The Effect of Direct Instruction about Text Features on the Comprehension of Science Texts for Learning-disabled Middle School Students

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Abstract

The purpose of this study was to determine if direct instruction teaching students to identify important information using cues from the text features in a science textbook has a direct effect on the comprehension of learning-disabled middle school students. The study consisted of a sample of ten seventh and eighth grade learning-disabled students who were directly instructed to identify text features and then locate important information. The participants were evaluated during two units of study on independent completion of two-sided notes after reading the textbook. The study involved the use of a pretest/posttest design to measure the difference in comprehension. The instrument used was cloze format two-sided notes created by the classroom teacher. The null hypothesis was accepted because the results were not statistically significant that the direct instruction about text features improved comprehension. Further research is needed to explore the effect of teaching text features to learning-disabled students to improve comprehension.

CHAPTER I

INTRODUCTION

Teaching students to comprehend texts is perhaps the greatest responsibility that teachers have. Comprehension involves not only decoding, but also interpreting statements, constructing meaning, and thinking critically (Paris & Hamilton, 2008).

Overview

Beginning in grade four, competent reading skills are necessary for school achievement in all subject areas. Reading comprehension is a principal concern for struggling and learning-disabled students (Kroeger, Burton, & Preston, 2009.) Most reading instruction is done in the elementary grades with narrative texts. By the time students reach fourth and fifth grade, the instructional time spent developing reading skills decreases while content learning increases (Gajria, Jitendra, Sood, & Sacks, 2007). On the other hand, a large percentage of the reading that middle school students do is expository, and expository texts are more difficult to comprehend than narrative. In fact, expository text, like science textbooks, are often are at a readability level greater than the grade for which they are intended while many learning disabled students' reading levels are below grade level (Kroeger et al., 2009). And middle school science teachers teach science, not reading. In American schools, educators assume the challenge of teaching learning-disabled students to comprehend textbooks that are often above their reading level.

There are numerous struggling and learning-disabled readers in the United States. According to the National Assessment of Educational Progress (NAEP), thirty-three percent of 4th grade public school students score at or below the "basic" level, and twenty-six percent of 8th grade public school students performed at or below the "basic" level on the NAEP 2009 reading test. Science scores are even lower. Only one-third of fourth graders and less than one-

third of high school students score in the proficient range (Therrien, Taylor, Hosp, Kaldenberg, & Gorsh, 2011.)

Difficulty with reading comprehension often affects success content areas (McTigue & Slough, 2010.) Many students struggle, but not all teachers know how to teach a student to read. Elementary school teachers are trained in the teaching of reading and receive additional professional development in strategies; whereas middle school teachers are often not trained in the teaching of reading unless they are language arts teachers. In addition, the demands of curriculum such as the recently adopted Common Core leave limited time for direct reading instruction after fourth grade. To compound the problem, difficult expository reading becomes more prevalent after fourth grade.

Most researchers understand that learning-disabled students often require additional time and instruction to accomplish skills that non-disabled students require (Therrien et al., 2011.) In schools however, direct reading instruction is steadily being replaced with content learning after fourth grade. Most studies show that there are numerous students who continue to struggle to read after fourth grade; and the high readability of content area texts in combination with the large amount of new content makes it very difficult for struggling readers to comprehend. Compounding the problem, few middle school and high school teachers have been trained in teaching reading. Allington (2011) reports three-quarters of teachers feel either not qualified or not responsible for remedial reading instruction. The most common differentiation content area teachers make is to modify the content for their students (McTigue & Slough, 2010.) Content modifications often enable students to succeed in their classes and even give them the opportunity to learn new concepts; however, these modifications do not give them the opportunity to learn how to better comprehend and gain information independently.

This action research study examines a strategy to change the way students comprehend a difficult text. It examines a cognitive strategy which teaches students to use text features to identify important information in a text in order to change the way students approach a challenging text. Hopefully, students can learn to be competent readers independently. Independent reading comprehension is important for success throughout school and beyond.

Statement of Problem

This study was designed to determine whether direct instruction about identifying important information through use of text features has an effect on the reading comprehension of the material in a science text for learning-disabled students.

Hypothesis

The null hypothesis states that direct instruction about identifying important information through the use of text features will not have an effect on the reading comprehension of the material in a science text for learning-disabled middle school students.

Operational Definitions

The dependent variable is reading comprehension. For the purpose of this study, reading comprehension is measured by scores on a cloze format two-sided notes post-reading activity.

The independent variable is direct instruction about identifying important information through the use of text features. The teacher directly teaches lessons about identifying text features, models how to use them to identify important information, and provides guided instruction for completing two-sided notes with important information gleaned through text features.

CHAPTER II

REVIEW OF THE LITERATURE

This literature review examines research on comprehension of expository and content area text for learning-disabled middle school students. The first section examines comprehension and why it is critical for learning. Comprehension for good readers, learning-disabled students, and middle school students is examined. The second section explores the challenges in comprehending science texts. Motivation for reading science texts and deep engagement of those texts are examined as they relate to comprehension. The third section presents present-day methods used to ameliorate the problems associated with comprehension. Content enhancements, cognitive enhancements, and peer-mediated strategies are all reviewed.

Comprehension and Its Importance

Reading comprehension was not a major focus of the first established schools because it was thought that understanding was a natural byproduct of reading (Frey, Lapp, & Fisher, 2011). Over time, teachers and researchers began to recognize that comprehension is a separate issue from being able to read. Today educators understand the true goal of reading needs to be deriving meaning from the text. They understand that students cannot learn from a text unless they comprehend it (Palumbo & Loiacono, 2009). The word *comprehension* is defined as a "complex process in which readers actively construct meaning" (Frey et al., 2011, p. 1). Comprehension is described as a gradual process that readers learn over time. Researchers explain that young readers begin by learning to sound out words and then move to more complicated tasks that involve demonstrating comprehension and understanding of what they have read. In education today, experts aim to better teach comprehension by increasing attention to vocabulary and students' exposure to informational texts (Palumbo & Loiacono, 2009). The

Common Core, which 46 states have adopted, calls for students to read more informational texts and then demonstrate comprehension and higher order thinking (McCown & Thomason, 2014). Most of today's educators understand the importance of teaching reading comprehension. But, Palumbo and Loiacono (2009) find that most reading comprehension strategies are taught in the elementary grades and that after fourth grade, most schools and teachers stop explicitly teaching comprehension.

Habits of Good Readers

The concept of comprehension has been researched for more than a century as educators seek to better understand the process (Frey et al., 2011). Today, they better understand what good readers do. Good readers not only read fluently, but they comprehend what they read. Frey et al.'s (2011) research finds that good readers employ cognitive strategies subconsciously and automatically. They also understand letter knowledge, word knowledge, syntactical and grammatical knowledge, and the semantic understanding of language. Paris and Hamilton (2008) agree. They also recognize that automaticity with decoding and phonological and semantic memory are two key skills that good readers have. Frey et al. believe good readers subconsciously monitor their thoughts metacognitively before, during, and after reading. They describe a consensus among researchers for understanding what happens during the three phases of metacognition. Before reading, competent readers preview the text, activate prior knowledge, and set a purpose. During reading, competent readers check for understanding while subconsciously paraphrasing, monitor comprehension with visualization, make inferences and predictions, integrate new information with prior knowledge, and adjust for complexity of the text by asking for help, adjusting the pace, or creating a concept map. And after reading, good readers summarize, evaluate, and extend understanding of ideas gleaned from the text. Paris and

Hamilton have a slightly different understanding how good readers think while they read. This view includes the understanding that comprehension involves construction of meaning and interaction with text to develop and interpret meaning. The ability to integrate background knowledge with the text is an important skill. Good readers comprehend what they are reading because they can connect to it. Paris and Hamilton add one additional key ingredient for good readers: the ability to sustain attention. All researchers agree that the ability to decode and think deeply about what is being read is important for good comprehension.

Problems for Learning-Disabled Readers

Learning-disabled readers often struggle with comprehension. The National Association of Educational Progress (NEAP) reports that from 1992 to 2005 70% of fourth grade students in the United States were reading below a proficient level, and that 36% were reading below a basic level (Palumbo & Loiacono, 2009). Research has found that many struggling and learning-disabled (LD) readers have not mastered basic reading skills. When this is the case, readers focus on decoding words rather than comprehending (Therrien et al., 2011). These LD readers lack the automaticity required to free-up working memory and therefore do not activate and employ the comprehension strategies that good readers do. Even when an LD student can read fluently, researchers find that comprehension, particularly of expository text, can be a significant problem (Gajria et al., 2007). Readers with learning-disabilities, unlike good readers, have not mastered a large set of strategies, nor do they have the ability to implement or coordinate the used of multiple strategies (Gajria et al., 2007). Unlike good readers, many learning-disabled readers do not employ metacognitive strategies (Frey et al., 2011). Learning-disabled readers tend to be unaware of their own thinking, have difficulty visualizing, have difficulty relating the text to prior knowledge, and show difficulty thinking deeply about a topic. Even when LD

students are taught specific strategies to improve comprehension, Gajria et al. (2007) point out that research indicates that retrieval of the strategy at the correct time and transferring that strategy to another task is challenging and rarely accomplished by LD students.

Problems for Middle School Students

There is a greater emphasis on content area, or expository, reading in the middle grades. After fourth grade, McCown and Thomason (2014) point out that most curriculums include a gradual shift from 50% expository texts to 70% by twelfth grade. This may be because expository text makes up 90% of what most adults read. Not only is there more content reading in the curriculum, in the middle grades, the "emphasis in learning shifts from learning to read to learning the content" (Fang, 2008, p. 476). In addition to more expository text exposure in the middle grades, researchers agree that informational text is more difficult than narrative reading (McCown & Thomason, 2014). McCown and Thomason cite specific reasons that content area reading is more difficult. These reasons include: content area reading tends to be more complex, it has a variety of text structures which may be unfamiliar to middle school students, it contains technical vocabulary, and it often introduces new ideas and concepts. All of these factors make reading content area, expository, text more difficult and contribute to an increased readability level. Gajria et al. (2007) note consensus among researchers in understanding that many content area text books are in fact at a readability level beyond the grade intended for use. Middle school teachers face an additional challenge in working with expository text with their students. Students in the middle grades in the same class can have reading skills and abilities which range widely (McCown & Thomason, 2014). Another reason that comprehension is a problem for middle school students in particular is that most reading and comprehension instruction is done before fourth grade (Frey et al., 2011). And Frey et al. (2011) point out that "good

comprehension instruction in primary grades will not adequately prepare a student" (p. 4) for reading in higher grades. Much of the reading done in the early grades is in narrative texts. Instruction therefore focuses on comprehending narrative text. Although comprehension is taught well in the primary grades, knowledge needed for comprehension of expository text may be inadequate. Palumbo and Loiacono (2009) report that middle school content area teachers are typically untrained and inexperienced in the area of teaching reading comprehension. In fact, researchers find that comprehension is being assessed chiefly with question and answer models for expository texts much more often than it is taught.

Challenges in Comprehending Science Texts

Content area books, particularly science textbooks, pose a comprehension challenge because they are written very differently than other texts. As previously stated, most textbooks are written at a higher reading level than the grade for which they are intended. This higher level makes them more difficult to read. Readability is higher because the quantity and complexity of new vocabulary in a science text can be "greater than in a foreign language" (McTigue & Slough, 2010, p. 214). Even when readability is estimated to be on grade level, readability formulas that focus on word length -the number of syllables within a word- may underestimate the difficulty of science texts because of the complex meanings of words in the context of science (McTigue & Slough, 2010). The language in expository texts is different than typical spoken language and narrative reading language. Readability, therefore, cannot be measured in the same way (Lapp, Grant, Moss, & Johnson, 2013). In addition to a higher readability, science texts tend to follow different structure than the narrative books on which elementary reading instruction is focused. Science textbook structures include: description, causation, problem/solution, and compare/contrast (McTigue & Slough, 2010). Information presented

within these different structures can be more difficult to read and understand (Sinatra, Broughton, Diakidoy, Kendeou, & den Broek, 2011). In the recent past, good reading instruction has emphasized teaching the "Fab Five." These components include the following areas of concentration within reading instruction: phonemic awareness, phonics, fluency, vocabulary, and comprehension (Fang, 2008). This type of reading instruction "does not adequately prepare students to read more challenging expository text" (Fang, 2008, p. 478). But being able to comprehend expository text is important. Fang (2008) points out that expository language is the primary way that students in middle and high school are assessed. McTigue and Slough (2010) and other researchers agree. Researchers also agree that students need to be taught additional strategies to comprehend expository text (Sinatra et al., 2011).

Students Intrinsically Unmotivated to Read Expository Textbooks

Most learning disabled readers are reluctant readers (Gajria et al., 2007). They lack the self-motivation to pick up books and read because reading is difficult for them, whether it is the comprehension, decoding, or the fluency. Many factors contribute to students' lack of motivation to read expository text. Fang (2008) notes expository texts specifically represent an unfamiliar, unfriendly type of text. These texts often have a "large concentration of technical specialized language which can pose a particular problem for the learning disabled student who struggles with vocabulary already" (Fang, 2008, p. 479). The higher density of information can cause cognitive overload, especially for struggling readers (Fang, 2008). Students can be turned off by the semantics or diction in an expository text because it is often unlike regular speech and is less comfortable to read. Students may not connect with expository text and may not be motivated to read because the schema or background knowledge needed to understand it is more specialized and different from everyday life and unfamiliar to them. Additionally, students may not be

motivated because, as Lapp et al. (2013) report, reading expository texts can be especially difficult because it requires students to be able to read many of the visuals like tables and graphs that make up almost 50% of many expository texts.

Importance of Engagement with Text

Along with lack of motivation to read comes lack of deep understanding. Like many of the factors that cause expository texts to fall short of enticing readers, having a dry tone or voice within expository text may cause readers to have a difficult time engaging deeply with the text (McTigue & Slough, 2010). Researchers agree that an author's voice contributes to how well students connect with a text, and science texts often have a flat tone as the author's primary purpose is to give accurate information rather than to engage the reader (McTigue & Slough, 2010). Understanding a large concentration of specialized language and great density of information in a science textbook is important for comprehension. Expository texts tend to be packed with new vocabulary, unfamiliar concepts, and new information. It is more difficult to read than a novel or biography, for example (Sinatra et al., 2011). Comprehending scientific texts therefore "demands deep engagement with the text to understand it" (Lapp et al., 2013, p.111). Deep understanding and deep engagement require a reader to be acquainted with and to utilize numerous strategies. Frey et al. (2011) report that research shows that students must be explicitly taught to understand and use many strategies to be able engage deeply and comprehend a difficult text. Students need specific instruction on the best methods of reading and understanding the visual information such as tables, graphs and diagrams (McTigue & Slough, 2010). Science texts often contain abstract rather than concrete concepts; generally, abstract concepts are more difficult to understand (Fang, 2008). Deep thought and deep engagement are both necessary to understand such complex and content-packed reading.

Methods to Ameliorate Problems with Comprehension

Asking students questions after they have read a portion of text is not comprehension instruction (Frey et al., 2011). Students, particularly learning-disabled students, generally comprehend best with direct, explicit, and systematic instruction. (Gajria et al., 2007; Therrien et al., 2011). In a meta-analysis of research on learning disabilities, Therrien et al. (2011) find that pre-teaching, reducing language/literacy demands, focusing on the big ideas, giving formative feedback, providing hands-on experiences, providing additional practice, and reviewing concepts are strategies that work best for teaching LD students to comprehend difficult expository text.

Teachers use many methods to teach strategies to help students to comprehend difficult expository text. The most commonly used methods include questions at the end of a unit, response to literature, graphic organizers and reciprocal teaching (Frey et al., 2011). The different strategies for teaching comprehension can be described in three categories: content enhancements, cognitive enhancements, and peer-mediated instruction.

Content Enhancement for Comprehension of Expository Text

Content enhancements are strategies and methods that organize and manipulate content to improve comprehension. Content enhancements include graphic organizers, mnemonic devices, computer and technology assisted learning, study guides, and semantic mapping (Gajria et al., 2007). In a synthesis of research, studies find that overall, directly and systematically instructing using content enhancements has a positive effect on the comprehension of LD students. When students are directly taught to use graphic organizers to collect and organize ideas before and during reading, they outperform students who are taught with traditional instruction (Gajria et al., 2007). Graphic organizers "facilitate the selection, organization and presentation" (Gajria et al., 2007, p. 218) of content dense expository text.

Several studies have been conducted specifically with post-instruction. The use of graphic organizers to facilitate comprehension as a post-reading activity does not have the same positive effect as prior and during instruction. Additionally, students who are taught to use graphic organizers do not have improved scores on maintenance and transfer assessments (Gajria et al., 2007). In multiple studies cited by Gajria et al. (2007) and Therrien et al. (2011), mnemonic devices have been shown to be particularly effective in enhancing learning and improving comprehension on post-instruction assessments. Computer and technology assisted learning showed little or no benefit for improving the comprehension of LD students (Gajria et al., 2007). This is the only cognitive enhancement for which there is no direct instruction from a teacher. Using study guides, annotating text, and completing cloze activities are additional strategies for content enhancement that have been proven effective for improving comprehension. These strategies engage students, help control readability, and offer a form of scaffold support (Palumbo & Loiacono, 2009).

Cognitive Enhancement for Comprehension of Expository Text

Cognitive enhancements are strategies that teach students *how* to learn. Cognitive strategies aim to "improve the way students approach and interact with text" (Gajria et al., 2007, p. 216), thereby improving comprehension. Some commonly used cognitive enhancement strategies include: teaching students to identify a main idea, teaching students to summarize, teaching students to identify text structure, and teaching students about text features, close reading, and metacognitive thinking. In a synthesis of studies researching comprehension of expository text for LD students, Gajria et al. (2007) find that, overall, direct instruction of cognitive strategies improves comprehension. Reading expository text for the purpose of identifying a main idea can also improve comprehension. Researchers find that when teaching

LD students to find and write the main idea in their own words, students comprehend better than when they are told what the main idea is. Researchers note, however, that comprehending the main idea itself is difficult for LD students. Often answers are inaccurate or too narrow (Therrien et al., 2011). Similar to teaching the main idea, teaching students to write a summary sentence for each paragraph they read produces a positive effect on posttests for comprehension (Gajria et al., 2007). It is noted, however, that the LD students in the studies are able to correctly identify literal information but unable to make inferences.

Another cognitive enhancement strategy that is used by teachers to improve comprehension of expository text is teaching students to recognize and understand the structure of a text. Structure refers to the way ideas are arranged in a text (Akhondi, Malayeri, & Samad, 2011). There are five types of text structure for which expository text are commonly written: descriptive, sequential, compare/contrast, cause/effect, and problem/solution. Akhondi et al. (2011) report that research reveals increased comprehension when students learn about text structure and use that knowledge well. They contend students who understand the structure of a text can understand how to analyze and approach it and will ultimately learn more. When students understand structure, they can approach learning differently by creating a plan in their mind for how to find information in the text (Kroeger et al., 2009).

Teaching students to identify the features within a text is another type of cognitive enhancement strategy to improve comprehension. Text feature walks, a method of previewing a text in order to identify and locate different features, require students to be actively engaged with the text. Students comprehend better when they can engage with a text (Kelley & Clausen-Grace, 2010). Common text features include: table of contents, index, glossary, headings, bold signal words, sidebars, pictures, captions, and diagrams. Kelley and Clausen-Grace (2010) believe that

understanding and using text features can help students predict, identify important learning, frontload vocabulary and concepts, and anticipate what they will read. McTigue and Slough (2010) agree that teaching students to read and interpret the visual information in a science text helps readers make connections. They also recognize that signal or pointer words, previews and headings, and questions and summaries at the end of a chapter can provide readers with information that may improve comprehension. Close reading is another cognitive enhancement strategy that can improve comprehension of expository text (Lapp et al., 2013). During a close read, students read and reread a text to more deeply and fully understand it. They may go through the process of identifying the text structure, text features, and key ideas (Lapp et al., 2013). Metacognitive thinking is a cognitive enhancement that is often used in conjunction with other strategies. When students think metacognitively, they consciously self-monitor how they are thinking and working as well as what they are thinking about (Kroeger et al., 2009).

Metacognition is a higher order thinking process that in itself requires students to think deeply and expand their ideas. When used in conjunction with other strategies, researchers note greater improvements with comprehension (Gajria et al., 2007; Kroeger et al., 2009). Research studies that examine students who employ metacognition along with another strategy are the only studies that show improvement on transfer comprehension tests (Gajria et al., 2007).

Peer-Mediated Learning Strategies

Peer-mediated strategies for teaching may include content and cognitive enhancement strategies, but have a primary focus on social interaction as part of the learning process. Some commonly used peer-mediated strategies include reciprocal teaching, peer-assisted learning, PAL, and role-playing (Kroeger et al., 2009). Researchers ascertain that peer mediated strategies require students to be actively engaged and teaches them that effort and engagement produce a

positive result. In reciprocal teaching, students take turns being coach or student. Coaches might ask partners to summarize, answer questions, clarify, or predict. Partners then need to respond, and coaches will evaluate answers. This is a kind of comprehension-monitoring and higher order thinking that improves comprehension (Kroeger et al., 2009). In PAL, students are also commonly grouped in pairs. As with reciprocal teaching, students work together to understand a text. Often students are grouped heterogeneously so that there is one strong reader per group. Teachers need to be careful to be aware of social skills and maturity when selecting parings and groups (Gajria et al., 2007). Teachers also need to constantly circulate to guide students during the process. Students might take turns reading, summarizing, questioning, predicting, and giving feedback (Kroeger et al., 2009). Peer-mediated learning is a cost-effective, teacher-liked, proven approach to teaching comprehension of expository text. It requires constant teacher support, but gives students more ownership of their learning (McCown & Thomason, 2014).

Summary

No matter which learning strategy is being used, direct explicit teacher instruction and scaffold instruction with a gradual release of responsibility produces the best results (Akhondi et al., 2011; Kroeger et al., 2009; Therrien et al., 2011). Learning-disabled students in particular need direct instruction and repeated practice as they often have a difficult time internalizing and transferring learned strategies (Frey et al., 2011; Gajria et al., 2007). Teachers should target strategies to specific goals and provide ample support so students can gain confidence and apply strategies on their own (Kroeger et al., 2009).

CHAPTER III

METHODS

The purpose of this study was to determine if teaching learning-disabled middle school students about the text features of a science textbook would result in better comprehension. This study examined a group of learning-disabled students in a multi-age multi-grade class. The participants were evaluated during two units of study on independent completion of two-sided notes after reading the textbook. During the first unit, the researcher used traditional teaching methods with the students; during the second unit, the researcher added supplementary lessons about finding important information using text features. The mean difference in comprehension between the two units was measured.

Design

The researcher used a pre-experimental design in this study. This study evaluated reading comprehension by comparing the mean difference in scores of completion of two-sided notes with text feature instruction versus without text feature instruction. A group of ten students in a multi-age multi-grade science classroom was randomly selected to participate. All ten participants were previously identified as having learning disabilities in the area of reading. The dependent variable was comprehension of a science textbook measured by evaluating completion of two-sided notes. The two-sided notes were cloze format. Students read the textbook as a whole group and then completed two-sided notes independently. The independent variable was whole group direct instruction about the text features in a science textbook. The research took place over eight weeks. In that time period, the students learned two chapters of the 6th grade McGraw Hill Science textbook. All participants received traditional instruction for the entire first chapter and then received traditional instruction along with three supplemental lessons, taught by

the researcher, about text features for the second chapter. The supplemental lessons included instruction that defined and identified different text structures, modeled how to use text structure to locate important information, and guided practice activities in which students completed two-sided notes based upon a chapter from a science textbook.

Participants

The participants in this study were randomly selected from a small private school in Maryland that serves students with learning disabilities and/or attention deficits. Ten students from a multi-age, multi-grade class were selected to participate. Five participants were boys and five were girls. Participants' ages ranged from eleven to fifteen. One of the participants was in 5th grade, seven participants in 6th grade, and two participants in 7th grade. All ten of the students had previously been identified as learning disabled and had had reading comprehension levels assessed within one month of the research. Instructional reading levels ranged from third grade to ninth grade. Two participants' reading levels were 3rd grade, three at 5th grade, two at 6th grade, and three at 9th grade instructional reading level. All of the participants had different additional learning disabilities identified including autism spectrum disorder, dysgraphia, attention deficit disorder, and auditory processing disorder. All participants had IQ's in the average or above average ranges.

Instrument

The instrument used to measure reading comprehension was cloze format two-sided notes which were created by the classroom teacher. The notes contained information gleaned directly from each chapter of the 6th grade McGraw Hill Science textbook. The notes had two columns: on the left were topic headings or main ideas; on the right were cloze statements. Students were expected to complete the two-sided notes independently after reading the textbook

as a whole group and were allowed to use their textbook for reference. The notes were a valid measure of comprehension of the textbook because they were created directly from the textbook. Because all of the instruments were teacher created, it was difficult to measure reliability and external validity.

Procedure

The students learned two chapters from the 6th grade McGraw Hill Science textbook. The regular classroom teacher instructed participants in a traditional manner for the first chapter. During the second chapter, the same teacher taught with traditional instruction, but also gave the participants three supplementary lessons (mid-unit) about text structure designed by the researcher.

While teaching the material in the first chapter, the classroom teacher used traditional instruction methods. For example, the teacher first gave the students a pretest and then proceeded to teach important vocabulary words from the first chapter. Students made flash cards and bingo games to continue to practicing vocabulary throughout the chapter. Next, the teacher introduced major concepts of the unit with an activity and a discussion eliciting prior knowledge. Finally, the teacher and students read the chapter in the textbook as a whole group. After reading, students independently completed cloze format two-sided notes from the reading. Results were recorded. After the Chapter One activity was complete, the teacher and students performed several experiments and activities as a whole class. At the end of the unit, the teacher and students reviewed vocabulary, core concepts, and two-sided notes as a whole class. Finally, students took a teacher created posttest consisting of multiple choice, matching, and short answer questions. The test was a modified version of the textbook publisher's post chapter assessment. The teacher modified the test based on the needs of the group of students.

During instruction of the second chapter, participants followed the same procedure with the addition of three supplementary lessons. The researcher taught supplementary lessons before the participants read the textbook. In the first lesson, the researcher introduced text-feature vocabulary. Students participated in an activity matching sample text features to vocabulary. In the second lesson, the researcher used a 6th grade science textbook and the think-aloud strategy to model how to identify important information from the text features. The researcher also modeled how to complete two-sided notes with this information. In the third lesson, participants reviewed text feature vocabulary, and worked together to complete cloze format two-sided notes using information found by identifying text features. After these supplementary lessons, the treatment group continued with a traditional teaching procedure. At the end of the second unit, the researcher compared the results from completion of the two-sided notes from both chapters.

CHAPTER IV

RESULTS

The purpose of this study was to determine how direct instruction about finding important information in a science text affects the reading comprehension of learning-disabled middle school students. Results of a comparison of pretest and posttest scores from the treatment group indicated that there was no significant difference in reading comprehension.

A dependent t-test was run to examine any significant differences between group performance prior to and after the intervention. Results showed no significant difference, $t(9) = .321$, $p > .05$. Table 1 shows the mean and standard deviation of the group's performances on cloze reading activities, pre and post-instruction.

Table 1

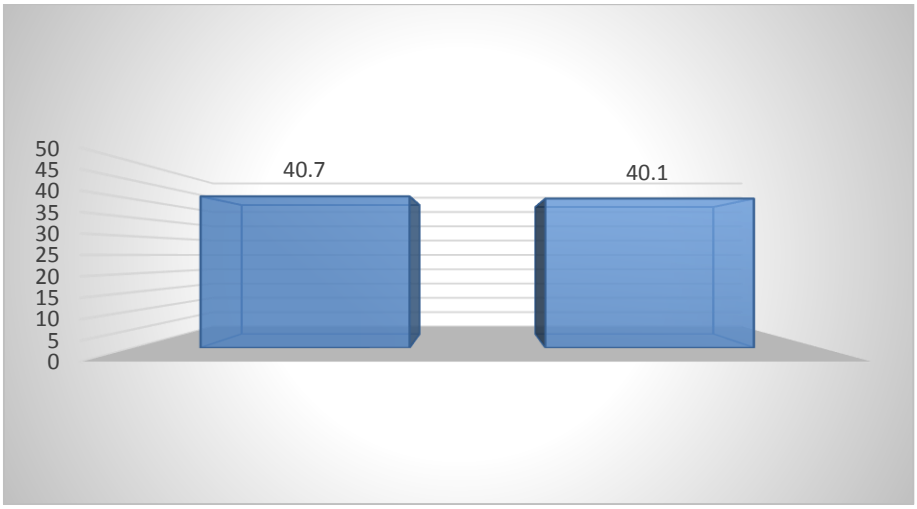
Means and Standard Deviation of Cloze Scores for the Group

Measure	Mean (SD)
Pretest Cloze Score	40.70 (4.855)
Posttest Cloze Score	40.10 (3.784)

After direct teaching lessons about text features, the mean score decreased slightly from 40.70 to 40.10. Table 2 shows the mean scores pre and post instruction.

Table 2

Mean Pre- and Post Scores



The null hypothesis stated that direct instruction about identifying important information through the use of text features will not have an effect on the reading comprehension of the material in a science text for learning-disabled students. The results supported this null hypothesis. These results and their implications will be discussed in Chapter V.

CHAPTER V

DISCUSSION

The purpose of this study was to determine if teaching learning-disabled middle school students about the text features of a science textbook would result in better comprehension. The null hypothesis stated that direct instruction about identifying important information through text features would not have an effect on the reading comprehension of the material in a science text for learning-disabled middle school students. The original null hypothesis was accepted.

Implications of Results

The results suggest that there was no significant difference in reading comprehension of a science text when direct instruction about identifying important information through the use of text features was implemented. Because there was no significant difference in reading comprehension, one could surmise that direct instruction lessons about text features did not convey a beneficial cognitive strategy to improve reading comprehension of a science text for learning-disabled students. One could also conclude that direct instruction of only three lessons did not provide enough instruction and practice time for students to learn and apply the strategy; or, one could conclude that identify important information from text features may direct students to where important information can be found but does not teach students to identify which information is most important.

Theoretical Consequences

This study examined teaching text features as a strategy to help learning-disabled students better comprehend expository texts. Results of the study were not significant, indicating that identifying text features may not be a beneficial strategy to help learning-disabled students comprehend a science text with more understanding. The participants in this study were chosen

from a convenience sample of ten students from a single multi-age class in a private school for students with language learning-disabilities. The participants in the study were all students who were unsuccessful in a regular school setting. This small sample of very specific students may not have represented the results we could expect from another sample. In addition to the possible issues with the sample population, several delays and interruptions in the study may have compromised the results. Further research is required to test the efficacy of teaching text features as a strategy to improve comprehension.

Connections to Previous Studies

Chapter II examined several studies that examined the capability of different strategies to help students improve comprehension. Other research examined strategies to improve comprehension of expository text for learning-disabled students. Gajria et al. (2007) conducted a synthesis of studies and cited a study by Graves that showed that identifying a main idea was a successful strategy to improve comprehension. Cited in the same synthesis, a study by Ellis and Graves showed that paraphrasing and doing repeated readings improved comprehension. This study researched the effectiveness of identifying important information from text features. This researcher believes identifying important information through text features is comparable with paraphrasing, doing repeated readings, and identifying the main idea. When using the text feature strategy, students learn to identify main ideas by locating key words and highlighted topics, they learn to paraphrase as they identify headings and subheadings, and they do repeated readings as they first walk through the text features, consider important ideas, and then reread the full text.

Several studies also examined strategies to improve comprehension of science texts for learning-disabled students. Mastropieri and Scruggs and Mastropieri et al. (as cited in Therrien et al., 2011) examined inquiry-based interventions and indicated positive results for improved

comprehension. Therrien et al. (2011) also found that there are many approaches that qualify as inquiry approaches and that studies support instruction for learning-disabled students that has a great deal of structure within those approaches in order to be successful. The meta-analysis clarifies that for inquiry based interventions, students investigate for themselves to find information. This study examined the effectiveness of doing a text feature walk to identify important information and can therefore be considered a type of inquiry based intervention or strategy to improve comprehension.

Palumbo and Loiacono (2009) found that taking notes and annotating text are effective methods for improving comprehension of expository text. This study asked students to identify important information through text features and then complete two-sided notes. In this study, students did not, however, annotate the text.

Threats to Validity

There were several threats to validity in this pre-experimental study including differential selection, baseline stability, and external generalization. Differential selection was a threat because the sample population was not randomly selected but was chosen from a school where students receive specialized instruction for language learning disabilities. Baseline stability is a threat because only one pretest and one posttest were used to generate data. External generalization was a threat to validity because the sample population included only ten students and would be difficult to generalize to the overall population. In addition to these threats, validity was threatened because the researcher was unable to maintain a continuous schedule throughout the study. The study was interrupted numerous times for unplanned school closings due to inclement weather so students experienced a delay between direct instruction about text features and completion of the posttest cloze activity.

Implications for Future Research

This research could be utilized in future investigations on improving reading comprehension of science texts or on the effectiveness of direct instruction of specific strategies to improve comprehension of expository text. Additional research could include comparisons of learning-disabled and non-learning-disabled students' ability to apply strategies to improve comprehension, studies that incorporate multiple baseline samples and multiple post-instruction assessments, studies that test the effectiveness of length of instruction, and scaffolded support on the effectiveness of different reading comprehension strategies, or studies that test the use of multiple strategies to improve comprehension of expository texts.

Researchers agree that educators need to find a way to make expository text accessible especially for middle and high school students as it is the primary way they are assessed (Fang, 2008; McTigue & Slough, 2010). They also agree that pre-teaching and collecting and organizing information before reading is an effective way to improve comprehension (Therrien et al., 2011; Gajria et al., 2007). Future studies that include teaching students to locate important information through text features along with another strategy teaching students how to identify a main idea should be investigated in the future.

Conclusion

In schools today, the reality is that expository texts such as science textbooks are written at a higher readability level than the grade for which they are intended (Gajria et al., 2007). Compounding the problem, students most often learn to read with narrative text. Expository texts are often unfamiliar (Fang, 2008). Additionally, in intermediate grades, when comprehending expository text becomes a necessary skill, students often do not receive instruction for reading the difficult expository texts because content area teachers are largely untrained to teach reading

(Palumbo & Loiacono, 2009). In addition, learning-disabled students often face the added challenge of reading below grade level, but working in grade-level content area classes.

This action research study examined the effectiveness of a strategy to help learning-disabled middle school students better comprehend science texts. The null hypothesis stated that teaching learning-disabled middle school students to identify important information in a science text through text features would not improve reading comprehension. The null hypothesis was supported. The results of the study show no significant difference in comprehension for students before they were taught the text feature strategy versus after the teaching of text features. Because of the number of interruptions to the study due to inclement weather, the small sample size, and the limited amount of direct instruction and scaffolded support, it is reasonable to assume that the results of the study might not represent accurate findings in another situation. The researcher learned that there should be a greater quantity of direct instruction of a strategy and more scaffolded support and practice for learning-disabled students. Additionally, future studies could be conducted incorporating two strategies at once as past research shows greater improvements in comprehension when multiple strategies are used.

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