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Higher-order thinking question affecting economically disadvantaged students' reading achievement

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HIGHER-ORDER THINKING QUESTION AFFECTING ECONOMICALLY DISADVANTAGED STUDENTS' READING ACHIEVEMENT

By

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Abstract

Reading proficiency continues to elude a large number of school children, in particular, our economically disadvantaged students (Clark & Akerman, 2006). In a continued effort to decrease the gap between the high-poverty and low-poverty students' reading scores, this study examined the effect of third-grade and fifth-grade teachers' use of higher-order thinking (HOT) question levels and student context (whole group, small group, and one-one-one) during reading workshop on economically disadvantaged students' reading achievement. Teacher questionnaires and researcher observations were analyzed to determine the effect on reading CRCT scores and the two domains within the reading CRCT scores of Literary Comprehension and Reading Skills and Vocabulary Acquisition. In addition, intraclass correlation coefficients compared teacher reported use of HOT question levels to researcher observed teacher use of HOT questions. Results suggested the teachers were not cognizant of the higher-order thinking question level they used during reading instruction. Hierarchical regression analysis of the teachers' use of HOT question levels suggested the questioning levels of remembering and understanding have a statistically significant effect on the reading CRCT scores of the economically disadvantaged students. However, the combined effect of all the HOT question levels did not statistically significantly affect the reading CRCT scores of third-grade and fifth-grade economically disadvantaged students. HOT questions during whole group reading instruction were statistically significant for the economically disadvantaged students' scores on the reading CRCT and Literary Comprehension domain. In fifth-grade, student context had a negative correlation across each of the reading assessments with small group have the greatest negative correlation with reading CRCT scores. Recommendations for future research of HOT

questions effecting economically disadvantaged students include exploring the teachers' use of HOT questions in varying academic disciplines, the use of one-on-one instruction with economically disadvantaged students, and exploring if student context (i.e. whole group, small group, and one-on-one instruction) affects achievement based on the students' grade-level.

Keywords: higher-order thinking economically disadvantaged students, student context, teacher cognizance

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"I can do all things through Christ which strengthens me." Philippians 4:13

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CHAPTER ONE

Introduction

Learning to read is one of the most important skills a student acquires throughout the twelve years of education. Reading influences every part of the student's years in school and throughout his/her life. Learning to read opens doors of new knowledge and broadens a student's world. Reading can take students to places they have not yet been nor may ever physically be. The ability to read can make available the career choice of an individual or deny their choice. However, reading proficiency continues to elude a large number of school children, in particular, our economically disadvantaged students (Clark & Akerman, 2006).

Research indicates children from poverty have been disproportionately identified at risk of academic failure (Natriello, McDill, & Pallas, 1990). We cannot blame the student for academic failure. When research indicates a 35 point gap between the high-poverty and the low-poverty student reading achievement scores after years of mandates, reforms, and laws, we must continue to examine the teaching strategies within the classroom. (Aud et al., 2010)

Duffy-Hester (1999) suggests the teacher is the most important factor in students' learning to read. Identifying effective teaching strategies which lead to the success of economically disadvantaged students must be a priority of educators. Effective reading teachers escort learners to a lifelong love of literacy (Blair, Rupley, & Nichols, 2007).

The Center for Improvement of Early Reading Achievement (CIERA) School Change study (Taylor, Pearson, Peterson, & Rodriquez, 2003) proposes higher-level comprehension instruction is important. The three-year study suggests higher-level comprehension instruction is an under-emphasized aspect of reading instruction. Particularly in grades two through five, the higher-level talk about text and writing are associated with student comprehension growth and student reading fluency. Teachers who ask a high proportion of higher-level questions were also identified as refraining from asking many low-level questions on story events and using comprehension questions to monitor students' reading progress.

The Florida Center for Reading Research conducted a study of the Florida Comprehensive Assessment Test (FCAT) and adolescent literacy and reading comprehension (Torgessen, 2004). They reviewed the reading, language, and cognitive abilities that are most important in explaining student performance differences on the FCAT at 3rd, 7th, and 10th grade. The Florida Center for Reading Research examined the FCAT because they believe the test places high demands on vocabulary and reasoning/inferential skills. They found the proportion of test questions requiring higher-order thinking skills increases from 30% in third grade to 70% in tenth grade.

Consequently, teachers' use of higher-order thinking questions must increase as students are promoted through elementary, middle, and high school.

As educators face new challenges to ensure low-performing students achieve the learning standards, the value of students utilizing higher-order thinking skills to pass state mandated tests is manifest. Matt Cardoza, Director of Communications for the Georgia Department of Education, states the Georgia test items contain a range of difficulty and complexity. Cardoza (as reported by Downing, 2010) emphasizes Georgia tests employ a model called Depth of Knowledge ranging from level 1 (skill/concept) to level 4 (extended thinking). The extended-thinking level encompasses the higher-order thinking skills of analyze, create, and critique. Therefore, asking students higher-order thinking questions will lead to students' familiarity with the skills necessary to answer the various levels of test questions.

In 2013 - 2014, Georgia state schools will begin to implement the Common Core State Standards Initiative proposed by the National Governors Association Center for Best Practice for English Language Arts and Math (National Governors Association Center for Best Practices, 2010). The common core standards will focus on the content and skills necessary to be college and career ready upon completion of high school. Along with providing clarity and consistency among schools, the common core standards will provide a focus on the application of knowledge through high-order thinking skills (National Governors Association for Best Practices, 2010). The higher-order thinking questions teachers ask students will prepare students to meet the challenges of the common core standards and also the challenges of competing in a global economy.

Purpose of the Study

The purpose of this study is to identify the higher-order thinking question levels, which teachers use with students, having the greatest influence on economically disadvantaged students' reading achievement. The central aim of the study is to determine whether particular higher-order thinking question levels increase the achievement of economically disadvantaged students.

Teachers bring into their classrooms a variety of personalities, experiences, knowledge, and beliefs about education that influence the teaching strategies they employ within the school day. Although elementary school teachers are required to meet state and federal requirements to receive a teaching degree, each teacher enters the classroom having a range of knowledge and beliefs about what educating students entails. It is through teacher's experiences, reflections, and professional learning that the teacher's knowledge and beliefs are strengthened, challenged, refined, and implemented to meet the needs of all students.

The quality of instruction students receive is a major factor in their reading success. Anderson, Hiebert, Scott, and Wilkinson (1985) suggest an unquestionable conclusion of research is the quality of teaching makes a significant difference in children's learning. In fact, research demonstrates the clear correlation between student academic achievement and teacher quality (Whitehurst, 2002). Whitehurst (2002) suggests the Elementary and Secondary Education Act (ESEA) (1965) assumes teacher quality is affected by the teacher's general knowledge and ability, certification and licensure, teaching experience, knowledge of subject matter he or she teaches, in-service

training that is intensive and focused, and the alignment of teacher training and standards-based reforms.

High quality, effective teachers are critical to the future well-being of a child and to the nation's future. Cochran-Smith (2008), a former president of the American Educational Research Association (AERA), states:

> There is an unprecedented emphasis on teacher quality in the United States and in many nations around the world. And there are extremely high expectations for teacher performance in the twenty-first century. Based on the assumption that education and the economy are inextricably linked, it is now assumed that teachers can, and should, teach all students to world-class standards, serve as the linchpins in educational reforms of all kinds, and produce a well-qualified labor force to preserve the nation's position in the global economy (p. 271).

The *No Child Left Behind (NCLB) Act of 2001* (2002) is designed to improve student achievement and close achievement gaps. NCLB (2002) initiates teacher accountability provisions with the goal of every child achieving state-defined education standards in reading, language arts, math and science by the end of the 2013-2014 school year. Student achievement data is disaggregated by subgroups of students (e.g., race, gender, students with disabilities, economically disadvantaged) in order to hold schools accountable for making adequate yearly progress (AYP) toward the goal. Closing the 35 point gap between children from low-poverty and high-poverty families would address the performance standards accountability of the subgroup economically disadvantaged

student population. Improving the effectiveness of teachers is critical to efforts to raise student achievement, narrow achievement gaps, and reduce economic disparity.

Children represent a disproportionate share of the poor in the United States. Children are 25 percent of the total population, but make up 35 percent of the poor population (National Center for Children in Poverty, 2012). In 2010, 16.4 million children under age 18, or 22 percent, were poor (U. S. Bureau of the Census, 2011). The poverty rate for children also varies substantially by race and origin with poverty rates for white non-Hispanic children 11.9 percent, African-American children 35.4 percent, Hispanic children 33.1 percent, and Asian children 13.3 percent (U.S. Bureau of the Census, 2011). With the poverty rate for children expected to increase, educators must focus on finding successful strategies to teach all children to read and to be successful within the school setting and within society (Murdock, Zey, Cline, & Klineberg, 2010).

There are a variety of reasons the economically disadvantaged students struggle academically beyond the control of the school system. However, it is not acceptable to fault the student for not learning the way teachers are currently instructing. Payne (2008) suggests educators can neither excuse students nor scold them for not knowing; as educators we must teach them and provide support, insistence, and expectations. Educators must examine what they are doing within the classroom to find out what will increase achievement for the economically disadvantaged student rather than faulting the student for not learning.

This quasi-experimental, quantitative, case-study design will identify the higher-order thinking (HOT) question levels employed during reading instruction by analyzing

teacher identified use of higher-order thinking questions, researcher observation, and the Criterion-Referenced Competency Test (CRCT) (Georgia Department of Education, 2012a) reading scores of economically disadvantaged students. Higher-order thinking usage of four 3rd-grade and four 5th-grade teachers within a middle Georgia elementary school was examined. Teacher participation was voluntary. The student scores in the convenience samples were from third- and fifth-grade economically disadvantaged students. Third-grade and fifth-grade students were chosen because the state of Georgia identifies these grades as "gate" years, requiring students to pass a competency test to be promoted to the next grade (Georgia Academic Placement and Promotion Policy, 2012).

Data were collected and analyzed to determine if the teacher participants' use of higher-order thinking questions supported economically disadvantaged students CRCT reading scores. Of the 94 students in third grade, 20 students meet the criteria to be considered economically disadvantaged. In fifth grade, the number of economically disadvantaged students is 26, out of a total fifth-grade enrollment of 113.

Teacher participants in the study completed a questionnaire (Appendix A) identifying self-reported use of higher-order thinking questions. In addition, observations of teachers during reading instruction were conducted by the researcher (Appendix B). The teachers' use of higher-order thinking questions was recorded to determine the level and frequency of each question asked during reading instruction. The researcher also recorded the context of students (whole group, small group, or one-on-one) during Reading Workshop to examine whether reading achievement was influenced by student context. Next, the economically disadvantaged students' CRCT reading scores from each

teacher's classroom were collected. The researcher examined the data to identify how the most frequently used higher-order thinking questions correlated to the effect on reading scores of the identified students. In addition, the researcher compared teacher-reported use of HOT question to researcher-observed teacher use to identify if teachers were cognizant of the HOT question asked to students.

The data collected in this study was used to examine higher-order thinking questions employed during reading instruction and the potential relationship that specific higher-order thinking question levels had on the results of high-stakes testing for students in grades three and five. The results of the data analysis have been used to identify the higher-order thinking question levels for teachers to use to affect the reading achievement of students identified as economically disadvantaged.

Definitions

Adequate Yearly Progress – Annual targets set by states for all students (including identified subgroups of students) enrolled in grades 3, 4, and 5 in reading, language arts, math, and science with the goal of all students achieving proficiency by 2013-2014 (Torgessen et al., 2007).

Economically disadvantaged students – Students determined eligible to participate in the Free Lunch Program under the National School Lunch Act (Governor's Office of Student Achievement, 2012)

Highly Qualified Teachers – A teacher who meets the identified requirements of having a Bachelor's degree, full state teacher certification, and demonstrates competency through

passing a state exam or meeting standards established by each state for teacher evaluation (U. S. Department of Education, 2004).

Criterion Referenced Competency Test (CRCT) – Georgia assesses students in grades three through eight to measure how well students acquire the skills and knowledge defined with the Georgia Performance Standards (GPS) in the content areas of reading, English/language arts, math, science and social studies. In order to meet the state's minimum level of proficiency students must score 800 or above (Georgia Department of Education, 2007c).

Assumptions of the Study

Assumptions of the research included: (a) Elementary teachers at the chosen elementary school implement the selected county's language arts units following the curriculum map and pacing guides. (b) The content of instruction, "the what", is the same across grade level classrooms. However, "the how" of instruction will vary. (c) Teachers focus daily reading instruction, Reading Workshop, for approximately ninety minutes. (d) Teachers are using assessment to guide the classroom instruction to meet the specific strengths and/or needs of all students. (e) All teachers in the study meet the Highly Qualified criteria as established by the state of Georgia. (f) Student performance on the reading CRCT is an accurate indicator of reading achievement.

Research Questions

In an effort to conduct an in-depth study of the higher-order thinking questions affecting economically disadvantaged students, this study was driven by the following research questions:

(R1) To what extent are teachers' cognizant of using HOT questions during reading instruction?

(R2) Does the difference in teachers' use of the levels of HOT question affect the reading achievement of economically disadvantaged students?

(R3) Does student context when teachers ask higher-order thinking questions affect reading achievement of third-grade and fifth-grade economically disadvantaged students?

Although many teaching strategies are labeled as effective, the concern of this research was to discover the particular higher-order thinking question levels influencing economically disadvantaged students. Another variable considered was to determine whether the student grouping (i.e. whole group, small group, or one-on-one) when the teacher asked the higher-order thinking questions affects student achievement. Therefore, this study was conducted to provide understanding into the higher-order thinking skills that best support economically disadvantaged students' reading achievement.

CHAPTER TWO

Review of Literature

History of Educational Reform Aimed at Closing the Achievement Gap

A "War on Poverty" was started in 1965 by President Lyndon Johnson with the Elementary and Secondary Education Act (ESEA) of 1965. Special funding (Title I) was earmarked for economically disadvantaged children in an effort to close this achievement gap. Over the forty-seven years since the ESEA Act, a multitude of initiatives have been funded aiming to create an equitable education for all students.

Improving America's School Act of 1994 (IASA) (1994) implemented a time frame for states to create content and performance standards and reading and math assessments for all students. In addition, the IASA drew attention to school wide reform and accelerated achievement growth as measured through adequate yearly progress

(AYP). IASA also allocated funds for schools based on the poverty level of the students (Letendre, 1996).

Along with funding came accountability. The Reading Excellence Act of 1998 (1998), No Child Left Behind Act of 2001 (2002), and the Reading First and Early Reading First programs mandated by NCLB (2002) have increased public attention of student academic success leading to increased accountability of teachers and education. One of the key provisions of the NCLB Act (2002) is states must annually assess students in reading and math in grades 3 – 8. In addition, states must set annual targets for all students (including subgroups of students based on racial/ethnic groups, income levels, students with disabilities, and limited English proficient) with the goal of all students reaching proficiency in reading and math by 2013-2014 (Stullich, Eisner & McCrary, 2007).

However, even with all the Federal and State laws increasing funding to schools, increasing accountably of teachers, and using scientifically-based reading research (SBRR) to teach students to read, current evidence suggests that the reading achievement of students from low-income families has not been positively affected (Allington, 2009). Allington suggests in spite of large amounts of money and effort, schools have failed to provide struggling readers with what he believes they need most, more and better reading instruction.

Effective Reading Teachers

In an effort to define research-based qualities of an excellent reading teacher, the International Reading Association (IRA) (2000) issued a statement identifying the following teacher qualities: (1) Teachers understand the development of reading and writing and possess a belief that all children can learn to be readers and writers. (2) Teachers continually assess student reading progress to guide reading instruction. (3) Teachers have a repertoire of effective teaching strategies and scaffold instruction based on student demonstrated abilities. (4) Teachers provide a wide variety of reading materials and texts for student use. (5) Teachers create flexible reading groups based on student's individual strengths or needs. (6) Teachers teach reading strategies to students to promote independence (International Reading Association, 2000). Additionally, excellent reading teachers have strong content and pedagogical knowledge, manage classrooms to ensure a high rate of student engagement, encourage independent learning through using motivational strategies, hold high expectations for student achievement, and provide assistance to struggling students (International Reading Association, 2000).

Blair, Rupley, and Nichols (2007) examined the position statement on Excellent Reading Teachers (International Reading Association, 2000) and a wide range of position papers to identify common instructional features associated with effective reading teachers. They concluded the "what" and "how" of effective reading instruction includes (1) administering a variety of assessment tools such as formal and informal tests, interviews, observations, samples of student work, portfolios, and student reflection, (2) explicit instruction in reading skills and strategies including modeling and guided

practice, (3) providing opportunities for authentic reading tasks to learn and apply skills and strategies based on desired learning outcomes, (4) actively engaging students by reading appropriate materials, (5) holding high, realistic expectations for students and communicating them to students in addition to high teacher self-efficacy.

Flynn (2007) researched what effective teachers do within the classroom to affect student literacy in a student population in which more than 50% of the students were eligible for free-school meals. Flynn (2007) studied three teachers in inner-city England primary schools who were identified as effective based on the head teacher's observations and student achievement scores. Flynn (2007) suggests effective reading teachers possess a range of teaching practices influenced by the behaviors of the teacher, teacher subject knowledge, and teacher-pupil interaction. Teachers' modeling, explanations, and high-quality questioning led to students' accumulation of reading skills and comprehension of reading materials.

Topping and Ferguson (2005) studied highly effective literacy teachers to discover whether the teaching behaviors were consistent between teachers and different literacy teaching contexts, and whether teacher perceptions of their teaching behaviors corresponded with researchers' observation of teacher behaviors. Researchers' observations during shared reading and general literacy sessions suggested effective teachers most frequently used interacting with students, followed by questioning, transmitting information, non-teaching behaviors, and assessing. They found the teachers' reported using less complex behaviors than the more complex behaviors that the

researcher observed. This suggests that the teachers in this research study were unaware of some of the behaviors they employed during reading instruction.

Effective Teachers and Higher-Order Thinking (HOT)

Benjamin Bloom (1956) developed a hierarchical classification of educational objectives that is key to understanding the learning process. According to Bloom, learning occurs in three domains: affective, psycho-motor and cognitive. Within the cognitive domain, Bloom categorizes and orders thinking skills and objectives representing a continuum of Low-Order Thinking Skills (LOTS) to High-Order Thinking Skills (HOTS). Identified as low-order are the thinking skills required to know, understand, and apply. Analyzing, evaluating and creating are classified as higher-order thinking skills.

Bloom's taxonomy was revised in 2001(Anderson & Krathwohl) to exchange the noun descriptors of Bloom's Taxonomy with verbs. In addition, a reordering of the high-order thinking skills placement of evaluation and creation moved creation to the highest position followed by evaluation. Anderson & Krathwohl (2001) also created descriptive sub-categories to outline the activities students engage in at each level of the hierarchy. For example, remembering is defined as retrieving, recognizing and recalling relevant knowledge from long-term memory (Forehand, 2010).

Effective literacy teachers model and teach both lower-order (decoding) and higher-order (comprehension) skills (Pressley, Rankin and Yokoi, 1996; Knapp et al., 1995). The effective teachers report monitoring student progress through the use of

questioning and students summarizing the main ideas of material read in order to promote meaning. Knapp et al. (1995) determined reading teachers who stressed meaning creation and higher-level thinking skills (in addition to lower-level skills) were more effective in increasing student achievement than others.

In another study focusing on effective teaching practices, Wray, Medwell, Fox and Poulson (2000) compared the teaching practices of identified "effective literacy teachers" to teachers that were not identified as "effective literacy teachers". The teachers not identified as "effective literacy teachers" failed to demonstrate to the same degree the specific teaching practices employed by the effective teachers. The teaching practices most often identified among the effective teachers included (a) using shared text to teach a range of literacy skills and knowledge at the word, sentence and text level, (b) providing a distinct beginning and end to each literacy teaching session, (c) employing a brisk pace with limited time frames for sub-tasks, (d) refocusing student attention regularly (e) teaching the purpose and processes of literacy explicitly, (f) modeling and demonstrating reading skills and strategies, (g) using a wide range of open-ended questions about reading decisions and strategies.

Bitter, O'Day, Gubbins, and Socias (2009), in a three year study of San Diego City Schools' (SDCS) instructional practices in a balanced literacy approach, found the teachers' use of high-level questions and discussion of text were associated with students' growth in reading achievement. However, when they replicated the 2004-2005 study in 2005-2006, they did not observe the same significant positive effects of high-level comprehension instruction. Upon reanalysis of the data to explore possible reasons for

discrepancies, they discovered an increase in the number of English Learners (EL). Thus they suggest that differential effectiveness of literacy practices for different groups of students is an area for further research.

Taylor, Pearson, Peterson, & Rodriguez (2003) suggest that schools have a plethora of information available to them to improve student reading. However, they suggest that often the dilemma is knowing where to focus their efforts due to so many options. Taylor et al. (2003) recommend teachers focus on elements of reading instruction that maximize students' cognitive engagement. Their study suggests higher-level thinking and application of reading strategies have the greatest impact on student reading achievement. The "how" (the teaching process) is of vital importance in student reading success.

McNeil (2010) researched the teacher's use of HOT questions and English Language Learners (ELL). Through teacher observation, teacher interviews, and student questionnaires, he suggests the frequency and type of HOT questions teachers use impact ELL students in addition to the perceptions, attitudes, and beliefs of the students. McNeil (2010) also suggests the context in which teachers ask HOT questions and the teacher's reason for asking the HOT questions are areas for further research.

Economically Disadvantaged Children

Although increased attention has focused on literacy achievement across socioeconomic lines, the gap remains. The National Assessment of Educational Progress (NAEP, 2005) estimates that approximately 37% of fourth grade students failed to

achieve at the basic reading level. The number of students scoring at this lowest level has remained relatively constant with only minimal gains over many years (NAEP, 2005) On each NAEP assessment given to fourth-grade students from high-poverty schools between 1998 and 2009, the reading scores for the high-poverty students were lower than student reading scores from low-poverty schools (Kerachsky, 2010).

National Assessment of Educational Progress (NAEP, 2011) reports the average 2009 reading score for a fourth grade student in Georgia was 221 (National average scores were 221). Sixty-six percent of students scored at or above Basic (partial mastery of fundamental skills), while thirty-two percent of students scored at or below proficiency levels (demonstrated competency over challenging subject matter).

Twenty-four percent of all public elementary schools in the South in 2007-2008 met the qualifications to be titled a high-poverty school (Aud, et al. 2010). High-poverty schools have 76-100 percent of students eligible for free/reduced-price meals. Nationally, approximately 6 million students attend a high-poverty school. Nationwide, students attending schools with a free/reduced-price lunch population of 0-25 percent had an average fourth-grade reading score of 238. Students attending schools with a free/reduced-price lunch population of 26-50 percent scored 226 on the reading assessment. Students attending schools with a free/reduced-price lunch population of 51-75 percent had an average reading score of 217. A free/reduced-price lunch student population of 76-100 percent had an average reading score of 203 (Aud et al., 2012). This is a 35 point gap between high-poverty students' fourth-grade reading scores when compared to low-poverty student reading scores.

In high-poverty schools, Hispanics and Blacks represent the greatest share of enrollment at both the elementary and secondary level (Kerachsky, 2010). In 2007-2008, almost 25 percent of students attending high-poverty elementary schools were identified as Limited-English Proficient (LEP) students (U.S. Department of Education, 2008). These figures have not changed significantly in the past fifteen years. In the Review of the Condition of Education, Young (1997) states:

> of the 4 million babies born each year, almost one out of three is born to a mother who lives in poverty…these conditions have been shown to be associated with children experiencing problems such as repeating a grade, requiring special education services…students from racial/ethnic minority backgrounds and low income families are more at risk for poor school outcomes and are becoming an increasing share of the student population (p. 3).

School enrollment in the United States is expected to continue to grow. From 2007 through 2019, public elementary and secondary education enrollment is projected to increase to 52 million students. The southern states are expected to experience the largest increase in the number of students enrolled from 2007-2009 to 2019-2020 to an enrollment of 40 percent of the total population of students in school (Kerachsky, 2010).

The National Center for Children in Poverty (2012) reports that nearly 15 million children in the United States – 21% of all children – live in families with incomes below the federal poverty level ($22,350 a year for a family of four). Although most parents of these children work, the low wages and economic instability keep these families within the federal poverty level. Focusing on children between the ages of six and eleven, 44%

of children live in low-income families while 21 percent live in poor families for a total of more than 24 million children (National Center for Children in Poverty, 2012).

Poverty has a wide range of effects for children. The National Center for Children in Poverty (2012) suggests poverty can contribute to poor health and mental health problems. Children who experience poverty when they are young and/or experience deep and persistent poverty are at the greatest risk for academic, social, emotional or behavioral problems (National Center for Children in Poverty, 2012). Research is clear that poverty is the single greatest threat to children's well-being (Payne, 2008).

Effects of Poverty on Children

The effects of poverty on children vary depending on a variety of differential factors such as timing, depth, and duration of childhood poverty (Duncan, Yeung, Brooks-Gunn, & Smith, 1998). Brooks-Gunn and Duncan (1997) report negative outcomes within the physical health, cognitive, school achievement, and emotion or behavior aspects of children of poverty. They report children living below the threshold of poverty are 1.3 times as likely as non-poor children to suffer learning disabilities and developmental delays.

Noble, Wolmetz, Ochs, Farah and McCandliss (2006) researched the relationship between cognitive skill and reading-related brain activity of students in low-socioeconomic versus high-socioeconomic environments. Through the use of functional magnetic resonance imaging (*fMRI)*, researchers suggest that a child's experiences and background, operationalized by socioeconomic status (SES), influence the brain activity

in the left fusiform gyrus. This area in the brain has been associated with the visual-orthographic process in reading (Brunswick, McDrory, Price, Frith, & Frith, 1999; Fiez, Baloto, Raichle, & Petersen, 1999; McCandliss, Cohen, & Dehaene, 2003; Price & Devlin, 2004) and is positively associated with reading skill deficits in children (Shaywitz et al., 2002). This study suggests the lack of literacy resources in low-SES environments affects students' development of this area of the brain which controls acquiring the phonological skills necessary to read.

In another study, Noble, Farah and McCandliss (2006) researched how socioeconomic background modifies cognition-achievement in reading. They examined whether the variance in reading ability, accounted for by phonemic awareness (PA) and socioeconomic status (SES), interact where previous studies have only examined these factors separately. They suggest children from lower socioeconomic backgrounds are consistently at a disadvantage when examining reading achievement.

Hart and Risley (1995) conducted a two and one-half year study focusing on the rates of vocabulary growth of children. They compared the vocabulary used within the homes of professional families, working-class families, and families receiving welfare. They found that the amount parents speak to their infants and toddlers is generally correlated with the parents' economic status. Hart and Risley (1995) suggest children from welfare recipients' homes hear fewer words per hour (616 words compared to 2153 words), hear less of a variety of vocabulary, and the use and quality of words heard is fewer. They suggest the lack of exposure to a strong vocabulary is correlated to standardized test measures of the child's intellectual achievement at age three ($r = .78$)

and then at age nine (r = .77). Biemiller (2007) suggests the lack of vocabulary is the main reason students have difficulty understanding text.

Why is HOT Important?

Will students be ready to face the challenges of the 21st century with the education they are receiving today? Society is changing at a rapid pace. Sir Ken Robinson, a creativity expert, states we are living in a day of "massive unpredictability" (Azzam, 2009) yet educators are charged with the task of preparing children for a world of unknowns. The ability to use information in critical thinking and problem solving in order to increase students' adaptability to the changing world is vital to students' future (Beachboard & Beachboard, 2010). Higher-order thinking questions allow students the opportunity to acquire the cognitive passport of the future (Martinez, 1998).

CHAPTER THREE

Method

Introduction

The purpose of this quasi-experimental study was to determine if teachers' use of higher-order thinking (HOT) question levels affects the reading achievement of economically disadvantaged students in third and fifth grade. Another variable to be researched is to review students' context (defined as whole group, small group or one-on-one) when teachers ask the higher-order thinking (HOT) questions to determine if context influences economically disadvantaged students' reading achievement scores. A comparison of teacher-reported use of HOT questions to researcher's observation of HOT questions will also be examined.

Rationale for Research Design

According to Creswell (2008), "If the problem calls for (a) the identification of factors that influence an outcome, (b) the utility of an intervention, or (c) understanding the best of outcomes, then a quantitative approach is best" (p.18). Creswell (2008) suggests quantitative design is compatible when the researcher is examining the relationship between variables and posing questions using surveys or questionnaires to collect information to produce statistical data. The descriptive data collected allowed the researcher to identify current teachers' beliefs of their use of higher-order thinking

questions, quantify the HOT question levels that teachers ask, and identify the HOT question level having the most positive influence on economically disadvantaged students' reading achievement.

In addition, the researcher's observation of the context of students when teachers ask HOT questions was examined to explore the impact of context on economically disadvantaged students' reading achievement. Student context was defined as whole group, small group, or one-on-one instruction. Whole group was defined as the teacher asking the question to the entire class and then calling upon one or more students to provide the answer to the question. Small group was defined as the teacher working with a group of six or fewer students and asking the question to the students within the group. One-on-one context is defined as the teacher working with only one student and the teacher asks only that student the question.

A comparison of teacher-reported use of HOT questions and researcher-observed teacher use of HOT questions was initiated to explore if teachers have a reasonable estimate of how frequently they use HOT questions. This data will be valuable to understand if there is a significant difference between what teachers perceive they are doing in the classroom and what actually occurs. This information may lead to teachers to make a more conscious effort to use the HOT questions within their classrooms to affect student achievement.

Research Site

The population included in this study was third- and fifth-grade regular education elementary teachers from a rural elementary school in the southeast. For the school year 2011-2012, the school's total student enrollment was 668 students (pre-kindergarten through fifth grade) consisting of 95 African-American students, 469 Caucasian students, 52 Hispanic students, 2 American Indian students, 16 Asian students and 34 mixed students. Twenty-two percent of students were eligible for free/reduced-price meals (101 students eligible for free meals; 54 students eligible for reduced-price meals). One hundred and six third graders' 2010-2011 CRCT reading scores indicated 97.2 % met or exceeded the standards with a mean score of 863.8 (Georgia Department of Education, 2011b). One hundred forty-five fifth graders' 2010-2011 CRCT reading scores indicated 96.6% of students met or exceeded the standard with a mean score of 847.35 (Georgia Department of Education, 2011b). The 2010-2011 School Report Card (Georgia Department of Education, 2011a) reported 100% of the economically disadvantaged students in third and fifth grade met or exceeded the standards on the reading portion of the CRCT.

Although all third- and fifth-grade students were included in the researcher's classroom observations, the student participants reported within this study were the third- and fifth-grade students meeting the federal requirements to qualify for free/reduced-price meals. The total number of students in third grade is 94. Twenty students in third grade were selected as participants as they met the researchers' identified population criteria as eligible for free/ reduced-price meals. In fifth grade, twenty-six students of the

113 students met the requirements of free/reduced-priced meals eligibility. The teacher participants in the study were 4 third-grade and 4 fifth-grade teachers at the elementary school.

The convenience sample of third-grade and fifth-grade teachers was chosen because third- and fifth-grade students are required by Georgia state law to pass the reading portion of the CRCT in order to be promoted to the next grade level (Georgia Academic Placement and Promotion Policy, 2012). Permission to conduct the research and collect the necessary data for this study was requested from the elementary school principal (Appendix D) and the Office of Professional Development (Appendix E). The researcher requested access to the third- and fifth-grade CRCT reading scores as provided by the Georgia Department of Education to the school. The database provided included grade, teacher name, student name, student date of birth, the scale score/performance level of the reading CRCT, the students' Lexile score (Stenner & Smith, 1982) and the number of correct student responses by content domain. Names of students meeting the eligibility requirements of economically disadvantaged were requested from the elementary school in order to identify the specific reading scores of each of the eligible students.

Participants

3rd grade teacher participants. In this elementary school, the gender of 3 third-grade teachers was female with only one of the 4 third-grade teachers being a male. All the third-grade teachers were Caucasian. The mean age of teachers was M = 44.63 (SD =

15.4). Years of teaching experience of the third-grade teachers was *M* = 16.5 years (*SD* =10.2) (Table 1). The mean years of the third-grade teachers teaching third-grade students was *M* = 9.5 years (*SD* = 10.11). Two third-grade teachers had Master's degree while one teacher holds a Bachelor's of Education Degree and one teacher holds a Specialist of Education degree. All the third-grade teachers have clear-renewable teaching certificates.

Table 1

Descriptive Statistics of Third-grade Teacher Participant (n = 4)

Characteristics	Mean	SD
Age	44.63	15.40
Years of teaching experience	16.50	10.12
Years teaching 3rd grade	9.50	10.11

The self-reporting teacher questionnaire asked teachers to identify the in-service or professional learning they had attended within the previous two years (Table 2) as the professional learning of teachers is mandated under the NCLB Act of 2001 (2002). All third-grade teachers reported having attended in-service or professional learning surrounding the topic of best-teaching practices in the area of higher-order thinking for five or more hours. The only topic of professional learning three teachers had not participated in at all was focused on strategies for teaching reading to students from diverse backgrounds. Teachers also reported their consideration of the Bloom's Taxonomy question level (Anderson & Krathwahl, 2001) before asking students

questions. One teacher reported she considered Bloom's Taxonomy a small extent, one teacher reported consideration of Bloom's Taxonomy a moderate extent, while two teachers reported they largely considered Bloom's Taxonomy before asking students a question.

In response to question number two of the teacher questionnaire (Appendix A), "Have you changed your methods of teaching reading in the past two years?", half of the teachers indicated they had made no changes to their methods of teaching reading. However, two teachers reported changing their reading teaching methods citing using partnerships more frequently and incorporating more conferencing with students during reading workshop.

Table 2

Third-Grade Teachers Hours Spent in In-Service or Professional Learning (n = 4)

Variable	Number of hours	Percentage of teachers
How students learn to read	Not at all (0)	
	1-2	
	3-4	100%
	5+	
Content standards in reading	Not at all (0)	
	1-2	
	3-4	
	5+	100%
Instructional methods for teaching reading	Not at all (0)	
	1-2	
	3-4	100%
	5+	
Strategies for teaching reading to students from diverse backgrounds	Not at all (0)	75%
	1-2	
	3-4	25%
	5+	
Best teaching practices in the area of HOT	Not at all (0)	
	1-2	
	3-4	

Table 2

	5+	100%

5th grade teacher participants. In this elementary school, the gender of all the fifth-grade teachers was female. Three of the fifth-grade teachers were Caucasian and one of the fifth-grade teachers was African-American. The mean age of teachers was *M* = 43.54 (*SD* = 4.9) (Table 3). Years of teaching experience of the fifth-grade teachers was *M* = 14.25 years (*SD* = 4.35). The mean years of teaching fifth-grade students was *M* = 7.5 years (*SD* = 4.65). Two fifth-grade teachers had Master's degree while one teacher holds a Bachelor's of Education Degree and one teacher holds a Specialist of Education degree. All the fifth-grade teachers have clear-renewable teaching certificates.

Table 3

Descriptive Statistics of Fifth-Grade Teachers (n = 4)

Characteristics	Mean	SD
Age	43.54	4.90
Years of teaching experience	14.25	4.35
Years teaching 5th grade	7.50	4.65

Teachers reported the in-service or professional learning attended within the previous two years (Table 4). Fifty percent of the teachers reported little (1-2 hours) in-service or professional development on the topic of best-teaching practices in the area of higher-order thinking. One teacher reported attending three – four hours while one teacher reported five plus hours of in-service or professional learning. Only one teacher

reported having no in-service or professional learning surrounding how students learn to read.

Teachers reflecting on their consideration of Bloom's Taxonomy question level (Anderson & Krathwahl, 2001) before asking students questions (teacher questionnaire number 5, Appendix A) indicated half of the teachers consider the Bloom's taxonomy level (Anderson & Krathwahl, 2001) to a small extent while half of the teachers consider the Bloom's taxonomy level moderately before questioning students. All fifth-grade teachers reported changing the methods of teaching reading in the past two years (teacher questionnaire number two, Appendix A). These changes include the addition of rigor and strategies, more read-aloud of texts, more higher-order thinking questions, asking student to visualize pictures for stories with the purpose of focusing on details within the text, conferencing with students more frequently, and more teacher reflection on teaching practices.

Table 4

Fifth-Grade Teachers Hours Spent in In-Service or Professional Learning (n = 4)

Variables	Number of hours	Percentage of teachers
How students learn to read	Not at all (0)	25%
	1-2	25%
	3-4	50%
	5 +	
Content standards in reading	Not at all (0)	
	1-2	50%
	3-4	25%
	5 +	25%
Instructional methods for teaching reading	Not at all (0)	
	1-2	50%
	3-4	25%
	5 +	25%

Table 4

Strategies for teaching reading to students from diverse backgrounds	Not at all (0)	
	1-2	25%
	3-4	50%
	5 +	25%
Best teaching practices in the area of HOT	Not at all (0)	
	1-2	50%
	3-4	25%
	5 +	25%

3rd grade student participants. Students in grade three ranged in age from eight-years old to nine-years old at the time of CRCT administration. The mean age of the economically disadvantaged students was 9 years, 2 months (*SD* = .62). Twenty students met the qualifications for economically disadvantaged in third grade (twelve males and eight females). The mean CRCT reading score for the economically disadvantaged third-grade students was 849.40 (*SD* = 27.29). Two economically disadvantaged students were receiving Early Intervention Program (EIP) (Georgia Department of Education, 2012b) assistance for reading and two economically disadvantaged students were participating in Early Intervention Program (EIP) support for math. EIP is a state funded program which provides supplementary instructional resources such as an additional teacher within the classroom during reading workshop instruction. The EIP Program targets students performing below grade level as measured by a state-created rubric or failing the CRCT assessment (Georgia Department of Education, 2012c). Additionally, three third-grade economically disadvantaged students were receiving instructional support at the Tier 3 level of the Response to Intervention: Pyramid of Intervention (Georgia Department of Education, 2012d). Tier 3 instructional

support allows for students to receive intensive, research-based interventions tailored to the specific skill deficit of the student (Georgia Department of Education, 2012d). None of the third-grade economically disadvantaged students had been retained in previous years or were in the gifted and talented program.

Table 5 reports the mean 2011-2012 CRCT reading score of economically disadvantaged students to the non-economically disadvantaged. Although less than the 35 point standardized reading score gap between economically and non-economically disadvantaged students reported by National Assessment of Educational Progress (2005), the third-grade economically- disadvantaged students scored almost 18 points lower on the reading CRCT than the non-economically disadvantaged students. Reviewing the domain score of Literary Comprehension and Reading Skills and Vocabulary, again the economically disadvantaged students scored lower than their non-economically disadvantaged peers.

Table 5

Descriptive Statistic of 2011-2012 Reading CRCT Scores and the Domain Scores of Third-Grade Students ([a]n = 20) ([b]N = 75)

Student population	CRCT Reading	Literary Comprehension	Reading Skills and Vocabulary Acquisition
Economically disadvantaged students[a]	*M* = 849.40 *SD* = 27.29	*M* = 18.8 *SD* = 3.5	*M* = 6.75 *SD* = .85

Student population	CRCT Reading	Literary Comprehension	Reading Skills and Vocabulary Acquisition
Non-economically disadvantaged students[b]	*M* = 867.37 *SD* = 26.95	*M* = 20.75 *SD* = 3.15	*M* = 7.32 *SD* = .82

Note. The CRCT reading score is a scaled score comprised of the three domains of Literary Comprehension, Reading Skills and Vocabulary, and Reading for Information (Georgia Department of Education, 2012). The Literary Comprehension domain consists of 24 multiple-choice questions. The Reading Skills and Vocabulary Acquisition domain consists of 8 multiple-choice questions.

Table 6 compares the percentage of economically disadvantaged students and non-economically disadvantaged students scoring at each of the performance levels. Seventy-nine percent of the non-economically disadvantaged students scored in the exceed range compared to 45 % of the economically disadvantaged students scoring in the exceed range. Although both the groups of students had a 100% passing rate, the non-economically disadvantaged student passed with higher scores.

Table 6

Third-Grade Student Performance Levels on Reading CRCT 2011-2012 ([a]n = 20) ([b]N = 75)

Student population	Exceeds	Meets	Does not meet
Economically disadvantaged students[a]	45%	55%	0%
Non-economically disadvantaged students[b]	79%	21%	0%

Note. Student scores at or above 850 indicate a performance level that exceeds the standard for the test. Student scores from 800 – 849 indicate performance that meets the standard for the test. Scores below 800 indicate performance that does not meet the state's minimal level of proficiency. Georgia Department of Education. (2012e). *2012 Score Interpretation Guide: Grades 3-8.* Retrieved from http://www.doe.k12.ga.us/

5th grade student participants. In fifth grade, students ranged in age from eleven- to twelve-years old when tested. The mean age of the twenty-six students was 11 years, 10 months (*SD* = .65). Fourteen male students and twelve female students met the qualification of economically disadvantaged students. The mean CRCT reading score for the economically disadvantaged fifth-grade students was 835.69 (*SD* = 16.36). Two of the fifth-grade economically disadvantaged students were receiving EIP math services however, none of the students were receiving EIP reading services (Georgia Department of Education, 2012c). One economically disadvantaged student received special testing accommodations of small group, extended time, and frequent breaks based on the student meeting the qualifications of the Rehabilitation Act of 1973 (1973) and the Americans with Disabilities Act (1991) (Advocacy Incorporated, 2012). None of the fifth-grade economically disadvantaged students had been retained in previous years or were in the gifted and talented program.

Table 7 compares the mean reading assessment scores of economically disadvantaged students to the non-economically disadvantaged students. While less than the national 35 point difference (Aud et al., 2012), the fifth-grade economically disadvantaged students scored almost 16 points lower than the non-economically disadvantaged students. Reviewing the domain score of Literary Comprehension and Reading Skills and Vocabulary, again the economically disadvantaged students scored lower than their non-economically disadvantaged classmates.

Table 7

Descriptive Statistics of 2011-2012 Reading CRCT Scores and the Domain Scores of Fifth-Grade Students ([a]*n = 25*) ([b]*N = 88*)

Student Population	CRCT Reading	Literary Comprehension domain	Reading Skills and Vocabulary Acquisition domain
Economically disadvantaged students[a]	*M* = 835.69 *SD* = 16.36	*M* = 10.96 *SD* = 2.17	*M* = 7.00 *SD* = 1.35
Non-economically disadvantaged students[b]	*M* = 851.65 *SD* = 26.83	*M* = 12.59 *SD* = 2.57	*M* = 7.16 *SD* = .97

Note. The CRCT reading score is a scaled score comprised of the three domains of Literary Comprehension, Reading Skills and Vocabulary, and Information and Media Literacy (Georgia Department of Education, 2012a). The Literary Comprehension domain consists of 16 multiple-choice questions. The Reading Skills and Vocabulary Acquisition domain consists of 8 multiple-choice questions.

Table 8 compares the percentage of economically disadvantaged students and non-economically disadvantaged students scoring at each of the performance levels. Fifty percent of the non-economically disadvantaged students scored in the exceeds range while 24% of the economically disadvantaged students scored in the exceeds range.

Although both the groups of students had almost a 100 percent passing rate, the non-economically disadvantaged students passed with higher scores.

Table 8

Fifth-Grade Student Performance Levels on Reading CRCT 2011-2012 ([a]n = 25) ([b]N = 88)

Student Population	Exceeds	Meets	Does not meet
Economically disadvantaged students[a]	24%	76%	0%
Non-economically disadvantaged students[b]	50%	49%	1%

Note. Student scores at or above 850 indicate a performance level that exceeds the standard for the test. Student scores from 800 – 849 indicate performance that meets the standard for the test. Scores below 800 indicate performance that does not meet the state's minimal level of proficiency. Georgia Department of Education. (2012). *2012 Score Interpretation Guide: Grades 3-8.* Retrieved from http://www.doe.k12.ga.us/

The fifth-grade students' results from the 2010-2011 and the 2011-2012 reading CRCT score, Table 9, report both the economically disadvantaged students and the non-economically disadvantaged students have the same percentage of students meeting or exceeding the minimum score of 800. In 2010-2011 and 2011-2012, both groups of economically disadvantaged students had a 100 % met and/or exceed score. Review of the non-economically disadvantaged students' 2011 and 2012 reading CRCT scores shows a minimal difference of only one percent in the does not meet category during the 2012 reading CRCT administration. The percentage of economically disadvantaged students that exceed the standards in 2010-2011 was 44 percentage points compared with the economically disadvantaged students in 2011-2012 that exceeded the standard by 24

percentage points (20 percentage points lower than the previous year) even though both of the tests contained HOT questions and were created to measure the Georgia Performance Standards.

Table 9

Fifth-Grade Student Performance Levels on Reading CRCT 2010-2011 and 2011-2012 ([a]n = 25) ([b]N = 120)

	Exceeds		Meets		Does not meet	
Student Population	2010-2011	2011-2012	2010-2011	2011-2012	2010-2011	2011-2012
Economically disadvantaged students[a]	44%	24%	56%	76%	0%	0%
Non-economically disadvantaged students[b]	44%	50%	56%	49%	0%	1%

Note. Student scores at or above 850 indicate a performance level that exceeds the standard for the test. Student scores from 800 – 849 indicate performance that meets the standard for the test. Scores below 800 indicate performance that does not meet the state's minimal level of proficiency. Governor's Office of Student Achievement. (2011). *2010-2011 Report Card*. Retrieved from http://reportcard2011.gaosa.org/

Instruments

Teacher Questionnaire.

The teacher questionnaire used was adapted from the International Association for the Evaluation of Educational Achievement *Progress in International Literacy Study in Primary School in 40 Countries* (PIRLS) (Mullis, Martin, Gonzalez, Kennedy, & Foy, 2007) (Appendix A). The Cronbach's alpha reliability coefficient for overall reading was 0.88. The PIRLS (Mullis et al., 2007) teacher questionnaire was designed to gather data with the purpose of developing students'

reading skills and strategies. The researcher selected questions from the PIRLS (Mullis et al., 2007) teacher questionnaire to construct the questionnaire employed. The following question numbers were identified as meeting the purpose of the study and included within the questionnaire: 11, 15, 16, 17, 29, 30, 31, 32, 33, 34, and 36. The researcher's adapted version was field tested at a local elementary school before actual implementation at the chosen elementary school. Reliability of the researcher's field-tested questionnaire was established using test-retest reliability.

Observation Tool. The researcher's observation tool listed each of the higher-order thinking skills from revised Bloom's Taxonomy (Anderson & Krathwohl, 2001). A category for "context" to record student grouping structure (whole group, small group or one-on-one) was included to inform the researcher of students' context when HOT questions were asked (Appendix B). The observation tool also allowed the researcher to identify the emphasis of the reading workshop lesson observed (i.e. mini-lesson, conferences or strategy groups, or teaching share). In addition, the students' first name answering the teacher's question and if the student's answer was correct or incorrect was recorded.

Reading CRCT Scores. Student reading achievement was measured using the results of the 2011-2012 reading CRCT administered in April 2012. The fifty-question multiple-choice test was administered in one day, which included a time limit of 90 minutes for Part I and an additional 90 minutes for Part II. This standardized test was administered by the students' general-education teacher, unless an Individualized

Education Plan (IEP) states specific accommodations for the student such as small-group setting.

The dependent variables for the research were the students' reading CRCT scores and the domain scores of Literary Comprehension and Reading Skills/Vocabulary included within the CRCT reading assessment. Students scoring below 800 on the reading CRCT are categorized as "does not meet" the standard. Student scores of 800 – 849 are in the "meets" the standard category. In order to "exceed" the standard on the reading portion, student scores above 850 are required (Georgia Department of Education, 2012a). .

The Georgia reading CRCT exam consists of three domains. In third grade, the domains are Literary Comprehension, Reading for Information, and Reading Skills and Vocabulary Acquisition. In fifth grade, the domains contained with the reading CRCT are Literary Comprehension, Information and Media Literacy, and Reading Skills and Vocabulary Acquisition (Georgia Department of Education, 2012a). For this research, the domains of Literary Comprehension and Reading Skills and Vocabulary Acquisition were used for the analysis as these two domains were common within the third- and fifth-grade reading CRCT.

According to the Georgia Department of Education (2007a) the Literary Comprehension domain in third grade includes the skills necessary to "comprehend and explore literary works by identifying and analyzing elements of various texts including short story, fairy tale, fable, folktale and poetry" (p. 9). The Reading Skills and Vocabulary Acquisition domain in third grade encompasses the skills necessary to "read,

interpret and apply difficult text and new vocabulary in a variety of texts" (Georgia Department of Education, 2007a, p. 8).

The Literary Comprehension domain in fifth grade includes the skills necessary to "comprehend and explore literary works by identifying and analyzing elements of various texts including short story, dramas, folktales, poetry and descriptive narratives" (Georgia Department of Education, 2007a, p. 15). The Reading Skills and Vocabulary Acquisition domain in fifth grade "refers to the skills required to read, interpret, and apply difficult text and new vocabulary in a variety of texts" (Georgia Department of Education, 2007a, p. 14).

In a release to the Atlanta Journal Constitution, the Georgia Department of Education described how the CRCT's validity is maintained. The DOE spokesman, Matt Cardoza, states establishing validity for the Georgia CRCT starts with the purpose of the assessment and follows through item writing and review. All CRCT items were written by qualified-professional content specialists specifically for the Georgia CRCT. The test items were evaluated by curriculum specialists for overall quality and clarity, content coverage and appropriateness, alignment to the state curriculum, and grade appropriate standards. The multiple-choice test had one clear, correct answer with appropriate, relevant, and reasonable distracters. In addition, the Georgia Testing Division members met quarterly with an independent panel of experts, Georgia's Technical Advisory Committee (TAC), who reviewed all aspects of the test development and implementation process (as cited in Downing, 2012).

Data Collection Method

Participants included in this study were third- and fifth-grade general education teachers in a rural-southeastern elementary school. The researcher explained the purpose of the research and requested teachers' participation in the research project at a before-school meeting. The researcher answered any teacher questions about participation in the study and then left the meeting. The request to participate (Appendix C) and the teacher questionnaire (Appendix A) were delivered to participants at this time by a teacher volunteer with instructions to return the request to participate and the completed questionnaire to the teacher volunteer in the provided sealable envelope within two days. The approximate time to complete the request to participate and the teacher questionnaire was ten minutes. Permission to ask the teachers to participate in the research project was granted by the school principal (Appendix D) and the school district (Appendix E).

Classroom observations occurred during teacher identified reading workshop time as required by the district-adopted language arts curriculum for each grade level. The literacy curriculum for the district includes a balanced-literacy approach emphasizing the Georgia Performance Standards for Reading. The components of reading featured during Reading Workshop include reading aloud to children, shared reading with the whole class, guided reading with a small group of students, and students reading independently. Each classroom teacher was observed two times during two consecutive calendar weeks. A total of sixteen classroom observations were conducted with the observation times ranging from 30 – 35 minutes each. The teachers' questions and student context were recorded by the researcher. Later the researcher assigned the questions to the appropriate

level of Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). Each of the HOT question levels were then used as a grouping variable to identify if the HOT question level affected economically disadvantaged students' reading achievement.

Analysis Methods

The Statistical Package for the Social Sciences (SPSS, Version 20) software was used to analyze the teacher questionnaire, the observation data, and the CRCT reading scores.

An intraclass correlation coefficient was computed to assess the relationship between the teacher-reported use of HOT questions and the researcher-observed teacher use of HOT. Intraclass correlation coefficient is recommended when the reliability or consistency of repeated measures is examined. In this research, the consistency of teacher reported data and researcher observed data was measured using the two-way random model, absolute agreement, average measure intraclass correlational model (Shrout & Fleiss, 1979).

Hierarchical regression analysis was conducted to examine the incremental contribution of the various levels of HOT questions on the CRCT reading scores of economically disadvantaged students in third and fifth grade. Petrocelli (2003) states the

"focus of hierarchical regression is the change in predictability associated with predictor variables entered later in the analysis over and above that contributed by predictor variables entered earlier in the analysis" (p 11). Hierarchical regression allows the researcher to "test theoretical assumptions and examine the influence of several predictor variables in a sequential way, such that relative importance of a predictor may be judged on the basis of how much it adds to the predictors of a criterion" (p 10). Based upon the revised Bloom's Taxonomy theory (Anderson & Krathwohl, 2001), the HOT question levels were entered in the following order: remembering, understanding, applying, analyzing, evaluating, and creating.

To answer the third research question, does student context when teachers ask HOT questions affect reading CRCT scores of economically disadvantaged students, the Pearson product-moment correlational analysis was implemented (Field, 2005). Correlational analysis best met the researcher's interest to discover if there was a relationship and the strength of the relationship between student context and reading achievement of economically disadvantaged students.

Measures for Ethical Protection

Many measures were taken by the researcher to ensure the rights of the participants were protected. First, no data was collected until the study was approved by the Institutional Review Board (IRB) at Columbus State University (Appendix F). The researcher received approval from the school system (Appendix E) before research began. Teacher participants were voluntary and a written consent was collected before

the research began (Appendix C). Teacher participants, the school principal, and the school system received a copy of the questionnaire and the observation tool the researcher used to collect teacher data. The researcher informed participants of the purpose of the research and explained that there were no foreseeable risks involved. To ensure a safe and productive setting where participants felt they could be truthful, data collected from teachers was confidential. In addition, teacher names and student names were coded after the teacher questionnaire and the classroom observations were completed to safeguard identity. The data collected will be destroyed after successful completion of the dissertation defense.

CHAPTER 4

Data Analysis

Results

This study examined the higher-order thinking question levels employed by third-grade and fifth-grade teachers during reading instruction and the student context when the HOT questions were asked. The targeted group of students for this study was the students meeting eligibility requirements for free/reduced-price meals. The purpose of this study was to determine the impact of the teachers' HOT questions to define if the HOT question levels and student context affected the reading achievement of economically disadvantaged students as measured by the 2012 reading CRCT scores and the Literary Comprehension and Reading Skills/Vocabulary Acquisition domains. The study used a teacher questionnaire and researcher observation to collect the HOT levels

teachers use within their classrooms and the student context when HOT questions are asked. In addition, the researcher compared the teacher-reported questionnaire data surrounding use of HOT questions to the researcher's observed teacher use of HOT questions. Another purpose of this analysis was to identify if teachers' acknowledged use of HOT questions during reading workshop instruction was correlated to the actual teaching practices occurring within the classroom.

Research question 1. The results of the study's first question, "To what extent are teachers cognizant of using HOT questions during reading instruction?", data were analyzed using the teachers' questionnaire data and the researcher's observation data. Table 10 displays the teacher-questionnaire data indicating the number of HOT questions third-grade and fifth-grade teachers reported asking during a reading workshop lesson. Questionnaire response choices included never or hardly ever (0-1), sometimes (2-3), often (4-5), and always or almost always (6 or more). Third-grade teachers reported they used evaluating and creating questions, the highest HOT question levels, most frequently (M = 3.83, SD = .37). Fifth-grade teachers reported using remembering and understanding questions, the lowest HOT question level, the most frequently (M = 3.0, SD = .00).

Table 10

Descriptive Statistics of HOT Questions Teachers Reported Using During a Reading Workshop Lesson ([a]n = 4, [b]n = 4)

	Third-Grade Teachers[a]		Fifth-Grade Teachers[b]	
Hot question level	Mean	Standard Deviation	Mean	Standard Deviation
Remembering	2.70	.73	3.00	.00

	Third-Grade Teachers[a]		Fifth-Grade Teachers[b]	
Understanding	3.20	.70	3.00	.00
Applying	3.50	.51	2.81	.40
Analyzing	3.65	.49	2.69	.47
Evaluating	3.85	.37	2.50	.51
Creating	3.85	.37	1.88	.71

The researcher's observation of teacher-use of HOT questions is presented in Table 11. The third-grade teachers were observed using remembering (*M* = 16.5, *SD* = 3.79) and understanding questions the most frequently during reading workshop. In fifth grade, teachers used remembering (*M* = 16, *SD* = 4.79) and applying questions (*M* = 10, *SD* = 5.48) most frequently. In both third grade and fifth grade, creating questions were observed the least (*M* = 1.25, *SD* = .50; *M* = 3.75, *SD* = 4.34).

Table 11

Descriptive Statistics of HOT Questions Researcher Observed During a Reading Workshop Lesson ([a]*n* = 4, [b]*n* = 4)

	Third-Grade Teachers[a]		Fifth-Grade Teachers[b]	
Hot question level	Mean	Standard Deviation	Mean	Standard Deviation
Remembering	16.50	3.79	16	4.97
Understanding	17.75	4.57	9	3.16
Applying	5.25	5.19	10	5.48
Analyzing	7.75	4.19	8.75	4.57
Evaluating	4.75	6.18	9	7.75
Creating	1.25	.50	3.75	4.34

Intraclass correlation coefficient analysis revealed no statistically significant relationships between teacher-questionnaire data and researcher's observed data (Table

12) in third grade. However, there was a positive, fair correlation for the HOT question level of evaluating (*ICC* = .41) and a fair positive correlation for the HOT level of applying (*ICC* = .24). In fifth grade, there were no statistically significant relationships in any of the HOT question levels and poor correlation of teacher reported data to researcher observations (Table 13).

Table 12

Intraclass Correlation Coefficient of 3rd Grade Teacher-Reported Use of HOT Questions to Researcher-Observed (n = 20)

HOT Level	Intraclass Correlation	95% CI	F value (df)	Sig
Remembering	.01	(.03, .10)	1.25 (19, 19)	.31
Understanding	-.01	(-.05, .09)	.921 (19, 19)	.57
Applying	.24	(-.89, .69)	1.31 (19, 19)	.28
Analyzing	.08	(-.29, .47)	1.20 (19, 19)	.35
Evaluating	.41	(2.99, .46)	.72 (19, 19)	.76

HOT Level	Intraclass Correlation	95% CI	F value (df)	Sig
Creating[a]				

Note. [a]Data is not available as the variable is a constant.

Table 13

Intraclass Correlation Coefficient of 5th Grade Teacher-Reported Use of HOT Questions to Researcher-Observed (n = 26)

HOT Level	Intraclass Correlation	95% CI	F value (df)	Sig
Remembering	.00	(-.07, .12)	1.00 (25, 25)	.50
Understanding	.00	(-.09, .16)	1.00 (25, 25)	.50
Applying	-.09	(-.42, .28)	.78 (25, 25)	.72
Analyzing	-.11	(-.30, .24)	.59 (25, 25)	.91
Evaluating	-.16	(-.76, .35)	.78 (25, 25)	.73
Creating	-.05	(-.97, .49)	.95 (25, 25)	.55

Research question 2. Examining how the HOT question levels influenced reading CRCT scores of third and fifth-grade economically disadvantaged students (Table 14), the findings indicated that 2% of the variance in reading CRCT scores was attributed to the HOT question level of remembering ($R^2 = .02$, $F_{1,44} = .86$, $p = .39$). The predictive power added to the model by including the variable of understanding increased to 21%. This change was statistically significant ($R^2 = .21$, $F_{2,43} = 5.73$, $p = .04$). Adding the remaining variables of applying, analyzing, evaluating, and creating explained an additional 8% percentage points however, this was not statistically significant in

predicting the economically disadvantaged reading CRCT scores of third and fifth-grade students.

Table 14

Summary of Hierarchical Regression Analysis for HOT Questions Predicting Economically Disadvantaged Student Scores in Reading CRCT in 3rd and 5th Grade (n = 46)

Variable	β	*SE B*	*t*	*Sig*	R^2
Remembering	-.23	.93	-1.33	.19	.02
Understanding	.38	.73	2.18	.04*	.21
Applying	.07	.83	.35	.73	.24
Analyzing	.31	1.35	1.41	.17	.25
Evaluating	-.06	.70	-.29	.78	.26
Creating	-.21	1.36	-1.14	.26	.29

*$p < .05$.

Research question 3. Teacher questionnaires and researcher observations were used to answer the question "Does student context when teachers ask higher-order thinking questions effect reading achievement of third-grade and fifth-grade economically disadvantaged students?" Table 15 reports the number of HOT questions the researcher observed the third- and fifth-grade teachers asking students within varying context student groups (i.e. whole group, small group, and one-on-one). Third-grade teachers asked the most HOT questions while students were in whole group setting (M = 29, SD = 23.96). Similarly, the fifth-grade teachers also asked the most HOT questions while students were in whole group (M = 31.25, SD = 7.37).

Table 15

Descriptive Statistics of HOT questions Third- and Fifth-Grade Teachers Asked in Each Context ([a]n = 4, [b] n = 4)

Participants	Whole group Mean (SD)	Small group Mean (SD)	One-on-one Mean (SD)
3rd grade teachers[a]	29.00 (23.96)	7.50 (6.24)	16.75 (21.75)
5th grade teachers[b]	31.25 (7.37)	13.00 (13.04)	12.25 (16.13)

Note. Data was collected by the researcher during two thirty-minute observations during reading workshop instruction.

A Pearson product-moment correlation coefficient was used to assess the relationship between the context of students (i.e. whole group, small group, and one-on-one) and third-grade economically disadvantaged students' reading CRCT scores (Table 16). There was a strong positive correlation and statistically significant effect of whole-group instruction and reading CRCT scores (r = .50, p = .03). Small group instruction had a moderate positive relationship (r = .31, p = .19) although not statistically significant. One-on-one context had a strong negative correlation (r = -.46, p = .04) and a statistically significant effect on the reading CRCT scores.

Whole group context (r = .48, p = .03) had a strong positive relationship and a statistically significant effect on the domain of Literary Comprehension scores of economically disadvantaged students reading achievement. Small group context (r = .40, p = .09) had a strong positive relationship on the domain of Literary Comprehension although not statically significant. A strong negative correlation and a statistically significant effect was reported for one-on-one context and Literary Comprehension (r = -.44, p = .05).

Whole group context (r = .33, p = .15) had a moderate positive relationship on Reading Vocabulary and Acquisition scores; although not statistically significant. Small group had no relationship to the domain scores while one-on-one group context had a weak negative relationship (r = -.25, p = .29) to the economically disadvantaged students' scores.

Examining the scores of fifth-grade economically disadvantaged students, no statistically-significant results were reported on reading CRCT scores, Literary Comprehension, and Reading Skills and Vocabulary Acquisition in each of the contexts. A variation of negative relationships were reported in each of the context groups on each of the reading tests with scores ranging from r = -.02 to r = -.99. The strongest negative relationship was between small group context and reading CRCT scores (r = -.99)

Table 16

Pearson r Correlation of Student Context When Teachers Ask HOT Questions to Reading CRCT scores, Literary Comprehension Scores, and Reading Vocabulary and Acquisition ([a]*n* = 20, [b] *n* = 26)

	3rd grade[a]			5th grade[b]		
Test	Whole group	Small Group	One-on-One	Whole group	Small Group	One-on-One
Reading CRCT						
r	.50	.31	-.46	-.13	-.99	-.08
p	.03*	.19	.04*	.53	.66	.70
Literary Comprehension						
r	.48	.40	-.44	-.02	-.27	-.19
p	.03*	.09	.05*	.94	.18	.35
Reading Vocabulary and Acquisition						
r	.33	.15	-.25	-.03	-.11	-.10
p	.15	.53	.29	.88	.60	.63

* $p < .05$.

CHAPTER 5

Summary of Findings

Overview of the study

Duffy-Hester (1999) suggests the most important factor in students learning to read is the teacher. As teachers face the challenge to ensure all students can read, higher-order thinking skills are critical for making meaning from what is read. The introduction of the English Language Arts Common Core Standards document (National Governors Association Center for Best Practices, 2010) suggests that in order for students to be college and career ready, students must master the standards in the Common Core State Standards for reading. Many of the standards in this document require students to utilize HOT skills such as applying, analyzing, evaluating and creating (National Governors Association Center for Best Practices, 2010).

Although many researchers have investigated the effect of HOT questions on students (Anderson & Krathwohl, 2001; Bloom, 1956; Knapp et al., 1995; Pressley, Ranking, & Yokoi, 1996) this research was focused on the level of HOT questions and the student context affecting the economically disadvantaged students reading achievement as measured by the reading CRCT scores. Additionally, this research examined the correlation between teacher-reported use of HOT questions and researcher-

observed use of HOT questions. In this study, the researcher used two methods to collect data surrounding the teachers' use of HOT questions and student context. First, the third- and fifth-grade teachers completed a questionnaire indicating their use of HOT questions during whole group, small group, and one-on-one reading instruction. Next the researcher conducted two thirty-minute classroom observations to record the HOT question levels used by third- and fifth-grade teachers and the student context when teachers asked the HOT questions. The dependent variable in this research study was the 2011-2012 reading CRCT scores of the third- and fifth-grade economically disadvantaged students. In order to further analyze the effect of HOT questions on economically disadvantaged students, the researcher further investigated the effect of context upon two of the domains included in the reading CRCT scores (i.e. Literary Comprehension and Reading Skills/Vocabulary).

Teachers' cognizant use of HOT questions. No Child Left Behind (NCLB, 2001) required states to make high quality professional development available to teachers. The Teaching Commission (2004) proposed "ongoing and targeted professional development to help meet the demanding standards". Although both the initiatives promote teacher professional learning, details of the content and character of the professional learning are not defined. In this study, the teacher questionnaire asked teachers to report the topics of their attended professional learning within the past two years. All the teachers in this study reported having participated in professional learning or in-service during the past two years focused on best teaching practices in the area of HOT questioning. The researcher would hypothesize that because teachers had attended

professional learning on HOT questions, the teachers would use the higher-levels questions during classroom instruction.

When asked to report the frequency of use of HOT questions, third-grade teachers' reported using the two highest levels of HOT, evaluating and creating, most frequently within reading instruction. However, researcher-observations of teachers' use of HOT questions indicated the lowest two levels of HOT, remembering and understanding, were most frequently used by teachers. A possible explanation for the difference may include the use of self-reported data. Cook and Campbell (1979) suggest participants tend to report what they believe the researcher expects to see, or report what reflects positively on their own abilities, knowledge, beliefs, or opinions. Because the teachers were aware of the researchers' focus on HOT questions and also the school districts' emphasis on teachers' use of HOT questions, the teachers may have reported frequent use of the questioning levels of evaluating and creating.

Correlation data suggested the HOT levels of applying and evaluating had a positive fair correlation, although not statistically significant. In this study, the third-grade teachers had a good understanding of how frequently they asked applying questions requiring students to use information to solve a given problem. A possible explanation may be that teachers are planning for and requiring students to "apply" what is taught to demonstrate the students' understanding. As the students apply what the teacher is presenting, the teacher is evaluating the students' application to make mid-lesson changes in instruction to either provide more support to the student or to continue to build upon the students' demonstrated knowledge (Teaching Excellence in Adult Literacy, 2012).

The findings of this research agree with Pressley, Rankin, and Yokoi (1996) and Knapp et al. (1995) that effective literacy teachers plan and teach both lower-order and higher-order skills. Third-grade teachers in this study were cognizant of how frequently they asked students to apply what was taught and the frequency they asked students to use evaluation to demonstrate their learning.

The other levels of remembering, understanding, and analyzing presented no relationship between what the teacher reported and what the researcher observed. One possible explanation for this may be teachers often become focused on the content they are presenting to students. This focus on content may overshadow the teachers' cognizance of the level of the questions presented to the students.

Three of the four teachers in fifth grade reported having less than four hours of professional learning or in-service focused on best teaching practices in the area of HOT. Teachers reported using the highest two levels of HOT, evaluating and creating, the least which was consistent with the researcher's observations. Although contrary to research suggesting the higher-level questions have the greatest impact on student achievement (Redfield & Rousseau, 1981) the test scores of the fifth-grade economically disadvantaged students for the past two years indicate a 99 to 100 percent passing score for economically disadvantaged students (Table 8). This suggests although the fifth-grade teachers are using the highest level of HOT questions the least, the economically disadvantaged students continued to meet or exceed the standards.

Correlational data presented no statistically-significant differences in the question levels fifth-grade teachers reported and the researcher observed data. In addition, there

was no relationship or a negative negligible relationship between teacher reported and researcher observed data. Topping & Ferguson (2005) researched highly-effective literacy teachers to discover if teacher perceptions of their teaching behaviors corresponded with researchers' observation of teachers' behaviors. They observed teachers during shared reading and general reading sessions concluding that one of the top two effective strategies teachers use with students was questioning. Their comparison of teacher reported data to their observations indicated the teachers were unaware of some of the behaviors they employed during reading instruction (often reporting less complex behaviors than the researcher observed). This research found similar results when the fifth-grade teachers frequently reported the opposite of the researcher's observations. A possible reason for the differences may be the human memory is fallible (Schacter, 1999). Previous researchers (Greenwald, 1980; Newman & Baumeister, 1996; Ross, 1989) suggest people misremember their past in order to confirm their self-theories and serve their current needs and motives. This may explain why the teachers reported using the higher-level questions rather than the lower-level questions the researcher observed.

Comparable to the fifth- grade teachers in this study, the third-grade teachers' self-reported data agreed with the findings of Topping and Ferguson (2005). Although the teachers reported they used evaluating and creating most frequently, observations suggested they asked remembering and understanding questions most frequently. Again, confirming the results of the Topping and Ferguson (2005) study.

The suggested findings of this research imply some teachers believe they are using the higher-level HOT questions frequently during reading instruction. However, when providing actual reading instruction, the teachers frequently ask more lower-ordering thinking questions than higher-order thinking questions. This finding suggests teachers are unaware of the levels they ask students and may need further professional development of how to incorporate the higher-level HOT questions within reading instruction. Additionally, focused lesson plans incorporating higher-level questions and student activities within reading instruction may assist teachers' awareness and use of HOT questions within the instruction.

HOT question levels. The results of the hierarchical regression analysis of the teachers' use of the various HOT level questions effect on economically disadvantaged students reading achievement suggest only the level of remembering and understanding combined have a statistically significant effect on the reading CRCT scores. The addition of the four higher-level questions levels (applying, analyzing, evaluating, and creating), did not have a statistically significant effect on the economically disadvantaged students' reading CRCT scores. Although Flynn (2007), in his research of effective teachers, suggested high-quality questioning led to increased reading skills for economically disadvantaged students, this study did not confirm his findings.

One possible explanation for this discrepancy may be the format of the reading CRCT assessment. The 2011-2012 CRCT reading assessment was a multiple-choice test which may possibly limit how the HOT thinking skills can be assessed. However, the

Common Core State Standard assessments being developed by the Partnership for Assessment of Readiness for College and Careers (PARCC) (2012) are purposed to assess and measure higher-order skills beginning in 2013-2014. The addition of constructed response questions and student writing to assess reading comprehension will require students to use the higher-level skills such as synthesize, evaluate, and create making the teachers' use of HOT question even more relevant to student success.

This research agrees with the Bitter, O'Day, Gubbins, and Socias (2009) replicated study in 2005-2006 of high-level questioning and growth in student reading achievement. When these researchers replicated their study from the previous year, they did not find the same significant positive effects of high-level questions. When they explored possible reasons for the discrepancies, they discovered an increase in the number of English Learners (EL). They suggested different literacy practices for different groups of students need further research. In this research that focused on the student group of economically-disadvantaged, the teachers' use of HOT questions did not predict student reading achievement. The findings of this study agree with Bitter et al. (2009) as varying groups (i.e. economically disadvantaged students) may be affected differently by the HOT question levels.

Student context. The researcher collected data to determine if student context (i.e. whole group, small group, or one-on-one) when teachers' asked HOT questions affected the reading achievement of economically disadvantaged students. In third grade, whole group had a statistically significant effect and positive correlation on the reading CRCT scores and the domain scores of Reading Vocabulary and Acquisition.

Small group did not have a statistically significant effect on any of the economically disadvantaged students reading scores. One-on-one context had a strong, negative correlation and a statistically significant effect on reading CRCT and Literary Comprehension scores. This data suggests HOT questions asked during whole-group instruction have the most positive effect on third-grade economically disadvantaged students' reading achievement. A possible explanation for this positive effect may be all students have the opportunity to hear the teacher's questions and also to hear the students' responses. The teacher's immediate feedback to the student's response will also provide either further explanation to clear up any student misunderstandings or confirm the accuracy of the student's response. Other researchers (Van den Branden, 2000; Morrow& Gambrell, 2000) suggest diverse learners' reading comprehension is increased when the meaning of a text is constructed collaboratively. The practice of constructing meaning in a whole group may explain why the whole-group questioning positively affected the economically disadvantaged students reading.

A possible explanation for the negative correlation of one-on-one and teacher HOT questioning may be the influence of teacher expectation on the student (Hattie, 2009). The teacher may have lower expectations when working one-on-one with a student. Hattie (2009) suggests that effective teachers not only use particular teaching methods, but also have high expectations for all students and create positive student-teacher relations.

In fifth-grade, the student context when teachers asked HOT questions did not have a statistically significant effect on the economically disadvantaged students' reading

achievement. Negative correlation across all of the reading assessments for economically disadvantaged students was presented. One possible explanation may be the students have developed personal learning strategies and their ability to learn does not depend on the context. However, this may be an area for further research.

McNeil (2010) suggested upon completion of his research surrounding HOT questions and English-Language Learners (ELL), further research should be focused on student context in which teachers ask HOT questions. This research study of context compared whole group, small group, and one-on-one, found whole group questioning to have the most positive effect on economically disadvantaged students' reading achievement in third grade. However, student context in fifth-grade did not have a statistically significant effect on the reading achievement of economically disadvantaged students.

King, Goodson, and Rohani (1998) suggest small groups can be effective in the development of students' thinking skills. Although this may be true in a variety of classrooms, in this research, teachers asking HOT questions to small groups did not have a statistically significant affect in either third- or fifth-grade economically disadvantaged student reading achievement. Further details of how King, Goodson, and Rohani (1998) measured the effectiveness of students' thinking skills may provide more information to support their suggestions.

Implications of the study

Centered on the review of literature and the findings of this study, the following implications for teachers' use of HOT questions with economically disadvantaged students are worth further consideration.

- Analysis of the teachers' use of HOT question levels suggests the questioning levels of remembering and understanding together have a statistically significant effect on the reading CRCT scores of the economically disadvantaged students. Although all the HOT levels together did not have a statistically significant effect, there was an 8% point increase from the low level of understanding to the highest level of creating. This suggests the higher levels of questioning do not have a statistically significant effect on the reading CRCT scores of economically disadvantaged students
- The reading CRCT scores and the Literary Comprehension scores of third-grade economically disadvantaged students in whole group settings suggest statistically significant results. Whole group had a moderate, positive correlation on the other domain considered, Reading Vocabulary and Acquisition, although not statistically significant ($p = .15$). A recommendation for third-grade teachers is to frequently use whole group settings to affect the third-grade economically disadvantaged students' reading achievement.
- The reading CRCT scores and the domain scores of fifth-grade economically disadvantaged students were not statistically significantly affected by the context. In addition, each context had a negative relationship on the scores. Small group

had a very strong negative relationship (r = -.99) with the reading CRCT scores suggesting that small group instruction should be used sparingly with fifth-grade economically disadvantaged students.

- Third- and fifth-grade teachers frequently reported the opposite of what the researcher observed. A possible risk-free strategy for teachers to become more self-aware may be to ask a colleague to observe and critique the teachers' use of higher-order thinking questions. Robbins (1991) suggests peer coaching is a way to increase feedback about instruction and curriculum, expand, refine, and build new skills.

Recommendations for further study

Based upon the findings of this study, the following recommendations are made for further research:

1. An area for further investigation may be the teachers' use of HOT questions during one-on-one instruction (Table 16) in third grade. The results of this study suggested a negative correlation between one-on-one context and economically disadvantaged student reading scores. Research focused on effective teaching practices with economically disadvantaged students during one-on-one instruction may lead to increased learning for these students. For example, instead of teachers asking HOT questions to economically disadvantaged students during one-on-one instruction, it may be more beneficial to students if teachers focus on

vocabulary strategies to expand the economically disadvantaged students' vocabulary repertoire.

2. This research examined data surrounding reading workshop and HOT question levels. Examining the use of HOT questions in other content area may find varying results.
3. In fifth-grade, the student context when teachers asked HOT questions did not have a statistically significant effect or a strong correlation across any of the reading assessments for economically disadvantaged students. This may be an area for further research to identify possible causality and to identify if HOT questions used in other content areas (i.e. Math or Science) are affected by student context in fifth-grade.
4. The use of teacher-reported data and the researcher's observation data was implemented within this study. Teacher interviews may provide more in-depth understanding as to the explanations for the teachers' choice of leveled questions.

Limitations of the Study

The limitations of this study included the use of self-reported data collected by the teachers' questionnaire and voluntary participation of the teachers. In addition, the researcher examined data of one school year (2011-2012) from one southern rural school of 4 third-grade and 4 fifth-grade teachers and 46 third-grade and fifth-grade economically disadvantaged students. Although scores from a criterion-referenced test were used to measure student success, other student successes such as increases in

gradient text level or increase in reading fluency, were not examined. Student reading skills such as phonemic and phonological awareness, sight word knowledge, and vocabulary were also not measured with this research.

An additional limitation was the comparison of the previous year's reading CRCT scores of the third-grade students. This limitation was present because this year's third-grade students did not take a criterion-referenced competency test in second grade. Therefore, a comparison of previous scores to current scores is unavailable.

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APPENDICES

Appendix A

Higher-Order Thinking Questions

Teacher Questionnaire

Name _____

Date _____

This research project will investigate the relationship between economically disadvantaged students' reading achievement and teachers' use of higher-order thinking questions.

This questionnaire is designed to gather information regarding teachers' use of higher level questions during reading instruction in an effort to improve reading instruction of economically disadvantaged students. It is addressed to teachers of third-grade and fifth-grade students, who are asked to supply information about their use of higher-order thinking questions.

Your participation is voluntary. I realize that you are very busy, but urge you to complete this questionnaire as accurately as possible. The information you provide is being collected for research purposes only and will be kept strictly confidential. The

questionnaire should take approximately ten minutes to complete. I appreciate the time and effort that this takes and thank you for your cooperation and your contribution.

Please answer questions directly on this questionnaire. Please return the questionnaire to Ruth Bennett by May 1, 2012 in the accompanying envelope. Thank you!

1. What grade students do you currently teach?
    - o 3rd grade
    - o 5th grade
2. Have you changed your methods of teaching reading in the past two years?
    - o Yes
    - o No
        i. If so, how have you changed your reading instruction: _____

        _____
3. Consider all of the professional development activities in which you participated during the last two years. To what extent did you learn about each of the following topics? Check one box on each line.

Professional Development Topic (Number of Professional Learning hours)	Not at all (0 hours)	Small Extent (1-2 hrs.)	Moder-ate Extent (3-4 hrs.)	Large Extent (5 or more hrs.)
How students learn to read				
Content standards in reading				

Professional Development Topic (Number of Professional Learning hours)	Not at all (0 hours)	Small Extent (1-2 hrs.)	Moder-ate Extent (3-4 hrs.)	Large Extent (5 or more hrs.)
Instructional methods for teaching reading				
Strategies for teaching reading to students from diverse backgrounds (including English Language Learners)				
Best teaching practices in the area of Higher Order Thinking Skills				

Classroom Organization and Reading Instruction

1. In a typical school week, what percentage of your reading instruction do you devote to the following?
   - Teaching the class as a whole group _____%
   - Working with a small group (4-6 students) _____%
   - Working with individual students _____%

   Total = 100%

2. During a reading lesson *with your students in a **whole group setting***, how often do you ask your students to do the following? Check one box on each line.

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
Remember, identify, quote, define				
Understand, explain, interpret				

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
Apply solve, use concepts in a new situation				
Analyze, compare, classify				
Evaluate, assess, recommend, convince				
Create, modify, generalize, integrate				

3. During a reading lesson *with your students in a **small group setting** (4-6 students)*, how often do you ask students to do the following? Check one box on each line.

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
Remember, identify, quote, define				
Understand, explain, interpret				
Apply solve, use concepts in a new situation				
Analyze, compare, classify				
Evaluate, assess, recommend, convince				

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
Create, modify, generalize, integrate				

4. During a reading conference *with a student reading **independently***, how often do you ask your student to do the following? Check one box on each line.

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
Remember, identify, quote, define				
Understand, explain, interpret				
Apply solve, use concepts in a new				

(Number of times per lesson)	Never or hardly ever (0-1)	Sometimes (2-3)	Often (4-5)	Always or Almost Always (6 or more)
situation				
Analyze, compare, classify				
Evaluate, assess, recommend, convince				
Create, modify, generalize, integrate				

5. To what extent do you consider the Bloom's Taxonomy question level before asking students questions during reading instruction?
    - o Not at all
    - o Small extent
    - o Moderate
    - o Large

Please include any additional comments you have about your use of higher-order thinking skills in your classroom.

_____

_____

_____

Thank you for completing this questionnaire.

Please return it to Ruth Bennett in the self-addressed envelope by May 1, 2012.

Adapted from Mullis, I. V., Martin, M. O., Gonzalez, E. J., Kennedy, A. M, & Foy, P. (2007). *PIRLS 2006 International Report: IEA's Progress in International Literacy Study in Primary School in 40 Countries*. Chestnut Hill, MA: Boston College.

Appendix B

Higher-Order Thinking (HOT) Questions: Researcher Observations

(Adapted from revised *Bloom's Taxonomy of Educational Objectives*)

Date _____ Start time _____ End time _____

Observer _____

Teacher observed _____ Grade _____

Lesson observed during: (circle one)

Mini-lesson Conferences or Strategy Groups Teaching Share

HOT Question	Whole group	Small group	One-on-one
Creating			
Evaluating			
Analyzing			
Applying			
Understanding			
Remembering			

Student Name	HOT Question Level	Correct Answer + or Incorrect Answer -

Notes:_____

Anderson, L.W., & Krathwohl, D. (Eds.) (2001). *A taxonomy for learning, teaching and assessing: a revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.

Appendix C

Informed Consent for

"Higher-Order Thinking Questions Affecting Economically Disadvantaged Students' Reading Achievement"

Dear Teacher,

The following information is provided for you to decide whether you wish to participate in the present research study. Before you give your consent to volunteer, it is important that you read the following information and ask as many questions as necessary to be sure you understand what you will be asked to do.

Principal Investigator: Ruth Bennett; (Ed. D. Candidate, Columbus State University); Degree(s): B.A., State University of New York, 1995, M. Ed., State University of New York, 1999, Ed. S. Columbus State University, 2005

Faculty Sponsor: Dr. Deirdre Greer; Assistant Department Chair of Teacher Education, Columbus State University, Columbus, GA 31907

Purpose of the Research

This research study is designed to investigate the effect of teachers' use of higher-order thinking questions on economically disadvantage students' reading achievement. A secondary purpose is to identify if student group structure (i.e. one-to-one, small group,

or whole group) when HOT questions are asked contributes to reading achievement of economically disadvantaged students.

You were selected as a participant because you are a third- or fifth-grade teacher at the researcher's chosen school. The researcher's focus on third- and fifth-grade teachers and students is due to the fact that the reading CRCT is a "gate" for both of these grades.

The data from this research will be used:

1) In the fulfillment of the Ed. D. candidate dissertation research requirements
2) In a possible academic article

Procedures

If you volunteer to participate in this study, you will be asked to complete a questionnaire collecting information about your teaching background and instructional practices as they relate to reading instruction. You will be asked to allow the researcher to disaggregate the data gathered during two thirty-minute classroom observations conducted between April and May 2012 to identify the level and frequency of use of higher-order thinking questions and the context of students during your questioning (i.e. whole group, small group, or one-on-one) . You will receive a copy of the final report before it is handed in, so that you have the opportunity to suggest changes to the researcher, if necessary.

Potential Risks or Discomforts

There are no foreseeable risks associated with the study.

Potential Benefits of the Research

Your participation in this study may benefit you by providing insight into your own use of higher-order thinking questions. In addition, further details as to the influence of higher-order thinking questions on the reading achievement of economically disadvantaged students in your classroom may be revealed.

Confidentiality and Data Storage

Your real name will not be used at any point of information collection. I will maintain the confidentiality of all collected data; however, you and the other third/fifth grade teachers will be aware that each of you is participating in the study. The raw data will be accessible only to me and my dissertation committee members for the purpose of analysis but will be protected by the rule of confidentiality. All research information will be kept in a locked file cabinet drawer in my home for a period of five years, after which it will be destroyed.

Participation and Withdrawal

Your participation in this research study is voluntary. As a participant you may refuse to participate at any time. If you decide to participate, you are free to withdraw at any time. Your decision about whether to participate or to withdraw your participation will in no way affect evaluation of your teaching now or in the future. To withdraw from the study please contact Ruth Bennett via letter to Ruth Bennett, 301 Robert Bryson Smith Parkway, Bonaire, GA 31005. If the researcher determines circumstances requiring

termination of your participation in the research, a certified letter explaining your termination in the study will be mailed to you.

Questions about the Research

If you have questions about the research at any time, please speak with Ruth Bennett at 301 Robert Bryson Smith Parkway, Bonaire, GA 31005 or (478) 929-6113 ext. 30105. This project has been reviewed and approved by Columbus State University's Institutional Review Board. If you believe there is any infringement upon your rights as a research subject, you may contact my chair, Dr. Deirdre Greer, at 706-507-8034 or the Columbus State University IRB at irb@columbusstate.edu or nicks_clayton@columbusstate.edu or IRB, Office of Provost, 4225 University Avenue, Columbus State University, Columbus, GA, 31907.

I have been given the opportunity to ask questions and these have been answered to my satisfaction. My signature below indicates my voluntary agreement to participate in this research study.

Please return one copy of this consent form to Ruth Bennett and keep one copy for your records.

_____	_____
Signature of Research Participant	Date
_____	_____
Participant Name (Please Print)	Date
_____	_____
Signature of Person Obtaining Consent (optional)	Date

Appendix D

March 26, 2012

Re: Doctoral Study Permission Request

Dear Principal,

I am currently a doctoral student at Columbus State University in the area of Educational Leadership. I am planning to conduct a research study focused on higher-order thinking questions teachers ask their students and the effect of the higher-order thinking questions on economically disadvantaged students. The anticipated research project start date will be April 20, 2012 with an end date of May 30, 2012.

The purpose of my study is to gain information from the school's third and fifth grade teachers' regarding the use of higher-order thinking (HOT) questions and the teacher's perceived use of HOT questions. In addition, I will be considering the student context (i.e. whole group, small group or one-on-one) to identify if group context when teachers ask HOT questions affect student reading achievement. While it is known that there is a correlation between teachers asking HOT questions and student achievement, the information gathered in this study may help our teachers focus on specific levels of questions having the greatest impact on economically disadvantaged students' reading achievement.

The school district's participation and teachers' participation in this study is completely voluntary. Should you grant permission for this research to occur, all information will be kept confidential and neither individual nor school will be identifiable from the final report.

I would greatly appreciate your approval to conduct this research project. If I can answer any questions regarding this request, please contact me at ruth.bennett@hcbe.net.

Respectfully submitted,

Ruth Bennett,
Principal Researcher

Enclosures: Teacher questionnaire

Appendix E

M E M O R A N D U M

DATE: April 11, 2012

TO: Ruth Bennett
Elementary School

FROM:
Director of Professional Learning

SUBJECT: **RESEARCH APPROVAL REQUEST**

Your request to conduct research for your doctorate program at Columbus State University is approved. The title of your research project is "*Higher-Order Thinking Questions and Reading Achievement of Economically Disadvantaged*

Students". The purpose of this study is to investigate the relationship between economically disadvantaged students' reading achievement and teachers' use of higher-order thinking questions. As I understand from your proposal, third and fifth grade teachers at ____Elementary and ___Elementary will complete a questionnaire. In addition, classroom instruction will be observed at ____ Elementary with the purpose of identifying teacher's use of higher-order thinking questions and CRCT data will be reviewed. The timeframe for this research project is one year from the date of system approval.

Thank you for submitting your research proposal, questionnaire, observation form, consent form, and the principal approval letters.

Please keep in mind that you will be responsible for compiling the data for your research. The staff at _____ Elementary School and the Department of Testing and Information Technology is unable to compile data for your research. Board policy also prohibits the use of system email for personal research. Please also remember teacher and student anonymity is of utmost priority for this research project.

I have attached to this memorandum the _____ County Schools Requirements for Conducting Research.

I wish you the best as you work toward earning your doctorate degree. Please let me know if I may be of any assistance to you again in the future.

Appendix F

IRB Approval

IRB Response
Date: April 27, 2012

Protocol Title: Higher-Order Thinking Questions and Reading Achievement of Economically Disadvantaged Students
Protocol Number: #12-039
Principal Investigator(s): Ruth Bennett

Faculty Supervisor: Dr. Deidre Greer
Faculty email: greer_deirdre@columbusstate.edu

Dear Ms. Bennett,

Members of the CSU Institutional Review Board have reviewed your research proposal identified above. It has been determined that the project is minimal risk and is classified as exempt under 45 CFR46.101(b) of the federal regulations.

Your most recent revisions to the project, which include conducting the research at a different school and excluding potential identifying variables from the study, have been accepted. Approval is granted for the project for one (1) year from the date of this letter for approximately 18 subjects.

Please note any change to the protocol must be submitted to the IRB before implementing this change. Any unanticipated harms to subjects or adverse events must be reported to the Office of Academic Affairs at (706) 568-2061.

If you have further questions, please feel free to contact me. Good luck with the study.

Sincerely,

Clay Nicks, Ph.D.
Chair, CSU Institutional Review Board
Associate Professor
Department of Health, Physical Education, and Exercise Science Columbus State University