The effect of explicit teaching of inferring on the reading comprehension of students with learning disabilities in middle school

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THE EFFECT OF EXPLICIT TEACHING OF INFERRING ON THE
READING COMPREHENSION OF STUDENTS WITH LEARNING
DISABILITIES IN MIDDLE SCHOOL

by

Rebecca R. Muller

A Thesis

Submitted to the
Department of Interdisciplinary and Inclusive Education
College of Education
In partial fulfillment of the requirement
For the degree of
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at
Rowan University
April 26, 2016

Thesis Chair: Jay Kuder, Ph.D.
Dedication

I dedicate this thesis to my students of yesterday, today, and those that are yet to come. A special dedication goes to those students who were used in this research. Special education has room to grow as we learn more about the brain through the field of neuroscience and psychology. Students who receive an individualized education plan should feel superior that their teachers are paying closer attention to their growth and that they are receiving not just an education but the love and care needed to grow despite academic struggles. Eleanor Roosevelt once said, “No one can make you feel inferior without your consent.” I hope that by helping my students attain strategies that help them navigate their broader world will stay with them and help them become stronger readers, but more importantly stronger, well-rounded individuals.
Acknowledgments

I would like to thank my students who allowed me to “experiment” with them and did so with enthusiasm; their parents for being incredibly supportive of their children and of my work with them; my grade-level team for helping me to brainstorm and enact my research in their classrooms. To Rosaria Norkus, thank you for helping me understand my own research on a deeper level through her experience, knowledge, and passion student achievement in reading comprehension. Thanks to my principal, Dr. Dennis Perry, for supporting my research and helping to guide me towards my next steps in higher education.

In addition, my family who understood the stress I felt at times during this process and reminded me to take a deep breath. My grandmother whose words of encouragement ring out to allow me to keep going even when I was sure I piled too much on my plate. My husband, best-friend, and number one supporter that helped me tweak my word choice and help me to become a smarter, more curious person every day. And our golden retriever, Roland, who makes even the most frustrating days a bit hairier, yet filled with much more love.
Abstract

Rebecca R. Muller
THE EFFECT OF EXPLICIT TEACHING OF INFERRING ON THE READING COMPREHENSION OF STUDENTS WITH LEARNING DISABILITIES IN MIDDLE SCHOOL 2015-2016
S. Jay Kuder, Ed.D.
Master of Arts in Special Education

The purpose of the study was to examine improvement of reading comprehension on students with specific learning disabilities in the seventh grade through the direct and explicit teaching of inferring. The students were taught to use a graphic organizer to aid their metacognition related to making an inference. Each student was identified as having weak inferential thinking skills through the Fountas and Pinnell Reading Assessment and the easyCBM long reading comprehension assessment. Data was collected during a baseline phase, intervention phase, and post-intervention phase. The independent variable was the use of a graphic organizer that aided in the strategy of making an inference. The dependent variable was the measure of the participants’ overall reading comprehension using the Fountas and Pinnell and easyCBM assessment. Overall, the results of the study demonstrated improvement in reading comprehension in the Fountas and Pinnell Assessment. Five out of seven students showed growth and one student maintained proficiency levels with the easyCBM assessment. Results of the study showed that metacognitive strategies improve overall reading comprehension when taught directly and explicitly as well as consistently within content areas.
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Chapter 1

Introduction

Reading proficiency is a critical skill that determines academic success for students in content area learning. To be successful in mathematics, humanities, and sciences students are required to read and comprehend material beyond its literal meaning, also known as the ability to inference. By third grade, a shift in reading occurs when learning to read becomes reading to learn (Clarke, Truelove, Hulme, Snowling, 2014). Once a student gets to middle school, it is expected that they already have the strategies to apply reading comprehension skills to their content-area reading. However, roughly 2.4 million students in secondary education categorized as learning disabled are three or more grade levels behind in reading (Kane, 2012). According to the National Report Card 2011, one-third of students from the United States did not achieve basic reading levels of competency of fourth grade and high school students and have shown no improvement in reading achievement since 1971 (Goldman, 2012).

Appreciation for reading comes when a reader can connect and find deeper meaning in the text. Readers make connections to themselves, other texts, and the world around them. They can link themes and messages and allow each book they read to take them to a new dimension and leave them a well-rounded individual for having spent time within the pages of the book. This is true for fiction text and it is through fiction text that readers gain the foundation of understanding and application of strategies at the elementary level. Yet, as students grow older and advance in grade-level, more and more of their text become nonfiction, as reading becomes the foundation for learning. They are expected to take the skills they gained during their formative years of reading stories and
apply them to nonfiction articles and content area reading. However, these skills are often not generalized skills. It is important for educators to continue explicitly teaching reading comprehension strategies into the secondary schooling years especially for students identified as having a specific learning disability related to reading.

**Statement of the Problem**

Twenty-first century learners consume the world around them through written-based language increasing the importance of literacy as a prime predictor of economic and social participation (Shanahan & Shanahan, 2008, 41). These implications make reading comprehension the most important aspect of schooling. With the many demands of education, reading comprehension is not just another thing in the curriculum to teach, but the most important aspect of schooling.

Literacy no longer refers to the simple ability to read (Wendt, 2013). It is defined as the ability to read text accurately and fluently, vocabulary, background knowledge, knowledge and skill in using reading strategies, ability to think and reason, and motivation to understand and learn from text (Torgesen, Houston, Rissman, 2007). Early intervention strategies were once the primary determinate for success in reading, but as the world keeps changing, educators need to keep up with the demands of literacy.

Each student has a different reader profile. Reading is a very personal and individualized process that takes place in the brain. The reading experience is composed of ability, attitude, and practice (Jones, 2012, 3). Many students define themselves as a reader or non-reader. What causes this delineation? Cunningham and Stanovich (1998) investigated what factors can predict whether a person is going to be a “reader.” It was discovered through a variety of longitudinal studies that despite the level of reading
comprehension ability, exposure to reading at an early age can predict reading volume; meaning the greater exposure to words, the greater impact on verbal intelligence regardless of cognitive function. Unfortunately, a middle school teacher has no control over when a student begins to read making adolescent literacy a complex area of research in itself.

**Significance of the Study**

Previously, literacy learning research had a strong focus on training for elementary level teachers, but with common core curriculum changes secondary teachers are also responsible for literacy instruction (Wendt, 2013). The Common Core guidelines encourage inquiry-based learning and critical analysis. They recommend that by eighth-grade students should be reading about 45 percent fiction text, 55 percent nonfiction text and with an increase to 70 percent of non-fiction by the end of twelfth-grade (Brown & Schulten, 2012).

By middle school students many who have had difficulty with reading may have a learning disability. Implications for students with learning disabilities include working memory capacity, prior knowledge, motivation, vocabulary, text coherence, and text structure (Silvana, et al 2012). The Matthew Effect, first coined by Walberg and Tasi (1983) and later used to describe reading behaviors by Stanvoich, describes how students who tend to do well continue to do well, and those who struggle with continue to struggle. When students are given texts that are too difficult for them, they cannot comprehend the material and therefore avoid reading assignments placing them at a further disadvantage.
Inferential thinking is an important strategy and is interconnected to many of the other reading strategies recommended to help readers gain comprehension of text. A reader needs to ask questions in order to make an inference. Students need to be able to make connection and build on their background knowledge, or schema, in order to infer the meaning of the text. However, inferencing is an indistinct term. The definition for inferencing varies greatly in academic text. It is sometimes referred to as the ability to make prediction, draw conclusions, using context clues, activating background knowledge, filling in the gaps of understanding, create interpretations, visualize meaning, and deal with ambiguity to text (Bintz, Pienkosky-Moran, Ritz, Skilton, & Bircher, 2012).

According to the What Works Clearinghouse (2008), several recommendations for improving adolescent literacy included providing explicit vocabulary instruction, direct and explicit comprehension strategy instruction, increase student motivation and engagement in literacy learning, opportunity for extended discussion of text meaning and interpretation, or making intensive and individualized interventions for struggling readers provided by trained specialists. Direct and explicit comprehension strategy instruction had a strong level of evidence of success.

**Questions.** Although there are a plethora of research-based strategies to teach reading, content-area teachers are often overwhelmed and neglect to take the time to teach reading strategy, especially when teachers consider reading not within their “content area” or feel inefficient at teaching the strategy. Content area teachers consider it someone else’s responsibility (Ivey & Broaddus, 2000). When and if they do attempt to imbed a strategy into their instruction the strategy is done with little consistency. How
can we move beyond the often stated “every teacher is a teacher of reading” (Shanahan & Shanahan, 2008) statement to an actual movement to teach educators how to use strategies to teach adolescent readers? Which strategies are best? How can we address those with learning disabilities to attain academic success with these strategies?

All students need to know how to read to compete in the global economy. They need to be able comprehend a variety of difficult texts effectively and furthermore convey meaning to communicate socially and electronically (Wendt, 2013). How can educators provide students with reading strategies that students can generalize across content areas and into their everyday life to better comprehend the world around them?

**Problems.** Common misconceptions of students with learning disabilities are that they have low IQs or that certain socio-economic levels produce significant levels of learning disability, however Dr. Sheldon Horowitz of the National Center for Learning Disabilities (2012) explains that learning disabilities do not discriminate. Having a learning disability does not correlate to IQ score (Stanovich, 2005).

Many times, once a student is determined to have a reading level that is below grade level, they are referred to the child study team to see if they can receive special education services. According to the federal and DSMV definition, a student with a Specific Learning Disability (SLD) is defined as one who does not adequately achieve for their age “or does not meet state-approved grade-level standards when provided instruction on those state standards.” If a student struggles in one or more areas of oral expression, written expression, listening comprehension, basic reading skill, reading fluency and comprehension and it is not a direct result of mental retardation, emotional disturbance, visual, hearing, or motor disability, cultural factors, environmental or
economic disadvantage or English as a second language, then they are considered to have a SLD.

Knowing a student has a SLD is often not enough to properly serve the student’s education needs. It is a heterogeneous classification that displays differently in each student. Students with SLD do not have an intellectual disability. Instead they have cognitive difficulties in the area(s) of perception, attention, memory, processing speed, metacognition, language, academic, or social (Watson, 2014). More assessment needs to be done by individual educators to determine how to best meet the needs of the student classified as SLD. Reading comprehension is already a complex instructional area making teaching reading to a student with SLD challenging.

Determining the area of weakness that interrupts comprehension for a student is difficult in teaching reading. Vocabulary, oral expression, figurative language, narrative skills, grammatical development, verbal reasoning, inferencing, comprehension monitoring, verbal working memory, and a motivation to read could all be influences that affect overall reading comprehension (Clarke, Truelove, Hulme, & Snowling, 2014). This is not an exhaustive list, yet many of these weaknesses are expected to be natural to a middle school learner.

Strategies used by proficient readers include making connections between prior knowledge and the text, asking questions, visualizing, drawing inferences, determining importance ideas, synthesizing information, and repair understanding (Goudvis, 2000). It may be assumed that deficits in comprehension are due to how comprehension is being taught to students. Decoding, phonological awareness, and fluency skills are the stressed areas of reading that occur at the elementary level often occurring in isolation to higher
order level skills needed for comprehension. Both basic and higher level skills need to develop simultaneously for students to develop overall comprehension (Silvana, Watson, Gable, Gear & Hughes, 2012). Once students enter middle school, content area teachers are often undertrained and underprepared to teach students reading comprehension strategies. Middle school educators often have a narrow range of instructional materials, perform an incongruent one-size-fits-all classroom curriculum, lack of student directness and ownership in the reading curriculum, and often are ineffective at prioritizing of instructional time (Ivey & Broaddus, 2000). These elements have a direct impact on the middle school student, more so when there are already deficits in reading comprehension.

Teachers who want to make an impact in their class are often determined to focus on as many different strategies in order to help their students achieve success. It is often difficult to determine one area of focus that will benefit the students of the class. Teachers need to provide comprehension strategies that are direct and explicit (Kamil, Dole, Kral, Salinger, Torgesen, 2008). Researchers from the National Center for Educational Evaluation and Regional Assistance (2008) found that some teachers adjusting reading assignments or methods of delivery, rather than help students learn specific strategies needed to comprehend the discipline content-area work.

**Purpose of the Study**

The goal of this study is to evaluate whether the reading comprehension skills of secondary-age students with learning disabilities, as measured by Fountas and Pinnell assessment and easyCBM assessments, can be improved by implementing the strategy of inferencing with direct and explicit instruction. Students need to integrate old and new information to make new meanings (Barth, Barnes, Francis, Vaughn & York, 2015). To
help aid in connecting old and new information, the use of graphic organizers will be used to assist the process of reading comprehension, with focus on making an inference. If a student can use and generalize these skills across content areas, the prediction is overall reading comprehension will improve.
Chapter 2

Literature Review

Understanding Reading Comprehension

Reading comprehension is a complex skill that places significant demands on students that involves a range of language and cognitive processes to make sense of written text (Silvana et al 2012). It can be defined as the ability to create a mental representation of text. At the elementary level, students are told to make a ‘mind movie.’ Through retelling, questioning and answering, and applying textual information students are able to create a picture in the mind of what is being discussed in both fiction and nonfiction text. While this mental representation is an important aspect of reading, with rising standards it is important to know how reader use and apply what they comprehension.

Van den Broek and Espin (2012) detail coherence of comprehension as mental representations, or ability to connect text to logical understanding, as a direct indicator of good versus poor comprehension. Since teachers cannot see what a student is thinking, it is important to make thinking visual by having students interact with text through output of comprehension such as through discussion and writing. Furthermore, the researchers distinguish the difference between the product and a process of comprehension. The product of comprehension is defined as the mental representation of the textual information that is within the reader’s mind, whereas the process is that automatic and strategic processes also known as coherence of textual understanding. Readers may not engage in strategic processes if they have little motivation or if the level of the text is not a good fit for the reader (either too difficult or too simple). In addition, there is no single
underlying source for poor comprehending (Skilton, 2011). Struggling readers are a heterogeneous group with unique profiles (Yeh, Mctigue, Joshi, 2012).

The multidimensional process of reading occurs in the brain. Sprenger’s research (2013) describes how the reading brain needs to be created and unlike language, reading is not learned spontaneously. Multiple brain regions are involved in comprehension (van den Broek, et al, 2012). The frontal lobe is responsible for reasoning, higher-level cognition, and expressive language while Broca’s region is responsible for comprehension. The occipital lobes recognize and interpret visual information. Listening to words, associating words, reading words, and producing words are necessary to build skills related to reading and all take place in different regions in the brain.

The more advanced neuroscience becomes, the more discoveries are being made related to how the brain learns to read. It has been determined that struggling readers’ brains work harder than those of non-struggling readers. A beginning reader will use different neural pathways than a skilled reader (Sprenger, 2013, 32). When it comes to dyslexia, these readers are using completely different areas of their brains compared to fluent readers.

How does a teacher uncover what stage of development a student is on as a reader? Most districts have some way of assessing students reading comprehension through district-wide assessments or standardized, computer-based assessments. Van den Broek and Espin (2012) suggest that there is a lack of consistency in skill sets on reading comprehension tests. Curriculum based measures which are designed to help teachers make decisions on instructional techniques and strategies to best help their students are not always accurate measures. There is variation of outcome from passage to passage.
being delivered and therefore provide an unreliability of growth rate over time. Depending on the students’ background knowledge on the area being discussed in the reading passage may limit their ability to attend and therefore infer meaning from the text. Assessments should obtain a profile of individuals’ strengths and weaknesses in the component skill and process linked to reading comprehension and should diagnose the source of reading comprehension problems in order to be any help to teachers to help students make gains in comprehension. However, due to the complexity of reading comprehension these measures are not always as useful as expected.

Overall reading comprehension can be broken down into two categories: lower and higher level skills. The lower level skills are word reading efficiency, vocabulary knowledge, and sentence level grammatical structure. The higher level skills are processing, inference generations, comprehension monitoring, and working memory capacity (Cain, Oakhill, 2006). Lower level skills take place in short term memory. If the lower level skills are not met, then working memory resources are being compromised and therefore interfere with higher level comprehension skills impeding comprehension. Higher level thinking skills lead to long term memory and therefore learning of a topic or skill. In regard to reading comprehension, higher working memory capacity leads to better the overall reading comprehension (Dehn, 2008, pg. 109).

To add to the complexity of the problem, Dehn (2008) states about 10% of middle school students with reading comprehension struggles are students with average decoding skills, adequate working memory capacity, and normal phonological short-term memory. One of these reasons might be due to the function of working memory. Working memory can be defined as the area of the brain that deals with inhibition, planning, and organizing
If working memory is weak, students cannot retrieve prior knowledge, monitor their own comprehension, or sift through irrelevant information (Silvana, Watson, Gable, Gear, Hughes, 2012). Insufficient working memory capacity is not the only reason for reading comprehension problems. Students with SLD struggle to construct meaning from written text, connect meaning to words, make inferences, draw conclusions, recall and summarize information, and actively monitor their comprehension (Silvana, et al, 2012). SLD students often have weaker vocabulary knowledge, are unable to use context clues, and therefore cannot make inferences. This has a direct implication for reading comprehension, because the higher the working memory capacity leads to better overall comprehension (p. 109). With so many factors that can inhibit reading comprehension success, how can an educator possibly determine exactly where the issue is forming without access to brain imaging for each student?

Cain, Bryant, and Oakhill (2004) conducted a longitudinal study that addressed reading comprehension skills and working memory capacity in students aged eight to eleven. When students are trained to focus on keywords from the text, their ability to make an inference can improve. Each text they gave the students sentences presented literal information, valid inferences, or invalid inferences. A valid inference is one that is consistent with the overall meaning of the sentences whereas the invalid inference does not add meaning to the text. When they read these in the context of short stories, students underlined parts that did not make sense or read that section aloud. It was thought that impaired working memory would impede student performance with inferencing task. The research showed relations between inference making, comprehension monitoring, and
reading comprehension, but direct correlation to working memory was not wholly explained.

To determine the area of weakness in reading comprehension, Cain, Bryant, and Oakhill categorized and assessed lower and higher processing skills in reading comprehension. They assessed verbal skills and word recognition as lower processing skills and chunked working memory, inference generation, and comprehension monitoring as higher processing skills.

The conclusion stated that verbal skills and word recognition alone do not account for the relationship between working memory and text comprehension. Weak word recognition and verbal skills showed variable correlation to weak overall reading comprehension, but they were not a complete determination for how the students would achieve on the higher processing skills. Inferencing making, comprehension monitoring, and processing capacity had a unique deviation for reading comprehension even after the lower processing skills were determined.

Working memory is important for inference making and comprehension monitoring, but depending on the students awareness of how to exhibit comprehension monitoring or knowing how to infer, the result were inconclusive. When students were told to monitor their comprehension before a task and create a mental image, results improved. The poor comprehenders in the study made more inferences in their responses when they were prompted to look for clues and explicitly told what to do. Since this was an explained and directed skill, working memory did not have a large part in the comprehension. Teaching students how to read strategically needs to be done directly and explicitly with the hope that students will generalize the skill across content areas.
Unfortunately, due to all of these variations, there may not be one, single instructional method that is sufficient for all readers, for all texts, in all learning situations (Barton & Sawyer, 2004).

**Middle School Reading and Students with Specific Learning Disabilities**

Sousa (2005) describes middle school as the last chance for struggling readers to get the needed support. It is assumed that they have already gained the skills in elementary school. However, reading comprehension is a complex skill that places significant demands on students beginning in elementary school and instruction needs to continue through secondary grades (Silvana, Watson, Gable, Gear, Hughes, 2012, 79). On the recent exam Partnership for Assessment of Readiness for College and Careers test scores, the state of New Jersey highest passing rate on the English and Language Arts test for seventh and eighth grades was 52 percent (Harris, 2015) proving that students are not gaining the necessary skills they need to be successful readers. It is no longer acceptable for a student to just simply understand a text. Common core pushes students to go beyond understanding to inferencing and conceptual understanding (Sprenger, 2013, p. 9).

Once students get to middle school without the ability to comprehend, academic supports for reading are often reduced. For many students with learning disabilities, reading comprehension difficulties result from, but not limited to, limited working memory capacity, inhibitory problems, lack of prior knowledge, misconceptions, limited text structure knowledge, ability to plan, or general language difficulties (Silvana, et al 2012). A student with this profile who can decode accurately but cannot understand what is being read is defined as a poor comprehender. These students need to be able to make inferences and build a mental model. A study by Cunningham & Stanovich (1998)
showed that reading early is important to predict exposure to literacy despite the level of reading comprehension ability. Some practitioners believe that by simply reading more, students will attain the skills needed to become comprehenders, but this is not necessarily true. Ivey and Broaddus (2000) express that reading difficulties are the result of lack of experience with text versus lack of ability.

The “Matthew Effect” in academic achievement was Stanovich’s (1986) way of describing how proficient readers get more proficient while struggling readers continue to struggle. If a student has a lack of decoding skills early in the reading experience, the challenge of reading will lead to lack of text exposure and limited practice with reading dealing development of word recognition. Students with varied experience and exposure to text make discrepancies even more apparent in the adolescents than might have been in elementary school where each student is starting from a separate but equal playing field. Furthermore, reading for meaning becomes hindered as students’ unrewarding experiences multiply; practice of reading is a mere task that is completed without any true cognitive involvement. Exposure to vocabulary is lessened, background knowledge does not build, familiarity with types of texts and structures is limited, and overall the comprehension and reader profile declines (Cunningham & Stanovich, 1998). A longitudinal study by Cain and Oakhill (2011) states that the Matthew Effects for vocabulary growth for poor comprehenders between the ages of 8 and 16 directly related to the reading habits and reading comprehension skills of the students.

With high stakes testing pressure on teachers to improve schools, teachers are focusing on skills and standards but a focus on reading, and reading well, needs to take precedent. The idea that students cannot read, will not read, or read but fail to understand
(Broaddus, 2000) cannot be guiding principles to teaching or ultimately ignoring students in a classroom. Applegate, Applegate, & Turner (2010) uncover the inadequacies of literacy leaders in developing flexible programs that guide students to becoming motivated, skilled, and thoughtful readers with all types of text.

There is an increasing need for secondary teachers to receive continuous professional development to provide meaningful reading instruction within subject areas. Content area teachers may not feel adequate to give reading instruction since they do not view themselves as reading teachers. Skilton surveyed teachers and determined that many teachers do not feel adequate when teaching reading strategies, which is discussed in detail in regards to inferring. Reed (2009) addresses the concern about the literacy needs of adolescents and determined that when professional development opportunities for secondary teachers was relevant, ongoing, frequent, and job-embedded, educators felt more confident and were able to support all readers in their classrooms. Developing a school-wide model of literacy instruction aided in fidelity to the literacy strategies allowing educators to support one another and, most importantly, support student learning within reading comprehension.

In a typical middle school, reading instruction takes place only in the language arts classes within approximately 45 minutes. Within three quarters of an hour teachers need to ensure that students are reading on grade level, can write on demand, are interested in reading a variety of material, and able to navigate high-stakes testing (Goodman, 2005). If content area teachers (mathematics, humanities, science, etc.) were able to teach reading strategies regularly, research of Bryan, Linan-Thompson, Ugel, Hamff, and Hougen (2001) saw a rise in students’ achievement in the middle schools.
If a student is unable to comprehend grade-level material, they are put at a disadvantage to excel in the class. The multifaceted process of reading requires teaching explicit tools for students to understand what they read. When only basic skills are reinforced students are less likely to acquire strategies and skills that enable them to comprehend more complex text. Therefore secondary teachers may need to provide direct reading instruction (Silvana, Watson, Gable, Gear, Hughes, 2012). Comprehension strategies are difficult to make concrete, therefore they need to be scaffolded. Effective teaching practices provide advanced organizers and support elaborative thinking but without explicit instruction of the strategy students will neglect to generalize the skills (Dehn, 2008, pg. 289). Regardless of what strategy instruction is reading comprehension is being taught, it must be highly structured, modeled, scaffolded, explicit, and intense (Silvana, et al 2012 & Dexter, Park, Hughes, 2011).

Making Inferences and the Use of Graphic Organizers

In the 21st century, students need to not only be able to read information, but think about it critically with great understanding. Hayakawa (1939) states, “Inference is a statement about the unknown made on the basis of the known.” On one level, it is an inherent, natural thinking process that helps people pose and solve problems. It is considered a constructive thinking process. On another level, it is a critical part of the reading process that activates readers to become curious about the text by activating background knowledge and text clues to help readers see what is not explicitly there (Bintz, Pienkosky-Moran, Berndt, Ritz, Skilton, Bircher, 2012). Some consider it ‘reading between the lines’ (Harvey & Goudvis, 2000) or rather to see what is not explicitly there.
The ideas on the shift of learning to read to reading to learn have been apparent for over thirty years when literacy research Jeanne Chall (1983) described the distinction, yet little has been done to prepare content-area teachers to continue to teach reading strategy (Goldman, 2012). Inferencing is likely a precursor to facilitating comprehension (Yeh, et al 2012).

Inferencing is a nebulous term. It is referred to in academic texts and educator’s manuals as infer, inferring, inferential thinking, and making inferences (Skilton, 2011) with definitions that include making predictions, drawing conclusion, using context clues, activating background knowledge, filling in the gaps, creating interpretations, visualize meaning, dealing with ambiguity, surface underlying themes (Bintz, et al, 2012; Goudvis, 2000; Torgesen, Houston, Rissman, 2007). It is a strategy that needs to be taught across the curriculum to teach students the difference between what a text says and what is actually means. Even with non-fiction factual text in a humanities classroom needs to be understood at a deeper level to include author bias and perhaps the implications of the historical event. In science students need to make connections and read in order to create their own hypothesis and observations to understand the world on a deeper level. Teachers are constantly referring to inferencing to allow their students to think critically, even if they are not referring to it as an inference.

Inferencing is the ability to draw conclusions based on clues in the text, make predictions before and during reading, identify surface underlying themes, use implicit information from text to create meaning during and after reading, and use pictures or imagery to help gain meaning (Goudvis, 2000). Inferring includes text clues plus prior knowledge in order to determine a conclusion about an underlying theme or idea in text
that is not explicitly written, but implied. They allow a reader to make their own interpretations of what is being said without the direct comment or command of the author. Making an inference is based on individual experiences, wisdom, values, log, thoughtfulness, and creativity in order to form new meaning (Keene & Zimmerman, 2007).

According to internationally-known speakers, workshop leaders, and literacy consultants Susan Zimmerman and Ellin Keene of the bestseller book Mosaic of Thought, “Inference is part rational, part mystical, part definable, and part beyond definition” (145). Mosaic of Thought was one of the first books to demonstrate explicitly teaching reading comprehension first published in 1997 and revamped in a 2nd edition in 2007. Their book was different from most teacher text because it described and modeled how a teacher would teach the strategies from an anecdotal standpoint. Teachers of reading struggle with what to teach and how to do it well.

How much emphasis do teachers place on inferencing? This was the question asked by Skilton (2011). She surveyed nine teachers in Ohio to find out how inferencing was being implemented in elementary and middle school settings and overall awareness of teaching inferencing. Prior to her interviewing the teachers, her research she reviewed reading teacher trade books and favored teaching references. What she discovered was that inferencing appeared in less than one percent of the pages in these books. When it was referenced, it was defined differently from one researcher to the next.

Based on her surveys, four out of five elementary teachers agree that they teach inferencing regularly, while one disagreed saying inferential skills were not important if students are struggling to decode. It was felt that students need to understand the words
before they can interpret meaning from the text. The teacher also admitted that she was not comfortable teaching inferencing. In the middle school, four out of the four teachers said they do teach it and that it is an essential part of thinking and understanding. The middle school teachers felt they do teach inferencing but may not use the word inferencing, because students are just doing it automatically. Teachers reflected that they do not explicitly states they are teaching inferencing but call it by other names. What was discovered was that the teachers reflected that they do not explicitly state when they are teaching inferences. Since teaching inferring is a complex task, teachers seems to avoid it. Whether this a subconscious or conscious effort, it is of the utmost importance that all teachers become aware of the implications of teaching inferences as it leads to more critical thinking skills. In summation, inferencing is a complex task that teachers seem to avoid.

Before a student can make an inference, many other aspects of reading must be acquired. Van den Broek and Espin (2012) discussed how cognitive theory and assessment can be synthesized to measure individual differences in reading comprehension. A reader activates their cognitive “toolbox” when reading a text. They need to know how to read the words on the page, think about what is being said, and make meaning in the text that can be applied to themselves or the world. It is a multi-layered process that takes cognitive awareness and strategy. After years of practice, the strategies taught should occur with automaticity. If the reader is paying attention to word decoding, vocabulary, or other areas that require working memory to be activated, there is distraction from the full comprehension of the text. Word reading accuracy involves being able to decode the words. Word reading fluency is how quickly a student can string
words together to make fluid phrases. The acquisition of vocabulary is not just be able to decode and read the words but understand their meaning in their academic context. While they are reading and understanding the words, working memory needs to be in tact to remember what was read and make outside the text connection to gain greater meaning of the overall text. All of these aspects influence reading comprehension.

Many aspects contribute to get a reader to engage in the strategic process of inferencing. Inferential processes depend on the knowledge about the text genre, schema related to the text, ability to think about text in a coherent manner, and the ability to allocate attention to text structure (van den Broek, et al, 2012).

It is important for middle school readers to not only read independently, but do so with directed focus. Sprenger (2013) describes strategies that can be modeled such as setting a purpose for reading, visualizing, predicting, active questioning, and other various activities that can be done before, during, and after reading to enhance comprehension. Teachers should teach a strategy and find a way to make the learning visual. This is usually done through graphic organizers.

Graphic organizers are not worksheets but an approach to make learning visual (Dehn, 2008, p. 186). Kim, Vaughn, Wanzek, Wei (2004) researched the effects of using graphic organizers for students with learning disabilities. The discussion determined that the longer intervention and more direct the instruction was for generalizing the use of graphic organizers, the more likely students were generalize the strategy to other content areas. Considering the brain once again, it is known linking new information to older, stored information creates a stronger connection and allows the brain to essentially learn. A graphic organizer provides the opportunity for students to connect existing information
to the new information within a text. It makes clear relationships between related facts and concepts, connected prior knowledge to new knowledge, allowing students to infer information (Dexter, Park, Hughes, 2011).

Coherent mental representations are best supported when a text can be inferred. To infer text students need to activate background knowledge, connect these bits of information to elements from the text in order to create an interconnected idea in the semantic network that represents the reader’s comprehension (van den Broek, Espin, 2012). To produce comprehension in the brain, the product, or mental representation of the textual information in the reader’s mind, needs to connect with the process, the automatic strategy of coherence, in order to make the text make sense and become meaningful to the reader. These connections can be taught through the use of graphic organizers.

Inferential processes are related to comprehension at the sentence-level and passage-level. Depending on how much information a person can store while reading, determines how well they can “read between the lines” of the text. Depending on the passage difficulty and the student’s overall background knowledge of the material can greatly impact the over comprehension of the text (Barth, Barnes, Francis, Vaughn, York, 2015). Students integrate old and new information, creating new synapse connections in the brain. Students are not only decoding the words but reading for meaning.

Inferential processes are related to sentence-level and passage-level comprehension which is moderated by comprehension skill at the passage level. Word reading accuracy, word reading fluency, working memory, and vocabulary acquisition all
have influences over inferencing. Without a strong foundation of these skills, the ability to deeply understand text is lost.
Chapter 3
Methodology

Setting and Participants

This study included seven middle school students (7th grade), five girls and two boys classified as having a specific learning disability. The students attend a middle school in a suburban southern New Jersey school district. The middle school contains sixth through eighth grade and holds approximately 1,000 students. The students that participated in the study are included into language arts classes but have an additional reading resource class daily due to their classification as special education students.

According to the New Jersey School Performance Report (New Jersey Department of Education, 2014), 68.1% of the students in the middle school are white, 8.8% of the students are black, 14.2% of the students are Asian, 5.7% of the students are Hispanic, and 3.1% of the students are two of more races. English is the primary language spoken in the community. When examining the middle school population, 22% of the students are students with disabilities, 15.6% of the population is considered economically disadvantaged, and 1.3% of the population is limited English proficiency students.

Of the seven students in the study, 6 are Caucasian and 1 is African American. Three out of the seven receive speech and language services and one receives occupational therapy services. These services are given during the instructional time of the replacement reading class.

The students included in this study are assigned to a single special education teacher in the seventh grade who is responsible for their Individualized Education Plan.
Each student is classified as having a specific learning disability (SLD). According to the U.S. Department of Education, a specific learning disability is a, “Disorder in one or more of the processes that included spoken or written language which creates difficulty in listening, thinking, speaking, reading, writing, and spelling”.

Additionally, each student has the learning goal of being able to draw inferences from the text and cite text based details in support of a claim.

The students attend a resource replacement reading class, a 45-minute class that is offered in addition to their 55-minute language arts core. The special education teacher provides support in their language arts class and supplements material to improve their overall reading comprehension. Through various evaluations, a common thread of weak inferencing skills was determined. Inferencing is defined as the reading process of connecting background knowledge and textual evidence to determine an outcome of the text. Most students can read text for literal meaning, but cannot assess text with critical thinking.

Participant 1. Student A is a seventh grade Caucasian, male student that is eligible for special education and related services under the category of SLD. Student A’s difficulty with writing affects his ability to get his point across in his subject areas. He struggles to organize his ideas, transfer his ideas to paper, elaborate on his ideas, then edit to make sure he has fulfilled the purpose of his writing assignment. He receives OT twice a week to help him with his fine motor skills.

When asked if he likes reading, he explains that sometimes, but only if he is reading for fun. If he is being forced to read, he tends to not enjoy the text. The hardest
thing about reading is staying focused. Asking questions and making connections while he reads is the most useful strategy to help him stay focused on his reading.

Participant 2. Student B is a seventh grade African American girl that is eligible for special education and related services under the category of SLD. She struggles with written expression and basic math skills. She does not ask questions, which makes it difficult to know when she needs help. Frequent check-ins are essential for her success. She needs to close read and analyze text to reach the deeper meaning. One on one reading conferences are needed to assure she is on track and comprehending text. She also needs support with citing and explaining/extending on citations from the text in written responses.

When asked if she likes reading, she said that she likes certain cartoon and comic books. She struggles with staying on focused and wanting to rush through the book causing her to not focus on the main idea or important details. While she reads she makes sure to pay attention to plot elements and will write these down to help her stay focused on the story.

Participant 3. Student C is a seventh grade Caucasian, female student who is eligible for special education and related services under the category of SLD. Student C is often able to answer reading comprehension questions from text that are "right there" and require basic recollection however she often struggles with questions that require inferential thinking. She has trouble making inferences and struggles with writing a multi-paragraph essay based on the prompt.
She expressed that she enjoys reading action packed books that make it difficult to put the book down. Reading becomes hard for her as soon as the actions begin to fade. There are no strategies that she finds help her with comprehension.

**Participant 4.** Student D is a seventh grade, Caucasian female who is eligible for special education and related services under the category of SLD. Her classification of SLD demonstrates weakness with retention. Overall, Student D tries to do well in school, but becomes easily unfocused especially when she is struggling with a task. She is able to locate factual answers within a given text but continues to struggle with most higher order thinking that requires making inferences and synthesizing information from a story. It is difficult for her to find information from the text to support her reasoning when she does answer a question.

She says that she only enjoys the book if she decides she likes it. If she does not like the content of the book, she will not enjoy reading. It is not that there is anything hard about reading; it is just uninteresting at times. She asks questions and makes connections while she is reading, but does not find that it is particularly helpful especially if it is an uninteresting book.

**Participant 5.** Student E is a seventh grade, Caucasian female who is eligible for special education and related services under the category of SLD. She is classified due to slow processing speed and difficult in overall reading comprehension which causes her to struggle in all subject areas. She received speech and language services once a week.

When asked about her feelings towards reading, understanding character traits can be difficult for her. She attempts to use strategies but sometimes does them without truly understanding why she is completing a task.
Participant 6. Student F is a seventh grade, Caucasian male who is classified special education and related services under the category of SLD. His disability can lead to a difficult time drawing inferences. He enjoys reading and finds nothing difficult with the process of reading. Predicting and connecting help Student F understand the text he is reading. He believes inferencing is an important skill. He receives speech and language services twice a week.

Participant 7. Student G is a seventh grade, Caucasian female classified under the category of SLD. She has a weakness in memory and retention. Large assignments need to be chunked for Student G for her to be successful. She receives speech and language services once a week.

She enjoys reading because she likes to explore new worlds in books. There is nothing difficult she finds about reading. Rereading and connecting the story to her background knowledge help her understand the text better.

Procedure

In this study, data was collected on seven seventh-grade students classified under as students with specific learning disabilities. Since September 2015, base-line data was collected as a needs assessment. Two forms of assessment were used to help determine students’ ability in reading comprehension. The students were given the Houghton Mifflin Harcourt easyCBM™ long passage reading comprehension assessment to analyze their reading comprehension and the Fountas and Pinnell Benchmark Reading Assessments (Heinemann) were given to determine students’ reading comprehension grade level equivalencies. What was discovered was that each student had a deficit in the ability to make inferences affecting their overall score. The assessments guided the
determination for an intervention that would help students enhance their ability to inference. Students were given a familiar assessment in a familiar setting within their regularly scheduled reading replacement class-time.

Since there are many factors that can determine issues with comprehension, assessments need to be given in order to determine areas of strength and weakness. According to the Fountas and Pinnell assessment handbook, each student was reading one to one-and-a-half years below grade-level. According to the EasyCBM™ Multiple Choice Reading Comprehension, students answered literal questions accurately with 94% whereas inferential questions were answered with 67% accuracy. These assessments helped determine a common thread of inferencing as being the main implications for difficulties in comprehension.

Variables

The independent variable in the study was the use of the graphic organizer and students’ interaction with text. The intervention aimed to increase the student’s ability to answer inferential questions with accuracy and the ability to support their answers. The dependent variables in the study were the students’ performance on the Fountas and Pinnell Assessments and scores on the Multiple Choice Reading Comprehension easyCBM™(Houghton Mifflin Harcourt).

Experimental Design

In order to conduct this single-subject design study, a baseline of reading comprehension was established with a focus on inferencing. The assessments used to establish the baseline were also used as a way to progress monitor students achievement after implementation of the strategy of graphic organizers. According to Marzano (2001)
described the strategies of identifying similarities and differences yields a 45 percentile gains and summarizing and note taking yields a 34 percentile gain. Both of these high-yield instructional strategies encompass making an inference using a graphic organizer.

Students were given an initial survey to determine the reading strategies they felt comfortable with as well as their predisposition to reading (Appendix A). Direct and explicit instruction was provided in the reading replacement resource classroom as an intervention to improve reading comprehension. Reading assignments with a focus on inferencing were given in content-area classes. Prior to intervention, during intervention, and post intervention EasyCBM progress monitoring assessments were given to track progress of student reading comprehension growth.

The teacher used a research-based lesson plan and delivery guide provided by Polk County School District in Florida. The Polk County School District uses The Reading Coach Model in the elementary, middle, and high school levels to help improve student reading achievement. It was one of pilot districts for the Reading Coach model based on the Reading First initiative in 2001. The reading plan is called Just Read, Florida! Comprehensive Research-Based Reading Plan that lays out the groundwork of specific lesson plans that is expected to be followed at all levels with ongoing progress monitoring. The idea that reading teachers exist at all levels of education, prevent early reading failure, and provide appropriate intervention for those who struggle to read. Additional professional development opportunities are given to middle and high school teachers to make sure they have the tools necessary to teach and support reading initiatives.
The lesson plan used in the research was for middle school with a focus on inferences. It included a five day lesson that directly and explicitly taught the reading strategy of inferences. The lessons were delivered to students in the reading resource classroom over the course of five days.

Day one was explicit instruction of the skill of inferencing which had the students take notes about what words come to mind when asked to inference, the difference between predicting and inferring, and the benefits of inferencing. Day two built on the knowledge attained in day one with modeled instruction with specific reading passages with the teacher using the graphic organizer (Appendix B). In day three, guided practice was used to allow students to use the models from day two with teacher assistance to help make inferences from various facts that lead to in-your-head questioning. Day four was independent practice with students attempting to use the graphic organizer on their own with a fiction text and non-fiction text printed from Readworks, a non-profit web-based site that provides grade level text that is aligned to the Common Core Curriculum standards. On day five, students were given a mini-assessment on inferring and student responses were reviewed from day four’s articles.

Explicit and direct instruction of inferencing with fiction and nonfiction text was implemented in the reading replacement resource classroom with support of the special education teacher. Students were taught how to use a graphic organizer to help them comprehend fiction and non-fiction text. The last two weeks, the students were given articles in their inclusion language arts, science and humanities classes.

After receiving a reading assignment in these classes, the students were asked to infer the text given. They had an open-ended response sheet with the option of using a
pre-printed graphic organizer if they were unsure where to begin. The purpose was to see if the student could generalize the skill of inferencing in a different setting and whether or not they used the graphic organizer with efficiency.

Since much of reading takes place in the mind, students were surveyed after (Appendix C) the intervention to determine how they felt the strategy worked to help them comprehend. The surveys were given after an independent reading assignment was given.
Chapter 4

Results

In this single-subject design, the effects of direct and explicit teaching of inferencing was examine with seven, seventh grade students classified as students with specific learning disabilities. The students were assessed on overall reading comprehension ability then given a strategy of inferring by using graphic organizers to help them comprehend fiction and nonfiction text. This skill was taught in the reading replacement classroom with the goal that students will generalize the skills to their content-area classrooms during reading assignments. The research questions that were answered were:

1. If taught explicitly, can students show the reading strategy of inferring by using a graphic organizer to help them comprehend fiction and nonfiction text?

2. Will students take these skills taught in a resource reading class and generalize the skill to other content area subjects?

3. Will this increase overall reading comprehension skills?

The students were initially assessment using Fountas and Pinnell Benchmark Assessment. The reason for using Fountas and Pinnell Reading Assessment is to get an overall view of a student's reading comprehension based on a grade level equivalency. The assessment provides information regarding the determined success of student reading a passage at the seventh grade reading level. Although some students were reading below grade level at the beginning the year, their other classes have them reading materials that are on grade-level from the onset of academic learning in the seventh grade classroom; therefore, strategies needs to be introduced to help students navigate these reading
assignments until they increase this aptitude in reading. The results of the Fountas and Pinnell helped to choose the appropriate text levels of the narratives and articles used in the intervention.

The comprehension skills assessed with the easyCBM multiple-choice reading comprehension measures consists of 20 items each worth one point assessing comprehension within a 1,500 word fiction narrative. No non-fiction assessments are currently available using this progress monitoring system. There are seven literal items, seven inferential items, and six evaluative items. The text was printed and students were able to interact with the text with highlighting and/or underlining key items. Literal items asked for an identification of an event from the text which is right-there in the text. An inferential question asked the student to find some “unsaid meaning from the text” (Bitnara, Park, Anderson, Irvin, Alonzo, & Tindal, 2011). Evaluative questions asked the reader to make a judgement based on the context of the story which went beyond what was in the text. With the multiple choice answers, there was one correct answer, one purposeful near-distractor, and one intended far distractor.

While the easyCBM test was used as a progress monitoring system, students were given the intervention of graphic organizers with the focus of making an inference. This was directly and explicitly taught over the course of five days. Then, students were given reading assignments in their content-area classes with the directions to use the strategy of inferencing. They were given open ended responses with the option of using a provided graphic organizer. Whether the student was able to make inferencing to help them comprehend was tracked along with the use of a self-made or provided graphic organizer.
Some students used a form of inferencing while others did not understand the question or made an invalid inference.

**Group Results**

Table 1 shows the outcomes of the Fountas and Pinnell assessment in the total growth of reading comprehension level according to grade level equivalencies. Initially, the assessment was given as a baseline to determine the reading level of each student and helped to determine text-level appropriateness of the intervention materials. During the intervention, students were tested again to see if there had been improvement from the initial baseline. Students were encouraged to use their strategies as they read and completed the assessment. Each student showed growth approaching grade-level expectations. Five out of the seven were on grade-level according to the Fountas and Pinnell assessment. By the end of the intervention, each student made at least one total year of growth. Only one student is reading behind grade-level as a grade six student in the seventh month.
Table 1

*Reading Comprehension Level According to Grade Equivalencies*

<table>
<thead>
<tr>
<th>Student</th>
<th>Baseline</th>
<th>During intervention</th>
<th>Post intervention</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F&amp;P Level</td>
<td>Grade. Month</td>
<td>F&amp;P Level</td>
<td>Grade. Month</td>
</tr>
<tr>
<td>A</td>
<td>U</td>
<td>5.7</td>
<td>Y</td>
<td>7.5</td>
</tr>
<tr>
<td>B</td>
<td>X</td>
<td>6.7</td>
<td>Y</td>
<td>7.5</td>
</tr>
<tr>
<td>C</td>
<td>W</td>
<td>6.4</td>
<td>Y</td>
<td>7.5</td>
</tr>
<tr>
<td>D</td>
<td>V</td>
<td>6.1</td>
<td>Y</td>
<td>7.5</td>
</tr>
<tr>
<td>E</td>
<td>U</td>
<td>5.7</td>
<td>W</td>
<td>6.4</td>
</tr>
<tr>
<td>F</td>
<td>V</td>
<td>6.1</td>
<td>Y</td>
<td>7.5</td>
</tr>
<tr>
<td>G</td>
<td>U</td>
<td>5.7</td>
<td>X</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Table 2 shows the overall reading comprehension according to EasyCBM. This is a fiction passage that assesses students overall ability to comprehend a on-grade level reading narrative. Unfortunately, the EasyCBM testing does not have a non-fiction option. All participants read the text, are encouraged to interact with the text while reading it, and then answer 20 multiple choice reading comprehension questions. This
was given as a baseline assessment pre-intervention, during the intervention process, and post intervention to determine overall growth in reading comprehension.

Table 2

*Baseline, Intervention, Post-Intervention Comprehension Test Results*

<table>
<thead>
<tr>
<th>Student</th>
<th>BASELINE</th>
<th>INTERVENTION</th>
<th>POST</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>13</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>B</td>
<td>14</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>C</td>
<td>16</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>D</td>
<td>13</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>E</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>F</td>
<td>16</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>G</td>
<td>16</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>
During the intervention process of using a graphic organizer with inferring the goal was for students to generalize the skill presented to them in the replacement reading classroom into their content-area inclusion classrooms. Students were given the same instructions in each class. Table 3 shows the results for generalization.

In Language Arts, one student used the provided graphic organizer, four used a self-made graphic organizer, one used a form of the inferring equation, and one student did not use the graphic organizer or make a valid inference. In Science, the five of the students used the provided graphic organizer, one used a self-created graphic organizer, and one was able to effectively infer the article but did not use a graphic organizer. However, in the Science classroom, although they attempted to use the graphic organizer,
two students did not have time to finish the assignment during the provided time. In Humanities, all students used a graphic organizer. Five students used the provided graphic organizers and two created their own.

Table 3

*Generalization of Skill to Other Content Areas*

<table>
<thead>
<tr>
<th>Student</th>
<th>Language Arts</th>
<th>Science</th>
<th>Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GO</td>
<td>Self-Created GO</td>
<td>Self-Created GO</td>
</tr>
<tr>
<td>B</td>
<td>Provided GO</td>
<td>Provided GO, Unfinished</td>
<td>Provided GO</td>
</tr>
<tr>
<td>C</td>
<td>GO</td>
<td>Provided GO, Unfinished</td>
<td>Provided GO</td>
</tr>
<tr>
<td>D</td>
<td>GO</td>
<td>Provided GO</td>
<td>Provided GO</td>
</tr>
<tr>
<td>E</td>
<td>Self-Created GO</td>
<td>Provided GO</td>
<td>Provided GO</td>
</tr>
<tr>
<td>F</td>
<td>n/a</td>
<td>No graphic organizer</td>
<td>Self-Created GO</td>
</tr>
<tr>
<td>G</td>
<td>GO</td>
<td>Provided GO</td>
<td>Provided GO</td>
</tr>
</tbody>
</table>

**Individual Results**

Using the EasyCBM Reading Comprehension test, the questions were broken down by literal, inferential, and evaluative questions with the focus on the growth of
inferential questions. Table 4 and Figure 2 illustrate the results for Student A on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student A increased to 5 correctly answered questions from an initial baseline of 13 questions correct to 17 questions in the post-intervention assessment. Out of seven given inferential questions, Student A remained consistent at five out of seven correct through all assessments. Student A did not frequently interact with the text and was quick to read through assignment. It is significant to mention that the ability to answer evaluative questions increased from two out of six questions to five out of six questions. Evaluative questions also imbed a form of inferencing since the reader must connect the reading to prior knowledge to think beyond what is written in the text.

Table 4

*Student A EasyCBM Reading Comprehension Results*

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>13</td>
<td>15</td>
<td>17</td>
</tr>
</tbody>
</table>
Figure 2. Student A Reading Comprehension, Question type breakdown

Table 5 and Figure 3 illustrate the results for Student B on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student B increased 5 questions from an initial baseline of 14 questions correct to 19 questions correct in the post-intervention assessment. Out of seven given inferential questions, Student B initially responded correctly to three out of seven inferential questions. During the intervention Student B answered all seven inferential questions correctly. During the post-intervention Student B answers six out of seven questions correctly increasing overall ability to answer inferential questions.
Table 5

*Student B EasyCBM Reading Comprehension Results*

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>3</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>14</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

*Figure 3. Student B Reading Comprehension, Question type breakdown*

Table 6 and Figure 4 list and illustrate the results for Student C on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student C answered 17
questions correctly in the baseline and post-intervention with no overall increase. However, out of seven given inferential questions, Student C initially answered four out of seven inferential questions correctly. During intervention and post-intervention Student C increased the number of correct questions by one.

Table 6

*Student C EasyCBM Reading Comprehension Results*

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>7</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>17</td>
<td>14</td>
<td>17</td>
</tr>
</tbody>
</table>

*Figure 4. Student C Reading Comprehension, Question type breakdown*
Table 7 and Figure 5 list and illustrate the results for Student D on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student D increased 5 correct questions from an initial baseline of 13 questions correct to 17 questions correct in the post-intervention assessment. Out of seven given inferential questions, Student D initially answered three out of seven inferential questions correctly. During intervention and post intervention Student D increased amount of inferential questions correct to five out of seven questions.

Table 7

Student D EasyCBM Reading Comprehension Results

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>3</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>13</td>
<td>13</td>
<td>17</td>
</tr>
</tbody>
</table>
Table 8 and Figure 6 list and illustrate the results for Student E on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student E remained consistent from baseline to post intervention scores both answering 17 questions correctly. During the intervention, the student received a score of 13 out of 20. The student took notably longer to answer the questions during this test and appeared anxious. Out of seven given inferential questions, Student E initially answered six out of seven inferential questions correctly, decreased to five questions during the intervention, and answered six of seven questions correctly during the post-intervention.
Table 8

Student E EasyCBM Reading Comprehension Results

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>17</td>
<td>13</td>
<td>17</td>
</tr>
</tbody>
</table>

*Figure 6. Student E Reading Comprehension, Question type breakdown*
Table 9 and Figure 7 list and illustrate the results for Student F on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student F decreased 3 questions answered correctly from the initial baseline of 16 questions correct to 13 questions correct in the post-intervention assessment. Out of seven given inferential questions, Student F initially answered five out of seven inferential questions correctly. During intervention Student F answered all seven correctly. Post-intervention Student F answered four out of seven correctly, a decrease of 3 questions answered correctly from intervention to post intervention. It should be noted that Student F did not use the graphic organizers in the content-area classrooms.

Table 9

**Student F EasyCBM Reading Comprehension Results**

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>7</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>5</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>16</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>
Table 10 and Figure 8 list and illustrate the results for Student G on the amount of literal, inferential, and evaluative questions correct in a 20 question reading comprehension assessment. In overall reading comprehension, Student G answered 16 questions correctly in the baseline and increased 3 correct questions to a total of 19 correct questions in post-intervention. Out of seven given inferential questions, Student G initially answered all seven questions correctly. During intervention, Student G answered five of the seven correctly. Post intervention Student G answered six out of the seven questions correctly. The evaluative questions increased from two questions correct in the baseline assessment to six out of six correct in the post intervention. Student G increased ability to answer evaluative questions similarly to Student A.
Table 10

Student G EasyCBM Reading Comprehension Results

<table>
<thead>
<tr>
<th>Type of Question Answered Correctly</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>Post Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal (out of 7)</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Inferential (out of 7)</td>
<td>7</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Evaluative (out of 6)</td>
<td>2</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Total (out of 20)</td>
<td>16</td>
<td>17</td>
<td>19</td>
</tr>
</tbody>
</table>

Figure 8. Student G Reading Comprehension, Question type breakdown
Chapter 5

Discussion

Summary

This study examined the effect direct and explicit teaching of instruction in using inference on the reading comprehension of middle school students with specific learning disabilities. The participants were taught the strategy of inferring through the direct and explicit teaching with a graphic organizer in a replacement reading classroom. The graphic organizer depicted the parts required to make a sufficient inference. After the intervention, students were given fiction and nonfiction reading assignments in their respective content area classrooms to determine if they generalize the skills taught in the replacement reading class.

Using the strategy of inferencing on assessments, all students were able to make positive gains. Five out of seven students increased their overall reading comprehension scores on the EasyCBM assessment. Each student increased their Fountas and Pinnell Reading Assessment scores by an entire grade level within the Fountas and Pinnell system.

Overall, the students were able to generalize and use the strategy of graphic organizer to infer meaning of fiction and nonfiction text in their content area classes. In their language arts class six out of the seven students used the graphic organizer to make valid inferences. In the science classroom, six out of seven students the graphic organizer, but only four out of the six were able to effectively complete the task in the allotted time. In humanities, each students used the graphic organizer to assist them, five using the provided graphic organizer and two creating their own version. Students that used the
graphic organizer were able to provide more succinct and valid inferences relating to the text which helped them with their overall comprehension of the text. If a student did not use the graphic organizer, their answers were vague and inconclusive to their understanding of the text.

During the post-intervention, students were given a survey to help the practitioner better understand the thought process of the student during the assignments in the content-area classes. Although the results indicate that students made significant improvements to their reading comprehension as a result of utilizing graphic organizers, several students commented that it was “weird” to complete language arts activities in a science class. When asked why they, explained that they do not have to think that way in science. It was easier for them to read like a reader in the humanities class due to the nature of the narrative context. Using inferencing in science as a reading strategy seems odd to them. When we discussed the many ways scientists infer information, students were able to see more connections and understand making an inference more globally. The language of making an inference alone was an academic word they only heard of in the language arts classroom.

The students agreed that having a directed focus and being able to preview the graphic organizer to know what was being asked of them prior to reading the assignment was important to their success on the assignment. Having middle schoolers read with a directed focus aligned with Sprenger’s (2013) research on the brain and reading. Students should always know what is being asked of them in order to set purpose to reading prior to starting the assignment.
While Barton & Sawyer (2004) expressed that there may not be one, single instructional method that is sufficient for all readers, for all texts, in all learning situations having a clear focus was essential. Background knowledge continued to be a factor for the students success on the reading assignment based on whether they had heard about the topic before or if it was an area of personal interest. In addition, it became clear through this study that students with specific learning disabilities do not have specific profiles confirming what Silvana, Watson, Gable, Gear, Hughes (2012) explained about SLD students have varied profiles resulting from, but not limited to, limited working memory capacity, inhibitory problems, lack of prior knowledge, misconceptions, limited text structure knowledge, ability to plan, or general language difficulties.

Although Van den Broek and Espin (2012) suggested that there is a lack of consistency in skill sets on reading comprehension tests, the EasyCBM was helpful in identifying how students respond to different types of questions. Being able to break down the assessment into smaller parts beyond the overall comprehension score was essential to guiding the study.

**Limitations**

Although gains were apparent, the sample size of this study was too small to understand the full effects of direct and explicit instruction of inferencing. It is evident that the graphic organizer helped students, but it would be important to know whether the positive effects lasted beyond the intervention period. Since the sample size was small, it would be interesting to conduct this research on a broader scale and on a longitudinal level to track the overall level of instruction from elementary to middle school and high school.
Having an assessment to determine the students’ overall working memory capacity would have also been beneficial to understand the overall profile of each student and would have helped guide the study.

**Implications**

Special education students who are required to learn on-grade level material when they are reading below grade level often have limited success in reading content-area texts. Inferencing is an integral part of reading comprehension, yet many teachers do not teach it explicitly. It is a strategy that students in middle years are supposed to be able to do spontaneously. For students with specific learning disabilities, the skill of inferencing needs to be consistently taught, not just in a reading resource room, but as a skill that is generalized across academic disciplines.

When asked what the students thought of doing an inferencing lesson in different content area classes, they were vocal in explaining that they found it awkward or weird to be doing a language arts lesson in a science or humanities class. They specifically said this for science class because it did not seem natural. It is essential that students use all their language arts strategies across the curriculum. In this study, the results were evident that writing down inferencing helped them comprehend the text.

While some comprehension strategies lend themselves more to narrative text, more time needs to be spent in teaching students how to use strategies to navigate nonfiction text. These are more difficult because many times the student does not have background knowledge to connect to make inferences or think beyond the text. Experience is the main factor for allowing students to increase overall reading
comprehension. If a student has more opportunity with non-fiction text articles at an earlier age then they will improve their ability to read content area text.

**Conclusion**

The current study suggests that the development of inferencing skills will improve comprehension. Setting a clear purpose for reading and giving the student multiple opportunities to interact with a variety of texts will increase their overall reading comprehension. The more practice a student, with or without a learning disability, has working with their metacognitive skills, the better reader they will become.

The “Matthew Effect” described by Stanovich (1986) cannot be a guiding principle that if a student cannot read at a certain point, their exposure to text should be limited. The area of weakness needs to be identified early and then the student should be given access to attainable text often.

Inferences are made every day. Whether a person realizes he is she is making an inference depends if they have been explicitly taught it as a skill. When it does not occur naturally during the reading process due to reading deficiencies, it is important that it is a directly taught skill that emphasizes making connections and broadening the mind. Tools need to be given to students at a young age and these same strategies or tools should be honed throughout education. It is not enough to expect students to automatically find deeper meaning if they are not being challenged to do so through reading a variety of texts.
References


Ivey, G. & Broaddus, K. (2000). Tailoring the Fit: Reading Instruction and Middle School Readers. The Reading Teacher. 54:1, 68-78.


Skilton, JA (2011). What discoveries can be made about inference teaching and learning from nine teachers? The Ohio Reading Teacher. Vol 41:1, 9-17.


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Appendix A

Initial Student Survey

Name for Study: ________________________

A. Race
1 - American Indian or Alaskan native
2 - Asian or Pacific Islander
3 - African American
4 - Caucasian
5 - Other (Specify)

B. Sex
1 - Male
2 - Female

C. Ethnicity
1 - Hispanic Origin
2 - Not of Hispanic Origin

Do you like reading? Why or why not?

What do you feel is the hardest thing about reading?

What strategies, if any, help you to comprehend what you read?
Appendix B

Graphic Organizers

OPTION 1:

<table>
<thead>
<tr>
<th>Text Clues</th>
<th>What I Know</th>
<th>Inference</th>
</tr>
</thead>
</table>

OPTION 2 (scaffolded):

<table>
<thead>
<tr>
<th>It says… (what is in the text)</th>
<th>I say… (my thoughts)</th>
<th>So… (inference)</th>
</tr>
</thead>
</table>
Appendix C

Student Survey (post intervention)

What was the title of reading?

Did you use a graphic organizer (provided or self-made)?

Was the graphic organizer helpful? Why or why not?

How would you rate yourself on a 1-4 scale on success with the assignment?

1- The text was difficult for me to understand and I was unclear how to use the graphic organizer to guide my thinking.

2- I needed some assistance using the graphic organizer, but saw how it could help my understanding in the future.

3- I used the graphic organizer to help guide my thinking and ultimately understood the text.

4- I felt comfortable with the assignment and fully comprehended the text.
Appendix D

Grade Level Equivalencies with Fountas and Pinnell

### Progress Monitoring by Instructional Text Reading Level

<table>
<thead>
<tr>
<th>GRADE</th>
<th>MONTHS OF THE SCHOOL YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>K</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>D/E</td>
</tr>
<tr>
<td>2</td>
<td>JK</td>
</tr>
<tr>
<td>3</td>
<td>M/N</td>
</tr>
<tr>
<td>4</td>
<td>P/Q</td>
</tr>
<tr>
<td>5</td>
<td>S/T</td>
</tr>
<tr>
<td>6</td>
<td>V/W</td>
</tr>
<tr>
<td>7</td>
<td>Y</td>
</tr>
<tr>
<td>8</td>
<td>Z</td>
</tr>
<tr>
<td>9-12</td>
<td>Z</td>
</tr>
</tbody>
</table>

- The Progress Monitoring by Instructional Text Reading Level chart is intended to provide reasonable expectations for 10 months of the school year. School districts should adjust the expectations to align with their school/district requirements and professional teacher judgment.
- Each level indicates the instructional level: that is, the level that he or she can read with instructional support (e.g., text introduction). At levels A-K, the instructional level is the highest level a student can read with 90–94% accuracy and excellent or satisfactory comprehension, or 95–100% accuracy with limited comprehension. At levels L–Z, the instructional level is the highest level a student can read with 95–97% accuracy and excellent or satisfactory comprehension, or 98–100% accuracy with limited comprehension.
- The student’s independent reading level will be one or two levels lower. The independent level is one at which the student can read without teacher support.
- If the student’s instructional level matches the indicated level at the particular point in time, the student can be considered to be reading on grade level. If the student’s level is higher, then the student can be considered to be reading above grade level. In this case, the student may be reading independently at the level.
- If a student’s instructional level is lower than that indicated at the point in time, the student will need intervention. If the student is one to three levels lower, a Tier 2 Intervention is needed. If the student is three+ levels lower, a Tier 3 Intervention may be needed.
- At some points in time, students may be transitioning from one level to another (for example, Y/Z in month 5 of grade 7). That means the student is reading mostly at the lower level but taking on some texts at the higher level with success. For purposes of analyzing data, consider the lower level Y as reading on grade level.