

The Impact of Teaching Students Higher Order Thinking Skills  
on Reading Comprehension

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Submitted in Partial Fulfillment of the Requirements for the  
Degree of Master of Education

June 2019

Graduate Programs in Education

Goucher College

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## **Abstract**

The purpose of this study was to discover whether teaching students higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning would increase reading comprehension. The development of comprehension skills was measured by students' performance on the Fountas and Pinnell Reading Benchmark Assessment, System One. This procedure took place over a 12-week block of time. Before higher order thinking instruction began, the Fountas and Pinnell Benchmark Assessment was given to all students to establish a baseline score. After the data was collected, instruction was able to start. One higher order thinking strategy was taught and focused on for a two-week period with the first week guided and the second taught through the "I do, we do, you do" instruction. Students viewed modeled expectations and then were able to work together as a whole class or in groups. The second week was set for students to begin completing the tasks that focus on the higher order thinking skill independently. The Fountas and Pinnell Benchmark Assessment was given again at the end of the 12 weeks but this time used a text the student had never read. After the new data was collected, the pretest and posttest scores were compared. The current research demonstrates that students who need enrichment benefit from the instruction of higher order thinking skills. Researchers should continue to study which specific strategies are more vital than others. The students who are reading slightly above grade level found success in this study, but it would be interesting to determine whether students reading at grade level or below grade level would benefit from this instruction.

# CHAPTER I

## INTRODUCTION

Reading is one of most important skills people learn. Teaching young readers helps to develop the mind and language skills at an early age, which strengthens with continued practice. Some vital abilities that are tied to reading are decoding, fluency, listening, vocabulary, and understanding. Readers who make connections, infer, and construct their own understandings are building their reading comprehension skills.

Reading comprehension is the ability to process and recall what has been read in order to create one's own understanding. Being able to read a text and answer explicit questions about what was read is a goal for children in the primary grades to master. Once young readers can answer text-dependent questions efficiently, the focus shifts. These readers are now ready to begin answering implicit questions. These types of questions are more challenging because the answers are not directly stated the in text. Readers need to develop higher order thinking skills to aid in looking for the clues that will not only help to answer these enriching questions about a text, but will also help these readers to develop understanding on a deeper level.

Higher order thinking skills are important for young readers to develop because those skills help improve reading comprehension skills. When learning new information, readers must not only understand the information, but also have the ability to connect to it, manipulate it, and infer from it in order to apply the information in new situations.

This researcher wanted to identify the impact of teaching students higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning, on reading comprehension. Research is related to the influence of teaching students higher order thinking skills. Because the delivery of higher order thinking skills is an important

initiative of one main Maryland County Public School system, this study will identify how effective these skills are for students to master.

### **Problem Statement**

What is the impact of teaching students higher order thinking skills, such as inferring, visualizing, making connections, predicting, summarizing, and questioning, on reading comprehension?

### **Hypothesis**

The following null hypothesis will be tested to determine the effectiveness of teaching young readers higher order thinking skills.

### **Null Hypothesis**

There will be no statistically significant difference in the improvement in reading comprehension skills between students who receive instruction in higher order thinking skills and those who do not.

### **Operational Definitions**

*Fountas and Pinnell Benchmark Assessment System 1*: The Fountas and Pinnell Benchmark Assessment System 1 is used to determine a reader's instruction level. The data is used to make informed decisions and plan meaningful instruction. Scores taken from the reading comprehension portion of the assessment will be used to determine the effectiveness of teaching readers higher order thinking skills.

*Reading Comprehension*: Reading comprehension is defined as the ability to process new information that was read in order to build new understanding. The Fountas and Pinnell Benchmark Assessment System 1 poses explicit and implicit questions to students after reading a text. The calculation of this score is computed by dividing the number of points students receive

for correct responses by the total number of points that can be received. This score will determine how well readers can answer comprehension questions.

*Higher order thinking skills:* Higher order thinking skills are defined as abilities young readers learn to build understanding of what was read on a deep level. When learning new information, readers must not only understand it but also have the ability to connect to it, manipulate it, and infer from it in order to apply new information in new situations. These skills include inferring, visualizing, making connections, predicting, summarizing, and questioning.

## **CHAPTER II**

### **REVIEW OF THE LITERATURE**

#### **Overview**

This review discusses the effect of teaching students higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning, on reading comprehension. Research is related to the influence of teaching students higher order thinking skills. How do the skills of inferring, visualizing, making connections, predicting, summarizing, and questioning affect reading comprehension?

The first section defines higher order thinking skills. Higher order thinking skills incorporate many different concepts and strategies aimed at encouraging readers to understand the text in a deeper, meaningful way. The second section defines reading comprehension. This definition has multiple meanings; due to the various levels, readers can make connections and construct their own understandings about what was read. The third section shares the positive effects of reading intervention and how teaching strategies in a purposeful way can improve reading comprehension. The last section summarizes the importance of teaching readers higher order thinking strategies. Even though some students will need more small-group or individualized support in this area than others, mastering these skills are essential for academic achievement.

#### **Definition of Higher Order Thinking Skills**

The higher order thinking skills can be defined as a set of learning concepts that facilitate growth in students' critical, inferential, and metacognitive thinking. Readers are required to do more than memorize facts and information. They must connect to information, infer, generate questions, and more. The skills that encourage readers to comprehend on a deep level are



inferring, visualizing, making connections, predicting, summarizing, and questioning. These strategies are learned and developed over time through meaningful instruction.

One important component to higher order thinking is questioning. Both teacher-generated and student-generated questioning positively affects implicit thinking, as suggested by Dr. Molly Ness (2017). Research has proven that generating questions motivates students, builds reading comprehension, and improves higher order thinking (Ness, 2017). Ness explains that even though children come to school with a natural sense of curiosity, most of the questioning is conducted by the teacher, causing students to lose interest and motivation. To test her hypothesis with concrete evidence, Ness conducted research inside of a first-grade classroom. A teacher, Mrs. Hynes, was followed. She begins by modeling how to generate questions, using simple texts and thinking stems. As students begin to become more independent with this skill, the teacher relinquishes the question generating to them. She observed that with each text read, the quality and quantity of questions produced were improved. Question generating helped the students make better connections and inferences as texts became more complex. Ness's study proved that young readers have the ability to generate meaningful questions that go "beyond" the text.

Questioning is not only used to teach students, but it is also used to assess students' understanding and improve critical thinking skills. Critical thinking involves the ability to recognize problems, collect important information that will help readers address problems, and make accurate conclusions (Nappi, 2017). Bloom's Taxonomy provides a structure for teachers, modeling complex thinking. The goal is for students to become independent learners, as the structure provides a scaffold for asking questions that become more and more complex. Anderson and Krathwohl (2014) conclude that the first four levels of Bloom's Taxonomy

(knowledge, comprehension, application, and analysis) are natural for learners to develop. The last two levels (synthesis and evaluation) are equally difficult, requiring learners to problem solve and think critically/creatively. This model was constructed for teachers so that it can help assist them in question building. Teaching students how to think about their thinking leads readers to a deeper understanding.

Another strategy that can be used to improve higher order thinking is metacognitive instruction. Metacognition is the awareness of one's thought process. With metacognition, readers are able to monitor their thoughts and build their own understanding as they read.

A meta-analysis of 17 studies of metacognition strategy instruction was conducted on students' reading comprehension in computerized reading contexts (Yi-Chin Lan, Yu-Ling Lo, & Ying-Shao Hsu, 2014). The studies were grouped into three categories: regulation, strategy cues with think-aloud and vocabulary, and comprehension support. It was concluded that metacognition is a powerful tool. This type of instruction will look different in all classrooms. The teacher needs to think about students' background knowledge, their reading levels, and resources when designing this instruction.

Another aspect of metacognitive thinking is activating prior knowledge. Learners who have background knowledge for what they are reading are able to make connections and build relationships. A study was conducted to prove this theory. The effects of both prior knowledge and metacognitive knowledge activation on text comprehension were studied and scored (Kostons & Werf, 2015). In the study, 88 primary students participated, and all had experience with metacognitive activities. Students completed a pretest and posttest that followed a similar procedure. After reading a text, students answered eight multiple choice questions and four response questions. Results from the study show that activating prior metacognitive knowledge

had a positive effect on text comprehension. Students need to know how to activate their prior knowledge so that they can build relationships to the text while also monitoring their thinking.

Vygotsky's theory of development states that cognitive thinking depends on the "Zone of Proximal Development" (Varga, 2017). This depends on a child's social interactions. The first level is what the learner can do independently, the second level is what the learner can do with assistance (scaffolding), and the third level is considered "out of reach." Vygotsky (as cited in Varga, 2017) believed that a student's maximum potential could be reached through language reinforced social interactions.

Recently, Varga (2017) sought to identify and analyze the essential parts of textual discussions that would positively affect students' cognitive development. The aim is placed on strategies taught by teachers to be used in discussions in order to foster metacognitive operations and build comprehension. Referring back to the Zone of Proximal Development, students will need support from teachers until learners can activate strategies independently. The teaching strategies used to offer students support in performing the metacognitive processes are identifying specific approaches, verbalizing one's own conclusions and connections to the text, adjusting taught strategies as needed, and interacting with the text in order to make inferences. Within normal teaching practices, teachers need to purposefully carry out textual discussions in order to improve metacognitive thinking.

### **Definition of Reading Comprehension**

Reading comprehension is the ability readers have to construct meaning from what was read. Comprehension involves decoding words, making connections between prior knowledge and new information, and thinking deeply to make conclusions. Readers comprehend texts at different paces and benefit from specific strategies. The higher order thinking skills can be

taught to students to improve critical thinking. Some teachers find it easier to teach the higher order thinking skills with the use of fiction texts. Fiction texts tend to take over primary classrooms, with some lacking rich nonfiction texts. Educators are encouraged to use a greater number of nonfiction texts in order to enhance reading comprehension and vocabulary.

Kuhn, Rausch, McCarty, Montgomery, and Rule (2017) conducted a study in order to determine the effectiveness of teaching reading comprehension and vocabulary strategies when tied to nonfiction texts. Those findings were compared to fiction texts in primary classrooms. For a total of eight weeks, primary students received fiction-based and nonfiction-based instruction, collecting data through assessments after a two-week period. The data proved that students were able to apply comprehension strategies and define vocabulary after nonfiction instruction was completed. Students were also motivated to read informative texts and connect vocabulary to prior knowledge. Even though reading fiction texts is also important, 50% of texts should be nonfiction in the primary grades in order to build comprehension and vocabulary knowledge.

Cognitive and motivational factors also play a role in building reading comprehension (Tarchi, 2017). According to the results conducted from Tarchi's (2017) study, creating inferences, assessing prior knowledge, metacognition, and motivation play a role in the improvement of reading comprehension. This study taught the higher order thinking skills with the use of an expository history text, proving that nonfiction texts are also motivating for young readers.

### **Reading Comprehension Strategies**

Reading comprehension strategies are tools readers use to understand what they are reading. These skills are learned over time through continued modeling and practice. Experts

continue to study how students can best grow as readers, especially readers who develop the ability to comprehend texts on a deeper level. Metacognition, engagement, and self-efficacy are all comprehension strategies used in reading development (Afflerbach, Cho, Kim, Crassas, & Doyle, 2013). Young learners, depending on their abilities, will need more support in building comprehension. Tools like story maps, question stems, and graphic organizers are examples of aids that young learners may need as teachers scaffold the higher order thinking strategy instruction (Mahdavi & Tensfeldt, 2013). When teachers see that students do not need the supports in place, teachers can begin to transfer independence to students. Instructional choices will differ for each student.

Another way to improve reading comprehension is to focus on text structure (Roehling, Hebert, Nelson, & Bohaty, 2017). Text structure refers to the way information is set up on a page. Using this strategy helps readers look for specific details within the text to help locate story elements, the main idea, and cause/effect relationships. Text structure also delves deeper into authors' choice. Readers think about why the author selected specific words to use and how the author wanted the reader to feel/understand. As stated previously, comprehending expository texts can be challenging for readers, so using this strategy can help readers understand the text more effectively.

Employing various types of discussion before, during, and after reading is another strategy used to build comprehension (Maine, 2013). Examples of discussion strategies are Socratic discussions, talk moves, think-pair-share, and more. Readers can be grouped heterogeneously or homogeneously. Explicit and implicit discussions encourage readers to make their own meaning and build their own conclusions about what they've read. Because readers connect to the text in different ways, sharing viewpoints among one another help peers think

about the text in a new way. When students read together, they also have the opportunity to think creatively, allowing critical thinkers to monitor their own understanding.

### **Summary**

Students who are taught higher order thinking skills and who use them independently are able to better understand what they are reading on a deeper level. Readers who comprehend don't just memorize information they read, but rather construct inferences and make connections to other texts and life experiences. They also manipulate new concepts and apply learning to situations where they can solve problems in creative ways. Students who need support in reading may benefit greatly from intervention focusing on comprehension strategies. Mastering these skills is essential for academic achievement.

## **CHAPTER III**

### **METHODS**

The purpose of this study was to discover whether teaching students higher order thinking skills, such as inferring, visualizing, making connections, predicting, summarizing, and questioning, would increase reading comprehension. The development of comprehension skills was measured by performance on the Fountas and Pinnell Reading Benchmark Assessment System 1.

#### **Design**

This project used a quasi-experimental design. A pretest was presented to all students in order to identify baseline scores. Twelve weeks of higher order thinking instruction was taught to all reading students. Higher order thinking instruction began with modeling and global reads in order to set expectations, so that by the second week, students were independently completing the tasks at hand. A posttest was given at the end of the 12 weeks to assess the effectiveness and impact on comprehension. Scores from the pretest and posttest were then compared in order to determine effectiveness of instruction. The independent variable was the instruction provided from utilizing higher order thinking skills. The dependent variable was the impact of instruction. The goal was to determine whether the independent variable (instruction) affected the outcome, done by comparing the pretest and posttest scores (Fountas and Pinnell Benchmark Assessments).

#### **Participants**

Participants in this study were 24 first-grade students who attend a rural elementary school in Harford County, Maryland. Within this group, there are 12 males and 12 females. This elementary school's population consists of students with diverse cultures and socio-

economic backgrounds. Within this group of students, 20 are Caucasian, two are African American, one is Hispanic, and another one is Chinese. These students are between the ages of six and seven years old. These students are homogeneously grouped. They read around the same reading level. These students read texts slightly above grade level.

The instrument used during the study was the Fountas and Pinnell Reading Benchmark Assessment System 1. The Benchmark is an informal way to assess young readers' reading abilities. The Fountas and Pinnell Reading Benchmark Assessment System 1 consists of a series of texts used to identify the student's current reading level. First, the student is given a Where to Start Reading Word List. The student reads words on the list. The lists of words get more and more challenging as the student progresses. When the student reads 16-20 words correctly on the list, he/she moves on to the next level. When the student reads fewer than 16 words correctly, it is time to stop. The student then begins reading the text at the appropriate level shown on the Where to Start Chart. Students read the leveled texts and answer questions about what they read until they frustrate. The reading level the student passed is considered his/her instructional level. The Fountas and Pinnell scores are converted into letters but can be aligned to lexile levels. This instrument assessed students decoding accuracy, reading rate, and fluency. These are important components of reading, but the main focus of the current study will be on the comprehension piece. The goal was for students to make growth in understanding what was read and to strengthen their ability to answer explicit and implicit questions.

### **Procedure**

This procedure took place over a 12-week block of time. Before higher order thinking instruction began, the Fountas and Pinnell Benchmark Assessment was given to all students to establish a baseline score. After the data was collected, instruction was able to start. The higher



order thinking skills that were taught to students were inferring, visualizing, making connections, predicting, summarizing, and questioning. One higher order thinking strategy was taught and focused on for a two-week period. The first week was guided. This was taught through the “I do, we do, you do” type of instruction. Students viewed modeled expectations and then were able to work together as a whole class or in groups. The second week was set for students to begin completing the tasks that focus on the higher order thinking skill independently. The Fountas and Pinnell Benchmark Assessment was be given again at the end of the 12 weeks but this time used a text the student had never read. After the new data was collected, the pretest and posttest scores were compared. The goal was for the comprehension scores to have risen after the instruction of the higher order thinking skills. This would show the impact of instruction focusing on higher order thinking. The idea behind the study is to determine whether this type of instruction is effective in improving reading comprehension.

## CHAPTER IV

### RESULTS

The purpose of this study was to discover whether teaching students higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning would increase reading comprehension. The development of comprehension skills was measured by students' performance on the Fountas and Pinnell Reading Benchmark Assessment, System 1.

The variables collected included pre- and post-measures collected from the Fountas and Pinnell Reading Benchmark Assessment, System 1 in order to determine effectiveness of instruction. The independent variable was the instruction provided from utilizing higher order thinking skills. The dependent variable was the impact of instruction. After comparing the pre- and post-data, it has been concluded that the independent variable (instruction) affected the outcome.

Data were analyzed in stages. First, an overall dependent or paired  $t$  test was run on the pre- and post-Lexile scores on the Fountas and Pinnell reading comprehension. Measures of Central Tendency are presented in Table 1 and the Paired or Dependent  $t$  tests are presented in Table 2. Results indicated a statistically significant difference in pre- and post-scores. With that statistical difference established, measures of central tendency were calculated for the subtests, and that is presented in Table 3. Statistical tests were then run using again the paired or dependent  $t$  tests for the subtests, and that is depicted in Table 4. Again, statistical significance was achieved, and thus the null hypothesis could be rejected.

Table 1

*Measures of Central Tendency for Pre- and Post-Lexile Scores*

	Mean	N	Std. Deviation	Std. Error Mean
Pretest Lexile Score	353.9	23	75.8	15.8
Posttest Lexile Score	560.4	23	51.9	10.8

Table 2

*Statistical Dependent t test of Pre- and Post-Lexile Scores*

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test Lexie Score - Post-Test Lexie Score	-206.5	95.6	19.9	-247.9	-165.2	-10.359	22	.000

$p < .05$  so statistically significance obtained.  
Null hypothesis rejected.

Table 3

*Statistical Dependent t tests of Subtests*

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Accuracy - Accuracy	-1.7	2.4	.5	-2.8	-.71	-3.5	22	.002
Comprehension - Comprehension	-.83	1.5	.31	-1.5	-.19	-2.7	22	.013

$p < .05$  so statistical significance obtained  
 Null hypothesis rejected.

## **Chapter V**

### **Discussion**

The purpose of this study was to discover whether teaching students higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning would increase reading comprehension. The development of comprehension skills was measured by students' performance on the Fountas and Pinnell Reading Benchmark Assessment, system one.

Data analysis in Chapter IV indicated statistical significance, and thus the null hypothesis that there will be no statistically significant difference in the improvement in reading comprehension skills between students who receive instruction in higher order thinking skills and those who do not was rejected.

### **Threats to Validity**

All educational research studies suffer from two types of threats to validity. Those are referred to as external and internal validity threats. Threats to external validity result in a large part to the type of sampling chosen. Internal validity threats arise from the design of the study. Even though all students did make growth in their reading comprehension, there were several threats to validity within this study. The internal variables would be the independent and dependent variables. The independent variable was the instruction provided from utilizing higher order thinking skills. The dependent variable was the impact of instruction. This is because internal validity draws a link between instruction and the dependent variable (impact). The external threat would be the homogeneous population of students.

The first threat to validity was interruptions made from staff and other students. Even though the Fountas and Pinnell Assessment is given to students individually, it had to be given

while the other students completed a different task. Even though the other students were encouraged to sit in their seats and complete their activity, they would still attempt to interrupt the teacher with questions. An announcement for the teacher would occasionally come in during the time testing took place also, interrupting the tester.

The second threat to validity was attendance. Due to vacation or illness, several students were absent during an attempt to have them tested. Because students are young, it can be difficult for a student to take a test efficiently after being absent for several days. If these specific students had not been absent for several days prior to testing, their scores may have been higher.

The third threat to validity was administration. Depending on student growth, students can take a long time to frustrate. It is a great accomplishment when students pass a reading level, but it means they need to be taken up to the next level. This can take several minutes to hours. Due to a limited testing window, the reading specialist stepped in to help complete the Fountas and Pinnell assessments in a timely manner. When asking students the comprehension questions, one teacher may have scored a response differently from another. This assessment can be subjective.

### **Comparison of the Results of this Study to the Previous Research**

The results of this study can be compared to a different study conducted by Kostons and Werf (2015). The study they conducted focused on the effects of activating prior knowledge metacognitive thinking on comprehension. In the study, 88 primary students participated, and all had experience with metacognitive activities. Students completed a pretest and posttest that followed a similar procedure. After reading a text, students answered eight multiple-choice questions and four response questions. Results from the study show that activating prior

metacognitive knowledge had a positive effect on text comprehension. Students need to know how to activate their prior knowledge so that they can build relationships to the text while also monitoring their thinking.

The study conducted by Kostons and Werf (2015) supports the notion that activating background knowledge and metacognitive thinking improve higher thinking. When compared to the students who were studied in this current study, the students in Kostons and Werf's study also were taught metacognition strategies before, during, and after reading to build upon understanding. All students made growth in their ability to answer questions orally, which was accomplished by instruction in accessing background knowledge and metacognitive thinking.

### **Summary and Suggestions for Future Research**

The outcome of this study was successful. The students who were taught higher order thinking skills such as inferring, visualizing, making connections, predicting, summarizing, and questioning did improve in their reading comprehension scores. The current research demonstrates that students who need enrichment benefit from the instruction of higher order thinking skills. Researchers should continue to study which specific strategies are more vital than others. The students who are reading slightly above grade level found success in this study, but it would be interesting to see if students reading at grade level or below grade level would benefit from this instruction.

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