire. That's what geologists call the edges of the Pacific plate. The Ring of Fire is definitely action-packed. In fact, it is home to 75 percent of Earth's active land volcanoes and about 80 percent of the planet's earthquakes.

To see the Ring, check out a map of the Pacific Ocean. Volcanoes cluster all around it! To the north, volcanoes dot Alaska's Aleutian Islands. In the west, Japan and Indonesia shake, rattle, and roll with strong earthquakes and fiery, hot volcanoes.
Closer to home on the Pacific's eastern edge, volcanoes poke out of the Cascade Arc. The Arc covers areas of northern California, Oregon, Washington, and parts of Canada. Here, you can find towering volcanic giants such as Mount St. Helens and Mount Rainier.

**Into the Mantle?**

We know that Earth's hot, active interior shapes our rocky home on the surface. But deep down, Earth still holds many secrets. Scientists, like those aboard The JR, have barely scratched the surface. They aren't trying to drill to the core, or even the mantle.

Not yet, at least. For now, they just want to reach deep into the crust. By the fall of 2009, they had drilled over a mile into the crust. It'll probably be another 10 to 20 years before scientists reach the mantle. But when they do, it will be a quite a thrilling moment. What will real mantle rock look like? What new things will it reveal about Earth?

There are so many more questions left to answer. Yet until scientists actually reach the mantle, they'll keep asking questions and wondering what's really going on deep down in our planet.

Geiger, B. (2010). Active earth. *National Geographic for Kids*
Active Earth Assessment

Directions: Read each question carefully and circle the correct answer. Be sure to read each question and all of the possible answers.

1. What happened to all of the materials in the earth when the earth cooled?
   a. The pieces froze in place
   b. The heavier pieces sank to the center of the earth and the lighter pieces rose to the surface of earth
   c. The heavier pieces rose to the surface of earth and the lighter pieces sank to the center of the earth
   d. The earth has always been the way it is now

2. How many layers is earth made of?
   a. 2
   b. 3
   c. 5
   d. 6

3. If you made a model of the earth, what material would be in the center (size of the material does not matter)?
   a. Tennis ball
   b. Whiffel ball
4. What was the name of the massive continent on earth 225 million years ago?
   a. Pangaea
   b. Asia
   c. Truela
   d. Africa

5. Which of the items listed is NOT a type of plate boundary?
   a. Divergent
   b. Transform
   c. Intersect
   d. Convergent

6. Why might you not want to live in the Ring of Fire?
   a. Because there are a lot of volcanoes and earthquakes
   b. Because the temperature is always over 100 degrees
   c. Because there is never any action and the plates never move
   d. Because random fires start when the plates move

7. What causes the continental and ocean plates to move?
   a. The gravity from the moon
b. The movement of mantle rock in a circle

c. The tides of the ocean

d. The high speed wind on earth

8. Two cars crashing into each other head on is an example of what type of collision?

   a. Divergent
   b. Transform
   c. Intersect
   d. Convergent

9. What is the thinnest layer of earth?

   a. Crust
   b. Mantle
   c. Soil
   d. Core

10. Why do you think it might be important to know how plate tectonics work?

    a. Scientist can better guess when volcanoes, earthquakes, and other things will happen
    b. So we can control the plates to move where we want them to
    c. Scientists can guess how the earth will look in the future
    d. Both a and c
Sea Monsters

By: Dan Hogan

Few places on our planet are as mysterious as the deep sea. Until recently, scientists doubted that many creatures could live there. Now experts are taking a deeper look at the ocean.

Scientists are sending submersibles, or small underwater vessels, far below the surface. Cameras on these subs sometimes catch glimpses of deep-sea creatures.

Scientists also cast large nets into the depths. Occasionally the nets trap beasts that humans have never seen before. Some of these animals look like real-life sea monsters! All this research is teaching scientists to view the deep sea in a whole new way.

TOUGH NEIGHBORHOOD

The deep sea is not an easy place to live. It's cold. Water temperatures may be just a few degrees above freezing.

It's dark too. The deeper you go, the less sunlight you get. At about 3,000 feet, light vanishes entirely. And that's just a quarter of the way down. The average ocean depth is 12,000 feet. The deepest spot yet discovered lies more than 35,000 feet below the surface.

That's a lot of darkness. With nothing to see, many deep-sea fish have no eyes. A few, such as giant squid, have huge eyes. These plate-size organs allow a squid to see dim outlines of other animals.

Besides the cold and the darkness, deep-sea animals face a third danger—other creatures.
CAUGHT IN THE FOOD CHAIN

Animals eat. One way or another, they must find food to survive. On land and in shallow water, many creatures chomp on plants. These animals are called herbivores.

Plants are rare in the deep sea, however. Surviving there means being a carnivore. That's an animal that eats meat.

This means deep-sea creatures have two big jobs. They need to find prey, and they have to avoid becoming prey themselves.

Link those predators and prey together, and you get a food chain. Each chain is a series of animals that eat one another. Shrimp, for instance, might get eaten by an anglerfish. Then the anglerfish may become a snack for a giant squid. The squid, in turn, could wind up in the belly of a sperm whale.

Life in a food chain is stressful. But some deep-sea creatures have found a way to make light of their troubles.

HAZARD LIGHTS

In a world without light, some "sea monsters" make their own. Special organs in their bodies produce chemicals that glow. Scientists call that ability bioluminescence. You may have seen it in fireflies.

Bioluminescence helps some deep-sea beasts find prey. It helps others avoid becoming another animal's meal. Here are a few examples.
Vampire squid: Confusing predators is this animal's key to survival. The squid oozes glowing goo. It can also turn itself inside out.

Sea cucumber: When a predator approaches, a sea cucumber sheds its sticky, glowing skin. The skin attaches to the predator and warns other creatures of its presence.

Viperfish: Nearly 350 tiny lights lure prey into the viper's mouth. The fish then uses its long, needle-like teeth to capture the prey. These teeth are so long that the viper cannot close its mouth completely.

Anglerfish: This predator has a "fishing pole" on the end of its nose. Bacteria, or germs, live at the tip and glow. Some fish think the light is food. They swim toward it and find themselves caught in a set of terrible jaws.

Dragonfish: This long, eel-like animal has a special glowing organ under each eye. It uses those organs like flashlights to hunt prey.

Bioluminescence can be risky, though. Sparkling in the deep, an animal might just catch the huge eye of a giant squid.
Drawing the attention of a giant squid is a really bad idea. The giant squid is one the largest monsters of the deep sea. It can grow as long as a bus. Many different species, or kinds, of squid swim in the ocean. We probably haven't met them all yet.

Just two years ago, scientists found another species (see Image Gallery at left). This giraffe-size beast lives half a mile below the surface. Like all other squid species, it has eight arms and two longer tentacles.

But the newfound squid has unusual arms. They're sticky. As the squid swims, smaller animals bump into the arms and get stuck. Next time the squid gets hungry, it has a meal handy.

This new discovery also has its own way of getting around. Unlike other giant squid, this one has large wing-like fins. It flaps its fins to swim through the ocean.

Most other species use a special body part called a funnel to move about. The squid shoots a stream of water from its funnel. The squirting water allows the squid to move surprisingly fast. To change course, the squid points its funnel in a different direction.

DEEP MYSTERIES

People often imagine the deep sea as a place of great silence. It's not. Those weird and wonderful creatures can be awfully noisy. Scientists have recorded many sounds from the bottom of the ocean.

Whales, earthquakes, and ships make most of those underwater sounds. What makes the others? Scientists don't always know.
They call one of the loudest sounds "Bloop." Many scientists think that a living creature must be making this strange sound. Yet it is so loud that the beast would have to be huge—even larger than the giant squid.

Is there an undiscovered monster bellowing in the deep? What might it look like? Those questions wait to be answered by tomorrow's explorers.
Sea Monsters Assessment

1. How are scientists able to see animals deep in the ocean?
   a. They send people in small submarines down
   b. They use submersibles with small cameras to take pictures
   c. Deep sea divers swim down with flashlights and cameras
   d. They wash up on shore and the scientists study their bodies

2. What are three reasons living deep in the ocean is dangerous for animals?
   a. Cold, dark, and no oxygen
   b. Dark, other creatures are dangerous, and no oxygen
   c. Cold, dark, and other creatures are dangerous
   d. No oxygen, cold, and other creatures are dangerous

3. How large can a giant squid grow to be?
   a. The size of a bus
   b. The size of a car
   c. The size of a lion
   d. The size of high school gymnasium

4. What does a giant squid’s funnel do?
   a. Changes the direction the squid is swimming
   b. Helps the squid swim
c. Sucks up the squid’s food  
d. Both a and b  

5. Why are most animals in the deep ocean carnivores?
   a. There are so many animals the fish do not bother eating the plants  
   b. The plants are all poisonous  
   c. The plants make animals glow and it is easier for other animals to find and eat them  
   d. There are hardly any plants in the deep sea  

6. Why don’t animals closer to the surface have chemicals in their body that help them see?
   a. There is light from the sun in the water so the animals can see  
   b. Animals closer to the surface are able to glow, but choose not to  
   c. Animals closer to the surface do glow at night  
   d. There are not as many animals to run into closer to the surface  

7. Which animal would be at the top of the food chain?
   a. Spider  
   b. Woodpecker  
   c. Frog  
   d. Wolf  

8. If an owl was a predator, which animal would be the prey
9. How could using bioluminescence become a problem?
   a. It could help animals find food to eat
   b. Other animals could see the light and come after the animal
   c. The animal can only use a limited amount and the light could run out
   d. There are no problems with bioluminescence, only good things

10. Why do you think the ocean floor varies in depth from 12,00 feet to more than 35,000 feet?
    a. There are mountains
    b. There are valleys
    c. There are volcanoes
    d. All of the above
APPENDIX B

Pre-Survey and Post-Survey
Pretest Study Strategy Survey

Directions: Please read the following questions and answer honestly. For this study, strategy means any steps or plan of action you use to help you read and understand better. An example would be taking notes or underlining what you think is important.

1. Do you use a strategy when reading your science book, social studies book, or nonfiction books?
   a. Yes
   b. No

2. If you answered yes for number one, which strategy do you use most often?
   a. Note taking
   b. Outlining
   c. Underlining
   d. Other

3. How often do you use the strategy?
   a. Every time I read
   b. Most of the time I read
   c. About half of the time I read
   d. Occasionally when I read
Post-test Study Strategy Survey

Directions: Please read the following questions and answer honestly. For this study, strategy means any steps or plan of action you use to help you read and understand better. An example would be taking notes or underlining what you think is important.

1. Did you use the SQ3R method when reading the passage?
   a. Yes
   b. No

2. If yes, which steps of the method did you use? You may circle more than one step.
   a. Survey
   b. Question
   c. Read
   d. Recite
   e. Review
   f. I did not use SQ3R

3. Do you think SQ3R helped you learn more than your other strategy?
   a. Yes
   b. No
   c. I did not use a different strategy

4. Would you use SQ3R in the future? Why or why not?
APPENDIX C

Principal, Parent, and Participant Support Letters
Dear Principal:

My name is Kylie Baier and I am currently completing graduate school at Bowling Green State University pursuing my Master’s Degree in Reading. I am conducting a study for my thesis, and I am inviting the fifth grade students at your school to participate in the study. The purpose of the study is to determine if the study strategy SQ3R is more effective than the students’ current study strategies when reading expository texts. There is research on the effectiveness of SQ3R, but very little research on the effectiveness of the strategy with middle level learners. This study will include the fifth grade classrooms in your school. The students participating in the study will be given a pretest survey to determine their current reading study strategies. The participating students will then be asked to read a passage selected for the National Geographic Explorer Magazine and answer 10 multiple-choice questions related to the reading, which will be utilized as their base level comprehension score. All students in the class will be taught how to use SQ3R for five days using the current science content being covered in one-hour sessions. After the training portion of the study is complete the participating students will be given a second passage of equal difficulty and asked to read and complete a 10 question multiple-choice assessment, serving as a second score. To complete the study, the participating students will be given a posttest survey to determine if SQ3R was used. Students’ thoughts on the effectiveness of the strategy will also be asked. The results of the two surveys and two assessments will be used for the study. I will be with the students for a total of seven class days.

The risks of the study are no greater than those encountered on a regular day. The students’ names as well as the school’s name will remain confidential. The students will not be asked to identify themselves on any of the assessments or surveys given. The students will be informed their grades will not be impacted by the results of the study or their willingness to participate. Those who choose not to participate will be given time to complete other homework or engage in sustained silent reading during the study. The assessments and surveys will be placed in a locked cabinet for the duration of the study and will be destroyed upon the completion of the study. This is a voluntary study, and students will have the ability to withdraw from the study at any time without an explanation.

If you are willing to allow the students in your school to participate in the study please fill out the information below. By signing this document, you are agreeing to allow the school to participate. If you have any remaining questions or any questions throughout the study please feel free to contact Kylie Baier or Dr. Cindy Hendricks at the numbers below.

If you have any questions about the study or any of the assessments, you may contact me at kbaier@bgsu.edu or 419-349-6150. You may also contact my thesis chair, Dr. Cindy Hendricks at cindyg@bgsu.edu or 419-372-7320. If you have any questions concerning your rights, please contact the Chair of the Bowling Green State University Human Subjects Review Board at hsrh@bgsu.edu or 419-372-7716.

Sincerely,

Kylie Baier
By signing the consent form you have read and understand the purpose of the study, and thereby give your consent for Kylie Baier to complete the study in your school.

Principal Name (please print): _________________________________ Date: ____________

Principal Signature: __________________________________________ Date: ____________
Dear Participant:

My name is Kylie Baier and I am in graduate school at BGSU. I am getting my Master’s Degree in Reading. I am conducting a study for my thesis, and I am asking you to be in the study. I am doing the study to see if a reading strategy helps students understand their science books better. There is not a lot of research on how well it works with kids your age. If you agree to participate, you will be a member of the study. Everyone in the study will first be asked to take a short survey. Then, everyone in the study will be asked to read a passage from National Geographic Explorer Magazine and answer 10 multiple-choice questions. I will teach everyone in the class how to use SQ3R using the science content being covered for five days. Then, everyone in the study will read a second passage with 10 multiple-choice questions. Finally, everyone in the study will fill out a short four-question survey. For the study, I will look at the scores of the two surveys and first and second tests. I will be with you for a total of seven class days.

There are no risks for the study. Your name will not be told to anyone. You will not have to write your name on anything either. Your grades will not be changed based on how you do or if you participate. If you do not participate you will have time to do homework or read. The tests and surveys will be put in on locked shelf during the study. After the study they will be thrown away. You do not have to do the study and can stop at any time.

If you want to be in the study, please fill out the bottom of the paper. By signing this paper, you are saying you will be in the study. If you have any questions please tell your teacher.

If you have any questions about the study or need anything else you can talk to your teacher. Then, your teacher can talk to me. Thank you for your time.

Sincerely,

Kylie Baier

By signing the form you have read and know why I am doing study. You give your permission for Kylie Baier to use the results of the surveys and tests in the study.

Student Name (please print): __________________________ Date: __________

Student Signature: __________________________ Date: __________
Dear Parent(s): 

My name is Kylie Baier and I am currently in graduate school at Bowling Green State University to get my Master’s Degree in Reading. I am conducting a study for my thesis, and I am inviting your child to participate in the study. If you give permission for your child to participate, they will become members of the study. The purpose of the study is to determine if the reading strategy SQ3R helps students comprehend their science textbooks better than their current reading strategies. There is research on how well SQ3R works, but very little research on how well the strategy works with middle level learners. Students participating in the study will first be asked to take a pretest survey. Then, participating students will be asked to read a select passage from National Geographic Explorer Magazine and answer 10 multiple-choice questions. I will teach all students in the class how to use SQ3R for five days using the current science content being taught. I will then give students participating in the study a second passage with 10 multiple-choice questions. Finally, participating students will be asked to fill out a short four-question posttest survey. The results of the two surveys and two assessments will be used for the study. I will be with the students for a total of seven class days.

The risks included in the study will be no more than a normal day. The students’ names will not be told to anyone and your child will not be asked to write his/her name on anything. Your child’s grades will not be changed based on the results of the study or whether you allow them to participate. Those who do not engage in the study will be given time to complete other homework or read. The assessments and surveys will be placed in a locked cabinet during the study and will be destroyed when the study is over. This is a voluntary study, and you can withdraw your child at any time without an explanation.

If you are willing to allow your child to participate in the study, please fill out the information below. By signing this document, you are agreeing to allow your child to participate in the study. If you have any remaining questions or any questions throughout the study please contact the teacher, principal, Kylie Baier, or Dr. Cindy Hendricks at the numbers below.

If you have any questions about the study or any of the assessments, you may contact me at kbaiser@bgnet.bgsu.edu or 419-348-6350. You may also contact my thesis chair, Dr. Cindy Hendricks at cindy@bgsu.edu or 419-372-7716. If you have any questions concerning your rights, please contact the Chair of the Bowling Green State University Human Subjects Review Board at hscr@bgsu.edu or 419-372-7716.

Thank you for your time.

Sincerely,

Kylie Baier

By signing the consent form you have read and understand the purpose of the study, and give your consent for Kylie Baier to use the results of the surveys and assessments in the study.

Parent Name (please print): ____________________________ Date: __________________________

Parent Signature: ____________________________ Date: __________________________
APPENDIX D

Pre-Assessment and Post-Assessment Reading Comprehension Scores
### Reading Comprehension Scores

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APPENDIX E

Pre-Survey Results
Pre-Survey Results

Do you use a strategy when you read?

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