ACADEMY OF READING® IMPACT ON STUDENT ACHIEVEMENT IN EXTENDED LEARNING PROGRAM

by

Latrasha Lorraine Palmer

Liberty University

A Dissertation Presented in Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

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APPROVED BY:

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ABSTRACT

The purpose of this casual-comparative study was to assess the effectiveness of Academy of READING® (AOR) on eighth grade Response to Intervention students using third nine-week benchmark scaled score and Criterion Reference Competency Test scaled score. The data collected from a public middle-school in rural Georgia revealed how student achievement, gender, and socioeconomic status were impacted by AOR. AOR participants, the treatment group, received 45 minutes of research-based computer intervention while the control, non-participating AOR, did not receive computer-based instruction during extended learning. This study compared differences in the mean scaled scores for at-risk students using an independent samples *t*-test. The findings for this research study indicated AOR participants' third nine-week reading benchmark scores were slightly higher than non-participating AOR. No significant differences were revealed between third nine-week reading benchmark based on gender. High SES AOR participants scored slightly higher than low SES AOR participants although the sample size was small. Non-participating AOR participants' student achievement outcomes were marginally higher than AOR participants on the CRCT. The researcher concludes that Academy of READING® did not impact student achievement. Furthermore, the researcher recommends that this study be replicated for a longer period with students from different ethnicities, more diverse economic population, and provide more feedback from students and teachers.

Keywords: at-risk, benchmarks, comprehension strategies, extended learning time, low-achieving, standardized test scores, response to intervention

Dedication

This paper is dedicated, first, to God in whom all things are imaginable and whose blessing, guidance, and mercy are ever-present in my life. This paper is dedicated to my family, especially my mother, Ann Deloris Palmer, and my aunt, Lorraine Palmer, who are truly my role models. My deceased brother, Tremon Montra' Palmer, who was my protector and my inspiration to believe in the impossible, my grandson, Carson Lenox Palmer, whom I hope and pray will understand the sacrifices that I made so that he will one day be proud to call me his grandmother, my son, Deon Montra' Palmer, who offered me never-ending encouragement when the task felt too overwhelming to accomplish, who was my mathematician without certification, and who was my never-ending insight, to my brother Darrell Dion Palmer, who I believe motivates me in spirit, to my brother Willie Williams, who listens to me and who loves to call me "sis," and to Carlton Coleman, who is my soulmate and who is my backbone when I do not believe in myself. I pray that I never forget the greatness you bestowed upon me. Finally, my grandparents John Henry and Maudine Palmer, whom I pray is watching from Heaven. In addition, I dedicate this work to Liberty University for helping me lean on my Savior every time I started, stopped, and finished an assignment.

Finally, this journey would not have been possible without God providing me with understanding, reassurance, and direction. I especially dedicate this paper to my mother, Deloris, for her faith, support, prayer and belief in me. You raised an awesome family and "showed" not "told" us that all things are possible. Your hardship was and will be my determination. Most importantly, you showed me how to be a lady. "You did that." Smile and be proud!

God Bless!

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Adequate Yearly Progress (AYP)

Computer-Assisted Instruction (CAI)

Computer-Based Instruction (CBI)

College & Career Readiness Performance Index (CCRPI)

Common Core Georgia Performance Standards (CCGPS, CCSS)

Criteria Reference Competency Test (CRCT)

Depth of Knowledge (DOK)

Executive Functions (EFS)

Functional Magnetic Resonance Imaging (fMRI)

Georgia Department of Education (GDOE)

Georgia Milestone Assessment (GMA)

Georgia Performance Standards (GPS)

Georgia Student Growth Model Report (GSGM)

Individuals with Disabilities Education Act (IDEA)

National Assessment of Educational Progress (NAEP)

National Reading Panel (NRP)

No Child Left Behind (NCLB)

Partnership for Assessment of Readiness for College and Career (PARCC)

Proton Echo-Planar Spectroscopic (PEPSI)

Response to Intervention (RTI)

Standard Error of Measurement (SEM)

Students Achieving Independent Learning (SAIL)

Statistical Package for the Social Science (SPSS)

Zone of Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Despite the numerous problems in the learning environment, schools across America are challenged with finding solutions to help at-risk students meet the criteria of Common Core Performance Standards (CCPS). These detailed standards in education are now part of Common Core Georgia Performance Standards (CCGPS) (Common Core State Standards, 2010), which in language arts and reading are currently labeled Georgia Standards of Excellence (GSE) (Georgia Department of Education, 2015**)**. With CCGPS and Partnership for Assessment of Readiness for College and Career (PARCC) increasing demands, at-risk students are required to read complex texts at each grade level to develop linguistic skills and abstract information they need beyond school life (Georgia Department of Education, 2013). The intent of CCGPS is to make sure that when students graduate from high school they are college- and career-ready. By providing students with rigorous tasks, educators expect students to read and comprehend material at or above grade level from various texts including but not limited to math, social studies, science, informational and technical information (Georgia Department of Education, 2014). When students do not meet the expectations set forth by No Child Left Behind Act (NCLB), many school districts use Extended Learning Programs to provide students additional instruction (Wolfe, 2009). For this study, Extended Learning Programs offer at-risk students additional opportunities to improve their test scores and to meet state standards requirements. Many of these programs are funded through Title I funds and offer service 1 hour per day for 5 days a week (Carnine, Silbert, Kame'enui, Tarver, & Jungjohann, 2006). Therefore, this study will examine if Academy of READING®, a computer-based reading program, decreases gaps in reading comprehension and contributes to students' progression towards meeting CCSS requirements during extended learning classes.

Background

In 2001, Congressional legislators passed Public Law 107-110, the No Child Left Behind Act (NCLB), to improve the educational system for all students regardless of their socio-economics status or learning disability (U.S. Department of Education, 2008, Stronger Accountability for Results). Since the passing of NCLB, educational constituents, the National Governors Association Center for Best Practices (NGA), and the Council of Chief State School Officers (CCSSO) have developed Common Core Georgia State Standards to ensure that students are prepared to transition to the next level of learning, are prepared to enter a two or four-year college programs performing at grade level, or are equipped to enter the workforce (Georgia Department of Education, 2014). To help students meet the requirements of CCGPS, many administrators are addressing issues that affect at-risk students, reviewing CCGPS criteria, and utilizing computer-assisted instruction (CAI) as one tool to improve students' reading skills.

Numerous studies have been conducted on how the brain obtains, processes, organizes, recalls, and forgets information. Adding to this body of knowledge, scientists have used medical imagery to understand the relationship between neurological development and learning. Spreng, a neuroscientist at Cornell University, and his colleagues conducted a quantitative meta-analysis study showing brain development after being exposed to cognitive and motor skills training. Spreng's results indicated that the experimental group improved significantly in working memory and word fluency (Patel, 2012). Having up-to-date information about how the brain processes information continuously helps researchers and educators improve student learning (Gulpinar, 2005).

Most likely, a human component that influences comprehension is readers' ability to make connections based on prior experiences and prior learning. For this reason, readers'

understanding and comprehension of text depends on their schema. Schema can be viewed as information that helps the brain process information (Miller, 2011). Having schema helps students gain an in-depth knowledge of what the text states, which leads students to know their purpose, to connect information to other text, to understand text structure, to formulate questions, and to synthesize information (Massey & Heafner, 2004).

In addition, other factors inherent within readers are "motivation, interest, and cognitive development" (Brownell, 2000, p. 105). Curriculum standards were developed to provide a scope and sequence of rigorous learning for each grade and subject matter (Common Core Standards, 2014). Regardless of curriculum complexity, to be successful, students must be able to relate and comprehend text (Rosenshine, 2012). Lacking motivation to read complex topics such as mathematics, science, and social studies that is above at-risk readers' level of maturation is frustrating (Ness, 2009). Moreover, as struggling readers enter middle school, they often lack expertise to strategically understand higher level text (Brinda, 2008; Fleming, 2007; Harmon, Hedrick, Wood & Vintinner, 2011; Jacobs, 2008). Mastering CCGPS standards will be overwhelming for at-risk students who lack the prerequisite skills to complete rigorous assignments. Walberg and Tsai identified a phenomenon in education labeled the "Matthew Effect" based on a Bible quote that states "the rich get richer and the poor get poorer" (1983, p. 360). Students intrinsically motivated to read plays an even greater role between readers and text (Guthrie, 2007).

Lyon (1996) suggested that at-risk students may have little trouble recalling information, yet are unable to derive meaning from complex text. Georgia's curriculum requires students to read challenging text with anaphora words or words that can only be understood by referring to the context. This can perplex at-risk students because many lack the ability to complete the

following: use prior knowledge, make connections, visualize, use deductive and inductive reasoning, formulate questions, determine importance, and synthesize the materials that they read (Grimes, 2004). The lexis of CCGPS categorizes vocabulary in a three-tier model. Tier One consists of "everyday speech;" Tier Two consists of "general academic" (Common Core State Standards, Appendix A, 2010); and Tier Three is "domain specific" (Beck, McKeown, & Kucan, 2002, 2008). Gaining a deeper understanding of text, students must utilize *Cloze Reading* to focus on important elements of text and to access different levels of meaning from literal to synthesis (Coleman & Pimentel, 2012). Cloze Reading refers to reading of short pieces of text to gain a deep understanding (Common Core State Standards, 2010). To successfully prepare for rigorous curriculum, at-risk students must be able to employ a variety of comprehension strategies such as "make connections, ask questions, visualize, infer, determine importance, and synthesize" (Kendall & Khuon, 2005, p. 5).

Administrators are using computer-assisted learning (CAI) to improve literacy skills. Existing studies show negative and positive consequences of computer-assisted instruction. Lowe (2001) noted that during the 1980s and the 1990s, numerous studies demonstrated positive effects of computer-based reading programs on students' literacy achievement. As time progresses computer-assisted learning continues to impact student achievement. Caccamise, Franzke, Eckhoff, Kintsch and Kintsch (2007) used Latent Semantic Analysis (LSA), a graphic computerized program to improve students' comprehension of expository text through summarizing. In addition, Myers and Wijekumar (2007) used Intelligent Tutoring of Structure (ITSS), a computerized animated web program to organize and comprehend expository text.

Hall, Hughes, and Filbert (2000) analyzed different methodological literature to study the impact of CAI on reading for students with learning disabilities. Hall et al. (2000) used

information either from experimental or quasi-experimental design studies published in refereed journals. Moreover, the researchers limited the studies to students with learning disabilities (LD). The researchers revealed that 13 of the 17 studies indicated that learning disabled students improved in reading decoding or reading comprehension after using computer-assisted instruction (CAI).

In addition, Moore Street Elementary located in Dublin City, GA used ClassWorks, computer-assisted learning software, to help 4th and 5th grade students with Educational Instructional Plans (EIPs). Additionally, ClassWorks was used for these same students for Tier II interventions through the Response to Intervention (RTI) program, which gave the students an additional 35 minutes per day with ClassWorks. The Criterion Reference Competency Test was used to measure students' growth. Fifth grade students increased from 80% to 89% proficient, and fourth grade students increased from 78% to 91% on the state's yearly assessment (ClassWorks, 2013).

To understand complex text and to prepare for demanding standards mandated by CCGPS, students must continuously be exposed to reading strategies at all grade levels (Georgia Department of Education, 2010). Accommodating these high marks of Common Core Georgia Performance Standards, school districts are addressing areas in reading by providing extended learning opportunities and by using Academy of READING®.

Academy of READING® is a research-based training and integrated monitoring software program designed to help struggling readers in grades Kindergarten to twelve and developed from using in-depth Functional Magnetic Resonance Imaging (fMRI) technology to examine how the brain processes visuals and how visuals impact cognitive development (Academy of READING, 2013). From studying pre-adolescent and adolescent dyslexic readers' images when

reading phonological text, researchers began to understand the brain's neurological structures (Cattell, 1941). In addition, following the National Reading Panel (2000) beliefs, Academy of READING developed a reading program focused on the following research-based skills: phonemic awareness, sound symbol association, decoding accuracy and fluency, automaticity, and comprehension; next, Academy of READING® uses progress monitoring and integrates lessons relating to CCSS and Response to Intervention (RTI) guidelines (Academy of READING, 2013).

Retention to Intervention, which is specified in IDEA (2004), was designed to monitor students' progress during each stage of intervention to determine the need for further research-based instruction and/or intervention in general education, in special education, or both (United States Department of Education, 2014). The National Association of State Directors of Special Education & the Council of Administrators of Special Education (2006) stated that RTI is based on three tiers wherein students are afforded a plethora of chances in the educational setting; also, RTI can be used to assist any student who is failing (Fuchs & Fuchs, 2006, p. 93).

The Georgia Department of Education (2008) states that Tier 1 is considered the key component of tiered instruction. All students receive instruction within an evidence-based, scientifically researched core program, but those children in need of additional intervention receive extra instruction at Tier 2 or Tier 3. Tier 2 consists of students who fall below the normal levels of achievement as measured by benchmarks or by state assessment tests, and Tier 2 consists of students who are at some danger for academic failure but who are still above levels considered to indicate a high risk for failure. Because students at Tier 2 are below expected benchmarks for their grade but have less demanding needs than students at Tier 3, interventions

at Tier 2 include researched-based programs at a level of proficiency considered to be further along the scale of skill achievement than Tier 3 (Klingner & Edwards, 2006).

Per the National Center on Student Progress Monitoring, progress monitoring produces the following results when it is applied appropriately:

- Students learn more quickly because they are receiving more appropriate instruction;
- Teachers make more informed instructional decisions;
- Documentation of student progress is available for accountability purposes;
- Communication improves between families and professionals about student progress;
- Teachers have higher expectations for their students; and, in many cases,
- There is a decrease in special education referrals. (United States Department of Education, 2008, p. 1).

When the Governor's Office of Student Achievement publishes its yearly report card on each school in Georgia, the Economically Disadvantaged subgroup is statistically analyzed and reported separately (National Assessment of Educational Progress [NAEP], 2007). Due to the passing of NCLB, school districts are using research-based instructional strategies in association with technological implementation to prepare students to be college or career ready (Beghetto, 2003). School districts use Academy of READING® to help assess student learning and to provide methodological practices to drive instruction with hopes of closing the achievement gap so that school districts are aligned with federal legislation such as the Individuals with Disabilities Education Improvement Act (IDEA, 2004) and No Child Left Behind Act (NCLB, 2001).

Problem Statement

NCLB (2001) provides federal funds through the Georgia Department of Education to local educational agencies and public schools to help ensure that all children meet challenging State academic content and student academic achievement standards, CCGPS (No Child Left Behind Act, 2013). In Georgia, schools are having difficulties closing the gap between at-risk and regular education students in reading (Georgia Department of Education, 2014). The gap in reading may be solved by implementing computer-assisted instruction that includes brain-based research, Executive Functions (EFs), pedagogically rigorous strategies, modeling, motivation, and inquiry (Academy of READING®, 2014).

Computer-assisted reading programs must be able to address Common Core Georgia Performance Standards that build on previous standards and provide a clear and concise alignment so that students will be prepared for college, career, and life (Rosenshine, 2012). Moreover, standards outline what students are expected to master as they transition through each grade (Thomas &Thorne, 2009). These instructional standards are research-and evidence-based; clear, understandable, and consistent; aligned with college and career expectations; based on rigorous content and application of knowledge through higher-order thinking skills; built upon the strengths and lessons of current state standards; and informed by other top-performing countries to prepare all students for success in the global economy and society (Common Core Standards, 2014).

With academic rigor at the forefront, Georgia educational reformers constructed the Georgia Milestone Assessment (GMA) to replace the Criterion Reference Competency Test (CRCT) (Georgia Department of Education, 2014). One guiding principle of Georgia Milestones stipulates that the assessment be sufficiently rigorous to ensure Georgia students are well-

positioned to compete with other students across the United States and internationally. Next, it is intentionally designed across grade levels to ensure that student learning is consistent with state standards and that students are on or above grade level. Georgia Milestones in middle school are designed to provide a valid measure of student achievement on state content standards across the full achievement continuum, to provide a clear signal on students' preparedness, and to be suitable for use in promotion and retention decisions focusing on reading (National Assessment Governing Board, 2008).

During the 2014-15 school year, students in Georgia took the Georgia Milestone. Per the Director of Assessment Research and Development Georgia Department of Education, the Department of Education did not release information pertaining to the validity and reliability of the Georgia Milestone until the testing facility had examined the effectiveness of the test (see Appendix C). Henceforth, the researcher used students' 2013-14 CRCT data aligned to CCSS to determine if Academy of READING® impacted student achievement. Knowing this data further assisted school districts with meeting the needs of at-risk students.

Presently, many students fail to graduate from or on time from high school. Many students are still graduating from high school lacking basic reading skills and are unprepared to enter the workforce or attend college (National Center for Education Statistics, 2009, 2011). The problem is these negative correlations leave educators struggling to meet the needs of all students (Purcell, Heaps, Buchanan, & Friedrich, 2013). School districts are relying on computerized-assisted instructional programs to solve at-risk students reading problems (Fairlie, 2012). In addition to closing the achievement gap between students, very few current empirical research studies exist on the effectiveness of the Academy of READING® software program (Morgan, White, Portal, Vanayan, & Lasenby, 2002). Therefore, this causal comparative study will attempt

to investigate the relationship between the Academy of READING® program and reading achievement scores of at-risk students.

Purpose Statement

The purpose of this quantitative, causal comparative study was to determine possible effects of participating in Academy of READING®, a research-based reading program, on the reading achievement of Response to Intervention Tier II eighth grade at-risk students during extended learning for duration of one academic nine-week term during the second semester. By examining academic gains and losses of this specific subgroup who have historically scored at or below the state's mean score in reading, this research will assist school districts in determining the effectiveness of Academy of READING®. In addition, this study will provide school districts with information pertaining to allocation of funds; scheduling of extended classes; helping limited English learners; assisting economically disadvantaged students; and aiding students with disabilities in reading comprehension.

The first independent variable was participation in Academy of READING®, which is a computer-assisted independent reading program that focuses on five instructional strategies based on National Reading Panel Report (2000). The second independent variable was gender. The third independent variable was socioeconomic status (SES) of the participants. Low SES comprised students who received free or reduced lunch, while high SES included students who do not receive free or reduced lunch. Dependent variables were students' reading scores on the grade level third reading benchmark assessment and students' reading achievement scores on the Criterion Reference Competency Test. The research questions were designed to examine the differences in reading proficiency.

Significance of the Study

The National Institute for Literacy and Center for Education Statistics (2006) reported over 40 million adults in the United States are functionally illiterate, and approximately 40% of fourth graders lack basic skills. Research showed that a child not reading on grade level by fourth grade would probably not graduate from high school (U.S. Department of Education, 2005). With student assessment moving to rigorous tasks and requiring higher level thinking skills, at-risk students will need reading strategies to help them conceptualize material that goes beyond Depths of Knowledge of a Level 1. Webb (2006) classified The Depth of Knowledge into four levels: "recall, skills, strategic thinking, and extended thinking" (p. 3).

Students must be able to provide constructed responses that require more in-depth thinking (Common Core Standards, 2014). What seemed like simplistic amendments to some were burdensome to those who had to tackle the task, which caused public schools to rethink and revamp the reading curriculum (Clark, 2011). One resolution to closing achievement gaps for many school districts is to provide students with computer-assisted instructions. For this research study, implementing Academy of READING® during extended learning time was studied. This research-based program provides students with a formative assessment, a form of checking students' understanding of standards during instruction, and a summative assessment, a form of signaling the end of students' mastery so that students can be successful in the regular educational setting and can pass stated mandated tests (Georgia Department of Education, 2011). Moreover, the summative assessment can show improvement on the Georgia Student Growth Model Index, which measures students' academic growth of students within the state (Georgia Department of Education, 2014).

To accommodate requirements of CCGPS, teachers must provide students with lessons that develop their creativity and promote higher level learning so that students can transition ready and prepared to engage in and complete task-centered activities. If students are unprepared to comprehend required texts, their chances of successfully reading higher level text is unlikely and completing college level assignments are lessened (Gerla, 2009). Black and Wiliam (2006) posited teachers are the persons who know very well what is happening inside the "black box," and educators can control classroom activities, which helps produce better outputs. For purposes of this research, benchmark assessment was categorized as summative assessment signaling the end of the third nine-week grading period, and the CRCT was categorized as summative signaling the end of the school year; nevertheless, teachers had data to help students towards requirements of CCGPS.

Benchmark assessments are used as measurable descriptors of student knowledge and have expected student learning outcomes at each grade level. Benchmarks have become a popular tool used in reviewing the effectiveness of teachers and schools. Olson (2005) stated that standardized benchmark assessments typically:

- are given periodically, from three times a year to as often as once a month;
- focus on reading and mathematics skills, taking about an hour per subject;
- reflect state or district academic-content standards; and
- measure students' progress through the curriculum and/or on material in state assessments. (p. 13)

This research study mainly examined student achievement as it relates to the Academy of READING®, which helps students regardless of gender or socioeconomic status prepare to

demonstrate mastery on summative assessments, such as benchmarks and the Criterion Reference Competency Test used during extended learning time.

Research Questions

RQ1: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the third nine-week reading benchmark assessment when participating in the Academy of READING® during extended learning classes versus those non-participating eighth graders?

RQ2: Is there a difference based on gender on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ3: Is there a difference based on socioeconomic status on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ4: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the Criterion Reference Competency Test when participating in Academy of READING® during extended learning classes versus those non-participating eighth graders?

Null Hypotheses

The null hypotheses are:

$H_0$1: There is no significant difference in the reading comprehension scaled scores of eighth graders on the third nine-week reading benchmark assessment when participating in Academy of READING® versus non-participating eighth graders.

$H_0$2: There is no significant difference based on gender in the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$3: There is no significant difference based on socioeconomic status in the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$4: There is no significant difference in the reading comprehension scaled scores on Criterion Reference Competency Test of eighth graders when participating in Academy of READING® versus non-participating eighth graders.

Definitions

Academy of READING® - a computer-based reading and math research-based program (Academy of READING, 2014).

Adequate Yearly Progress or AYP - Part of the No Child Left Behind Act (*NCLB*). It measures year-to-year student achievement on the Georgia Criterion-Referenced Competency Test. Several factors like percentage of students meeting or exceeding standards, attendance rates, and number of students participating in assessment, are all factored into the calculation for adequate yearly progress (Georgia Department of Education, 2008).

At-risk - Poor academic and social skills that promote a general disconnection within the school environment (Smink, 2000).

Benchmark - Detailed description of a specific level of student performance expected of students at specific ages, grades, or developmental levels. Benchmarks are often represented by samples of student work. A set of benchmarks can be used as "checkpoints" to monitor progress

toward meeting performance goals within and across grade levels (Georgia Department of Education, 2011, p. 8).

Cloze Reading - Refers to reading of short pieces of text to gain a deep understanding of the text (Georgia Department of Education, 2008).

College & Career Readiness Performance Index - Index that informs parents and the public how schools are performing in a more comprehensive manner than the pass/fail system previously in place under Adequate Yearly Progress (AYP) (Georgia Department of Education, 2014).

Comprehension Strategies - Set of steps that purposeful, active readers use to make sense of text when they read (National Institute for Literacy, 2007)

Common Core Georgia Performance Standards - Provide a consistent framework to prepare students for success in college and/or the 21st century workplace. These standards represent a common sense next step from the Georgia Performance Standards (GPS) (Georgia Department of Education, 2011).

Depth of Knowledge - Term that refers to the substantive character of the ideas in the performance standards. Depth of Knowledge classifies the various levels of understanding that students must demonstrate as they encounter and master the content and skills within the performance standards. This schema for evaluating standards has four levels of knowledge: recall, skill/concept, strategic thinking, and extended thinking. Operational definitions and labels vary by subject (Georgia Department of Education, 2011).

Direct Instruction - A scripted approach with brisk-paced instruction that enables students to learn systematically through steps in a sequence where cognitive skills are developed (Carnine, Silbert, Kame'enui, & Tarver, 2004).

Extended Learning Time - Additional time given to students to enhance their learning.

Formative Assessment - Evaluation tool used to guide and monitor the progress of student learning during instruction (Georgia Department of Education, 2011).

Georgia Criterion Reference Competency Test - Shows how learning compares to a preset criterion of acceptable performance on specified learning targets, rather than to compare students to one another (Stiggins, Arter, & Chappuis, 2006).

Georgia Student Growth Model Report (GSGM) - Provides information about students' academic progress (Georgia Department of Education, 2014).

Low achieving students - Students who do not achieve academically at grade-level standards (Georgia Department of Education, 2011).

Metacognition - Awareness and knowledge of one's mental processes so that one can monitor, regulate, and direct them to a desired end (Anderman & Anderman, 2009).

Nontraditional instruction - Teaching that is social, in real time, among equals, different approach to learning, and spontaneous (Overbaya, Patterson, Vasua, & Grablec, 2010).

Response to Intervention (RTI) - An "early detection, prevention, and support system that identifies struggling students and assists them before they fall behind" (U.S. Department of Education, 2009b, p. 4).

Scaffolding - Relates to instructional strategies used to help students progress toward understanding assignment first with assistance and gradually moving towards independency (Georgia Department of Education, 2011).

Schema - A mental structure to organize and simplify knowledge of the world (Miller, 2011).

Semantics - Study of meaning that is used by humans to express themselves (Bender, 2008).

Standardized Test - All students take the same test under the same conditions with the same instructions and scoring. Test administration and scoring are thereby "standard" for all students. This results in scores that can be compared across students, classrooms, buildings, and districts (Stiggins et al., 2006).

Summative Assessment - Evaluation tool generally used at the end of an assignment, unit, project, or course (Georgia Department of Education, 2011).

Syntax - Used to refer directly to rules and principles that govern the sentence structure of any individual language (Bender, 2008).

Traditional instruction - Teaching practice that is transmissive, in order, hierarchical, structured (Kelm, 2011).

Summary

Common Core Georgia Performance Standards (CCGPS) have caused public education systems to make drastic changes in addressing how students learn. All students are expected to meet standards set forth first by NCLB and CCGPS in reading as stated by the College & Career Readiness Performance Index. To meet these criteria, administrators are providing at-risk students with research-based programs such as Academy of READING® to help them become proficient in reading. This study examined at-risk students using Academy of READING®, during extended learning time, and the following chapter reviews literature related to the this study.

CHAPTER TWO: REVIEW OF LITERATURE

Overview

The No Child Left Behind Act of 2001 (NCLB) addressed the importance of all students, regardless of students' socioeconomic status or learning disability, being able to comprehend complex reading material. Thus, school districts are finding methods to help struggling readers become college and career ready. Knowing that the newly developed Georgia Milestone Assessment (GMA) and Georgia Student Growth Model Report (GSGM) rate students' progression and determine if a school receives satisfactory marks on the College & Career Readiness Performance Index (CCRPI*)*, school districts have reexamined how reading is being taught (Georgia Department of Education, 2014). In conjunction with finding research-based solutions, administrators and teams of teachers agree that low achieving students need additional support other than a traditional classroom, which is defined based on normal school hours (Jacobs, 2010). To combat at-risk reading problems, educational systems redeveloped their School Improvement Plan and their Technology Integration Improvement Plan to incorporate computer-assisted instruction (Schwartz, 2008). For these reasons, the primary purpose of this literature review is to evaluate the theoretical basis for this research, to review basic principles of literacy, to study issues relating to adolescent literacy, to investigate possible methods to assist at-risk students, and finally, to review empirical evidence pertaining to Academy of READING®, a computer-assisted instructional reading program.

Brain-Based Research

Academy of READING® was created on a theoretical framework that reading is a relationship between clear, methodical skills and instruction, literature, linguistics, and comprehension that is best suited for students (Academy of READING, 2014). Before

developing Academy of READING®, researchers studied how the brain processes information. Based on Paivio's (1971) research, the human brain has a left and a right hemisphere; the left hemisphere operates in a coherent, logical manner, and the right hemisphere operates in an innate, holistic manner. When both components are used effectively, facts or ideas that are memorized through words are stored in the left hemisphere of the brain, and ideas memorized through a picture or sketches are stored in the right hemisphere of the brain, which set up a powerful combination for enhancing memory (Mohs, 2007). The brain makes sense of information because there is a pattern that helps it understands relationships and connections (Nielsen, Zielinski, Ferguson, Lainhart, & Anderson, 2013). Researchers of Academy of READING®, utilize Functional Magnetic Resonance Imaging (fMRI) technology to examine how the brain processes visuals and how visuals impact cognitive development.

Using (fMRI) technology, which measures changes in metabolic brain activity, neuropsychologists and other researchers have first-hand knowledge on how the human brain performs cognitive tasks (Shirky, 2010). To further guide practices of researchers, research using fMRI has shown that reading is a process depending on all strands working simultaneously (Prat, Keller, & Just, 2007). Magnetic Resonance Imaging has provided scientists with significant insight into what causes reading disabilities and has provided techniques to help at-risk reading students (Nielsen et al., 2013).

Gabrieli (2009) and Melby-Lervag (2012) concluded dyslexia is one of the most profound reading disabilities; furthermore, some dyslexic students lack phonological skills to process advanced reading material. The International Dyslexia Association (IDA) and National Institute of Child Health & Human Development, USA [NICHD] (2002) defined dyslexia as "a learning disability that is characterized by difficulties with accurate and/or fluent word

recognition and by poor spelling and decoding abilities; this learning disability leads to students having difficulties in reading comprehension" (p. 2).

Dr. Sally Shaywitz, Todd Constable, Robert Fulbright, John Gore, Kenneth Pugh, and Bennett A. Shaywitz (1998) used fMRI technology to conduct a case study on how phonological reading assignments impacted 29 dyslexic students and 32 normal readers. The study shows dyslexic readers having an under-activation of the brain region that joins printed information. Additionally, dyslexic readers' brain region illustrated over-activation known as Broca's area, region of the brain where motor neurons control speech (Bock, 1998). In contrast, normal readers' image presented no increase in Broca's area. Dr. Shaywitz implied that dyslexic readers may utilize the Broca's area to compensate for lack of phonological development (Bock, 1998).

In another study that used brain imaging, Todd Richards and University of Washington's researchers conducted a case study involving six dyslexic male students and seven non-dyslexic above-average male students ranging from ages 10 to 13. Researchers used a Proton Echo-Planar Spectroscopic (PEPSI) imaging like fMRI, to measure their metabolic brain region (Posse, Dager, & Richards, 1997). The treatment group was given phonological-driven instructions for 3 weeks consisting of 15 two-hour group sessions, and the same treatment group was re-imaged and re-tested after a year.

The PEPSI results illustrated that dyslexic students' reading skills had not decreased from the previous assessment, and their imaging scans depicted 1.8 times the energy to perform phonological tasks as the control group. Additionally, this approach revealed a response to treatment, which led researchers to believe that a well-developed instructional intervention program-focusing on phonological processing, sound symbol, and decoding skills could be conducive to dyslexic readers comprehending written language (Richards et al., 1999).

While numerous studies have examined dyslexic students' reading ability, researchers have now begun to understand its neurological structures; for example, Richards and the University of Washington's researchers surmised that the functional connectivity of dyslexic readers' brain was sufficient for the regions to act as a system for decoding print into phonological structures (Shaywitz et al., 1998; Shaywitz et al., 2000).

Noteworthy to this study, Gaskins (2005) and RAND Reading Study Group (2002) stated the purpose of reading is to understand text; though there is no dispute that understanding text necessitates reading words correctly is not reading intention. The study stated that reading is an interaction among the reader, the situation, the task, and the text that results in the construction of meaning. For comprehension to occur readers must utilize their Executive Functions (EFs) (Wagner & Sternberg, 1987); therefore, it is worth mentioning EFs' role on early reading and development.

Executive Functions help children as young as infancy and into adulthood by providing means to manage complex cognitive processes based on the Cattell-Horn-Carroll (CHC) research theory of intellectual abilities (Cattell, 1941). EFs and associated brain developments parallel reading acquisition; therefore, work in EFs has profound implications for fostering successful development of reading skills, including pre-reading skills, word reading, and reading comprehension (Brown & Campione, 1986). Children who are better able to process flexible sounds and meanings of words have more success in developing reading comprehension leading educators to assume that children ranging from age 5 to 7 executive processes are already developed (Meltzer, 2007). Since at-risk students lack sufficient cognitive skills to process advanced concepts, they have trouble grasping the explicit curriculum (Diamond, 2010). Some researchers, regardless of their field of study, state that learning to read as early as third grade

has its advantages because by fourth grade, students encounter a variety of text (Hernandez, 2011). As these students move to the later grades, they need executive demands such as planning, strategizing, and organizing to become prolific readers (Diamond, 2010).

Sousa (2001) suggested that reading capabilities can be related to children's biological structure rather than from an obtainable skill and that brain regions are related to how learning activities, such as reading, link to classroom discussions. PEPSI allows neurobiologists to understand brain functions, brain development, and human learning (Richards et al., 1999). In 2005, Tankersley found patterns useful in connecting new learning to prior knowledge and experiences; it makes sense to provide the brain with as many ways possible to connect new information as students read.

Executive functioning issues are not considered a reading disability (Yovanoff, Duesbery, Alonzo, & Tindal, 2005). Nevertheless, many at-risk students who exhibited EFs' traits did not meet the criteria for a learning disability because at-risk students readily succeed with the narrowly defined subskills that are rated on most widely accepted test inventories (Meltzer, 2007). Understanding how these functions impact learning will be conducive to helping students improve their reading skills (Cox, 2007). Swanson (1999) and Torgesen (1982) suggested that these students have been characterized as "actively inefficient learners" because of their difficulties accessing, organizing, and coordinating multiple mental activities simultaneously in academic areas including reading comprehension and written expression (p. 20). As soon as executive functions are connected to one another, the brain processes these actions in seconds; still, students, lacking insufficient executive skills, have difficulties inferring beyond the surfaced details (Reiter, Tucha, & Lange, 2005). When executive functions are operative, students have a better chance understanding words that are not clearly stated in context. Table 1 demonstrates

how each process allows students to manage tasks. In addition, these neurological-based skills are proven to assist students with improving their mental capabilities (Lloyd, 2011).

Table 1

Definitions for Processes of Executive Functions

Process	Definition
Attentional control	The ability to focus on particular information or task regardless of distractions or fatigue
Cognitive flexibility	The ability to consider multiple bits of information or ideas at one time and actively switch between them when engaging in a task
Inhibition	The ability to restrain one's normal or habitual responses (also called response inhibition or inhibitory control)
Initiation	The ability to overcome inertia and begin a task
Metacognition	The ability to take a step back and reflect on thoughts, perspectives, and mental processes and assess their effectiveness
Organization	The ability to impose order on information and objects or to create systems for managing information or objects
Planning	The ability to decide which tasks are necessary to complete a goal, including understanding which ones are most important and the order in which the tasks should be completed to most effectively reach the goal
Response to feedback	The ability to adjust one's behavior or alter one's plans in the face of new information
Self-regulation	The ability to control one's own behavior and emotions to achieve goals
Switching or shifting	The ability to change one's attentional focus from an initial idea to a new one (this is related to cognitive flexibility)
Working memory	The ability to hold information in mind to support the completion of task

(Dawson & Guare, 2010, pp. 1-2).

Effectiveness of Executive Functions

Raver (2010), Director of Chicago School Readiness Project (CSRP), conducted a randomized-control trial with 18 out of 35 Head-Start classrooms. The research shows that the treatment group, CSRP teachers, had better-controlled and more emotionally-supportive classrooms than the control teachers. Executive functions used in the study were attention, inhibition, and experimenter-rated impulsivity. Using the executive functions, the 4-year-olds in CSRP children improved significantly in vocabulary, letter-naming, and math, in comparison to the controls. CSRP's improvement of academic skills was mediated largely via its improvement of EFs.

Montessori schools, which are in 117 countries across six continents, used the term "normalization" akin to Executive Functions (Lloyd, 2011). Adding to the definition, Lloyd defined normalization as a shift from disorder, impulsivity, and inattention to self-discipline, independence, orderliness, and peacefulness. Teachers at the Montessori schools use EFs' concepts of cognitive, social, and emotional development with infants to grade 12. In connection to the other concepts, scaffolding techniques are provided so that children are far more likely to experience success than failure. Students are afforded individualized and pacing instruction where they become in control of their learning like the Zone of Proximal Development and EFs' cognitive flexibility and metacognition. Finally, to increase students' motivation, students receive awards and honors.

Lillard (2006) compared children who applied to Montessori, but did not get accepted, to the children who did get accepted, at the end of Kindergarten (age 5) and end of Grade 6 (age 12). Data revealed at age 5, Montessori children showed better EFs than peers attending other schools. More so, they performed better in reading and math and displayed more concern for

fairness and justice. No group difference was found in delay of gratification. In addition, at age 12, on the only measure related to EFs, Montessori children showed more creativity in essay writing than the control group. They also reported feeling more of a sense of community at school.

Cogmed, a computerized training program, was developed by Sweden's Karolinska Institute. The program focuses on the brain's neuroplasticity to enhance students' performance by utilizing visual working memory. Tailoring to ages 4 to adult, Cogmed provides participants 5 weeks of 25 intensive session. Klingberg, Forssberg, and Westerberg (2002, 2005) stated that after participants completed training, their cognitive performance such as reading comprehension and new learning improved. In like manner, Westerberg, Bartfai, Clevberger, Hirvikoski, Jacobaeus, and Klingberg (2007) reported that Cogmed conducted a randomized control study that improves attention and executive functions during the student's session. From observing how the brain processes information, how using EFs' components are associated with reading, and how using EFs produces positive results, three instructional design theories, connectivism, cognitivism, and socialism, have shown to impact at-risk readers.

Theoretical Framework

Academy of READING® was developed based on the Reading First Program requirements, which is a component of NCLB, 2001 (AutoSkill, 2006). Using research-based theories such as connectivism, cognitivism, and socialism, school districts use computer-assisted instructional programs to strengthen students' reading skills.

Connectivism. Connectivism deals with learning that involves developing meta-skills for delineating patterns and connections within a mass of technology-mediated knowledge that is

rapidly changing under the learner's control (Siemens, 2005). In accordance with this definition, these major components are described as:

- learning and knowledge rests in diversity of opinions;
- learning is the process of connecting specialized nodes or information sources;
- learning may reside in non-human appliances;
- capacity to know more is more critical than what is currently known;
- nurturing and maintaining connections is needed to facilitate learning;
- the ability to identify connections between concepts is important;
- maintaining current and accurate knowledge is the purpose in connectivist activities; and
- decision-making is a learning process as information can change, and what is viewed as correct one day may be incorrect the next. (Siemens, 2004, p. 3)

Knowing that the world is rapidly advancing, educators are exposing students to technology more than ever (U.S. Department of Education, 2014). First, the Internet has been significant in providing the educational system with a learning environment for supporting the connectivism theory (Brown, 2002). For example, educators use technology to help students by offering advanced, all-digital technology that promotes authentic exploration through discovery and by offering students opportunities to visualize experiences beyond the walls of schools' infrastructures (Lento, 2005). Being exposed to programs such as WebQuests, ThinkQuests, Web Inquiry Projects, blogs, and Wikis, students can learn information at faster paces (Smaldino, Russell, Heinich, & Molenda, 2005).

Cognitivism. Cognitivism refers to the study of how the mind obtains processes, and stores information (Stavredes, 2011). Anderson and Krathwohl (2001) referred to cognitive skills

as brain-based learning skills need to complete a task; these brain-based learning skills consist of remembering, applying, analyzing, evaluating, and creating. In fact, the Department of Education (2004) stated that students who have limited cognitive development are so limited that weakness in their cognitive development accounts for 88% of their reading problems. Knowing students lack cognitive development, teachers must rethink how teaching and learning occur, must understand the whole child, and must provide students with learning structures to help all subgroups (Black & William, 2009). In 2006, Browder, Wakeman, Spooner, Ahlgrim-Delzell, and Algozzine defined students with significant cognitive disabilities as:

> Students classified as having moderate or severe mental retardation, who may have additional disabilities such as autism or physical disabilities. Individuals with severe cognitive disabilities may use nonlinguistic communication … and exhibit learning characteristics that require greater time to learn and intensive forms of instructional support. (p. 392)

Cognitive development is essential when processing information. Students who have not progressed beyond basic concepts will have difficulties adjusting to a structured curriculum (Mol & Bus, 2011). Planning for the future, school districts are utilizing computer-assisted learning programs to help develop students' cognitive skills.

Schema Theory. Sir Fredric Bartlett defined schema as "an active organization of past reactions, or past experiences" (Bartlett, 1932, p. 201). From his research, he concluded that what one remembered "fit in with a subject's performed interests and tendencies;" in addition, Bartlett proposed that people have schemata or unconscious mental structures that represent an individual's generic knowledge about the world. It is through schemata that old knowledge influences new information (Bartlett, 1932, p. 93).

Minsky (1975) used Bartlett's Schema Theory to give machines human qualities. As a computer scientist, Minsky concluded that computers were lacking the ability to store knowledge about the world, which was like Bartlett's schema theory. Minsky's theory, his conception, Frame Theory, was developed to represent knowledge in machines. Rumelhart (1980) supported Minsky's theory by stating that schema improves comprehension and recalls of written material. His findings suggest that learning takes form in many ways; both discovery through play, and insight through instruction.

In 1977 and 1984, Richard Anderson, an educational psychologist, related Schema Theory to education. Anderson theorized that schemata provide a form of representation for complex knowledge, and that the construct, for the first time, provides a principled account of how old knowledge might influence the acquisition of new knowledge. Using the Schema Theory, he implied that the reading process mirrors two principles. First, reading uses the bottom-up approaches to reading, where reading perceived letters coming into the eye. Anderson (2008) stated that the bottom-up consists of using letter and sound recognition. Secondly, reading uses the top-down knowledge to construct a meaningful representation of the content of the text (p. 3). Furthermore, the top-down consists of using background knowledge and making predictions to comprehend text. Henceforth, efficient readers combine elements of both. Alexander, Schallert, and Hare (1991) refuted Anderson's viewpoint on schema in education. These researchers noted that Anderson's work caused systematic uncertainty between the two concepts in educational literature.

In summary, Vacca and Vacca (1986) concluded that for humans to comprehend information beyond basic recall, humans must be able to connect new knowledge to prior knowledge. One of at-risk student's major problems is he or she does not have prerequisite skills

to complete implicit tasks (Blackmore & Frith, 2005). Using the Schema Theory in relation to cognitive development will help improve students' reading skills as they are exposed to social learning.

Socialism: The Zone of Proximal Development. Vygotsky's Social Development Theory (1978) continues to emphasize the necessity of social interaction on the development of cognition. Vygotsky's theory is based on three primary principles: Zone of Proximal Development (ZPD), scaffolding, and metacognition. ZPD is what one knows at present and what one learns between development as determined through problem solving under supervision of one's teacher or in collaboration with more advanced peers (Vygotsky, 1978). Although Vygotsky did not develop the concept of scaffolding, his phrase ZPD includes techniques of scaffolding such as reasoning, implementing demonstrating, hinting, prompting, cueing, coining phrases, practicing skills, and language that children need to enhance confidence and strengthen what the educator views as essential to master reading skills and to continue the learning process (Leat, 1998). From applying the ZPD and scaffolding methods, students use their metacognition skills to plan, assess, and monitor the task (Efklides, 2008). With these principles utilized, research shows that at-risk students' reading skills will improve (Israel, 2005).

Many students are entering school with limited cognitive development (Burrage, 2008). Due to the number of students failing reading on standardized tests, Liang (2011) conducted an empirical study to observe readers' response and cognitive activities' influence on adolescents' abilities to understand reading passages. Rosenblatt (1938) stated that readers-response allows the reader to perceive the author's work based on his point of view. On the other hand, cognitive activities such as games based on concentration, hands-on activities, drawing, art projects, and nature walks help readers improve their mental processes (Shirk, Burwell, & Harter, 2003).

Liang evaluated 85 sixth graders' responses to literature and comprehension when they were taught in a Scaffolded Reading Experience (SRE) using a reader-response approach or a cognitive-oriented approach (2011). Miller (2011) used the ZPD as part of a theoretical framework for testing two scaffolding approaches that were adopted by (Wood, Bruner & Ross, 1976). Scaffolding specifies the types of assistance that makes it possible for learners to function at greater depths of their Zones of Proximal Development. Wood et al. (1976) reported the response and cognitive-oriented approaches are consistent with the definition of scaffolding because they were created to provide support at the beginning and to be removed as learners' abilities develop. Outcomes of this empirical study revealed that teaching literature with a specific approach does not affect student response to text and comprehension. Therefore, this study concluded that teachers match a scaffolding approach with desired outcome to close gaps between what students can understand by themselves and what they can comprehend and write with direct assistance.

Moreover, teaching the writing process is considered a strenuous task when students do not have prior reading knowledge. In efforts to help 24 advanced second language learners of the Spanish language comprehend the complexity of writing, Schwieter used Vygotsky's theory of the Zone of Proximal Development (ZPD) and scaffolding techniques to study second language writing (Bodrova & Leong, 1996). During the ZPD, advanced English learners acted as authors, critics, and editors to create a magazine for an authentic audience. Students edited papers, and an instructor conferenced with each student where constructive scaffolding writing methods were taught. Results of this empirical study suggested that teaching writing through scaffolding writing techniques and receiving feedback during debriefing conferences within ZPD efficiently improve writing proficiency in second language learning when contextualized through a writing

workshop. Bodrova and Leong collected quantitative data in the form of ANOVA to imply that there is steady, continuous improvement of writing skills in context (1996). Therefore, this study concluded that when students use scaffolding methods during the Zone of Proximal Development, students' understanding of complex assignments will improve with directed assistance.

Socialism is not only used to strengthen students' reading skills, but educators practice socialism to improve their teaching strategies. Stanevich (2008) conducted an empirical study that examined 12 teachers. This study is pertinent because it provided insight on teachers understanding the relevance of cognitive development and Schema Theory, which addresses what a person needs to understand rigorous assignments and which focuses on a cognitive approach (Prat & Just, 2008). Zone Proximal Development (Vygotsky, 2006) was used to test participants' learning ability. Using different methods of teaching and peer conferencing teachers implemented different instructional practices to improve student learning. Hence, this outcome suggested that exposing teachers to different teaching methods will affect their teaching. To enhance this concept, teachers are required to meet the demands of Common Core State Standards (Gamse, 2008). Knowing that students are at different intervals of learning, teachers provide students with different instructional pedagogies to perform tasks (Ellerson, 2012).

Even though Vygotsky (1978) did not use the term scaffolding, his concept of the Zone of Proximal Development implies that scaffolding is part of this concept. Therefore, educators are now relying on programmed instructional design of drill and practice software that provides students with scaffolding techniques to help at-risk reading students comprehend rigorous assignments (Reiser & Dempsey, 2006).

Although at-risk students need additional reading support to close the achievement gap, their learning ability can be improved when they have assistance (Puntambekar & Kolodner, 2005). Figure 1.1 shows that no single strategy works best for understanding tasks; however, being able to have effective learning feedback and to understand different ways to comprehend a task is conducive to learning. As students analyze the lesson, minimum assistant is needed because one of the Zone of Proximal Development (ZPD) purposes is to bridge the gap between the existence and the nonexistence (Vygotsky, 1978). Figure 1 illustrates scaffolding and Vygotsky's concept of the ZPD.

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(Source:http://www.buzzle.com/articles/zone-of-proximal-development.html, 2011)

Figure 1. Zone of Proximal Development

During Stages I and II, the facilitator develops schema by guiding students through the task. The facilitator continues to model lessons and to check for clarity and understanding. As students begin to conceptualize the information, the teacher gradually releases control. At this point, the facilitator becomes an observer causing students to become independent learners. By Stage III, students' "performance is developed, automatized, and fossilized" (Gallimore & Tharp, 1990, p. 186). During Stage IV, students should have a clear understanding about the assignment. Then, learning becomes recursive, where ZPD sequences are similar for the development of new information,

Principles of Literacy

Annually, the United States Department of Education spends billions of dollars to improve reading skills of adolescents (United States Department of Education, 2014). Despite funding reading programs, the dropout rates steadily increase, and many students are graduating from high school ill-equipped to read, which causes major consequences for those graduates (Madden, Slavin, Karweit, Wasik, & Dolan, 1993). To improve students' reading problems, Academy of READING® and other computer- assisted instructional programs utilize research-based reading components such as phonological awareness, phonics/word study, fluency, vocabulary, and comprehension to improve at-risk students reading.

Phonological Awareness. There has been much debate over the most effective phonological strategies and the phonologic link to comprehension. For this reason, phonics role in reading and writing has become a political issue as it has an educational one (Armbruster, Lehr, & Osborn, 2001). For the purposes of this study, it is essential to understand the meaning of phoneme. The National Reading Panel (2000) defined a phoneme as the smallest unit of sound in a word. For example, the word cat is made up of three phonemes (or three sounds): /c/ /a/ and /t/. The word fish is also made up of three phonemes (or three sounds) even though fish has four letters: /f/ /i/ /sh/. It is crucial to understand that phoneme awareness is combining sounds. By combining the letters /f/ /a/ /t/, students will understand that the word is pronounced fat, and other words with the same beginning will possibly pronounced the same. When students grasp an understanding of vocabulary, students make sense of higher depths of knowledge questions (Mountain, 2005).

Studies have shown the effectiveness of CAI software programs on phonological awareness. First, Blanchard (2000) researched the efficiency of phonics on Phonological Awareness on students in the second to fifth grade. The research revealed that phonics software improved student learning in comparison to the school's program titled Herman Method for Reversing Reading Failure. The control group mean score was 169.3, and the treatment group was 164.38. Furthermore, the control group showed a mean of 52.53-point gain, and the treatment showed a mean of 49.25-point gain. Blanchard proposed that both programs were instrumental in improving phonological awareness (p. 21).

Carter G. Woodson Middle School in Virginia conducted a case study using the Sound Reading program, which is aligned to Common Core State Standards (CCSS), Response to Intervention (RTI), and focuses on the cognitive development of learning (Sound Reading, 2015). The supplementary reading program was used in five classrooms. The students increased significantly in fluency (38 percentile) and comprehension (36 percentile) using the computer-assisted reading program (Sound Learning, 2015). Even though this Sound Reading program revealed positivity, the study did not provide randomization, which limits the effectiveness of the program.

Research shows that struggling readers lack phoneme awareness to read higher level material (AutoSkill International Inc., 2014). Sometimes phonemic awareness is not directly connected to reading comprehension because there are other causes that can affect reading comprehension: poor vocabulary, lack of background and context information, distractibility, and lack of focus (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2002). Numerous times, students who are struggling with reading comprehension lack the ability to recall words. Rose

(2006) stated, “Research has shown that phonics instruction would help students decode words and would assist them with understanding reading” (p. 66).

Teachers and schools have been blamed for students’ inability to connect words. However, the National Reading Panel cited that during Kindergarten, 18 hours total of phonemic awareness instruction—just 30 minutes a week, six minutes a day—provided maximum advantage. Aligning with previous research, Snow, Burns, and Griffin (1998) described the difference between phonological awareness and phonemic awareness in this way:

> The term phonological awareness refers to a general appreciation of the sounds of speech as distinct from their meaning. When that insight includes an understanding that words can be divided into a sequence of phonemes, this finer-grained sensitivity is termed phonemic awareness. (p. 8)

Phonics/Word Study. Phonics is having capabilities to blend letters to construct words in written text (National Reading Panel, 2000). Theoretically, if an insight can be gained on relevance of exposing students to phonics, then pedagogical decisions can be more effectively made to improve student instruction:

> Instructors should recognize ample evidence that youngsters who were directly taught phonics became better at reading, spelling and comprehension than those who picked up all the confusing rules of English on their own; educators who denied this reality were neglecting decades of research, which led to neglecting their educational students’ needs. (Rayner et al., 2002, p. 84)

Moreover, phonics will help children identify and associate sounds of letters. Chall (1967) stated that the application of phonics in children’s beginning stages of education was less systematic. Foorman, Francis, Schatschneider, and Fletcher (1998) supported the use of phonics. From

Foorman's earlier research, phonics was revised as synthetic phonics, referred to as a method where teaching letter sounds and then blending sounds together to pronounce words. In contrast, larger unit phonics, referred to as detecting and blending word parts that are larger than phonics (National Reading Panel, 2000). This panel determined in their meta-analysis of phonics instructional research that explicit, systematic phonics instruction is a crucial component in an effective reading program by showing how kindergartners and first graders produced positive results, how students from all socioeconomic levels experienced gains in reading, and how students' comprehension and word recognition improved.

In other words, it will be problematic for a child to advance in his reading skills if the teaching of phonics is detached from the curriculum. Bradford, Shippen, Alberto, Houchins, and Flores (2006) researched the effectiveness of using the Corrective Reading Program to teach decoding skills such as letter-sound correspondence to students with moderate intellectual disabilities, and students participating in the Corrective Reading Decoding Program completed the program's first level and completed explicit skills associated with phonics and phonemic awareness. Bradford et al. (2006) reported students with moderate disabilities as being successful in the Corrective Reading Program.

Los Angeles Unified School District in California implemented Earobics*,* a computer-assisted research-based reading program, to impact student achievement. Earobics was designed to adhere to Title I guidelines, to coincide with the Reading First Program, to follow the standards mandated by NCLB, and to provide features to monitor for all subgroups in achieving AYP. The district used Earobics to help at-risk students in Kindergarten through third grade where 83% were English language learners. The treatment group consisted of 39 students. The control group used only the core reading program. Thus, the treatment group means sum score in

blending words were 5% as compared to the control group's 2.5%. Additionally, the treatment group mean sum score in rhyming words was 3.9%, and the control group was 1% (Earobics, 2015).

Fluency. Adam (2011) defined reading fluency as the ability to read aloud with the kind of ease, accuracy, rhythm, and intonation that signals ongoing command of the meaning and flow of the text. Being able to read accurately is troublesome for many at-risk readers. The National Assessment of Educational Progress (NAEP) reported as many as 40% of fourth graders in the nation's schools are unable to read with minimal fluency (as cited by Daane, Campbell, Grigg, Goodman, & Oranje, 2005). NAEP administered reading passages to a group of fourth graders. The results revealed the average fourth graders who were not yet able to read NAEP's test passage with minimal fluency fell below the "Basic" cutoff, indicating an incapability to comprehend or derive meaning from grade-level texts. To further demonstrate the impact of fluency, only 10% of fourth graders could read the passage "with phrasing that was consistent with the author's syntax and with some degree of expressiveness" (Daane et al., 2005, p. 5), and only this group obtained reading comprehension scores that were at or above grade-level ("Proficient" on the NAEP).

Shneyderman (2006) used Voyager Passport, a computer-assisted reading program that focuses on fluency, vocabulary, comprehension, and writing, to evaluate ninth and tenth graders of limited English Proficiency (LEP) in Miami, Florida. The treatment group consisted of 453 students, and the control group consisted of 394 students who were matched to the experimental students based on English for Speakers of Other Languages (ESOL). The study did not report whether the control group received any remedial intervention. The Florida Comprehensive Assessment Test (FCAT) pretest was the dependent variable. Ninth graders improved

significantly showing (ES= + 0.22, p< .05), but tenth graders revealed no significant effects showing (ES= + 0.12, p<.05) for a mean effect size of +0.17.

These statistics further illustrate the importance of students being able to read fluently. Adam's (2011) Catch-22 statement:

> A text read without fluency can barely be understood, and what has not been understood cannot be learned. It follows that unless and until children can read and understand texts on their own, they need support and instruction to help them through it. The value of providing such help is not merely one of ensuring that students will gain from the text at hand but, more importantly, that they will be better able to manage the next text on their own—after all, schoolbooks only become harder with time. (p. 5)

Vocabulary. Research shows that struggling readers have limited vocabulary skills; therefore, comprehending complex reading material is difficult**.** Based on Lloyd and Mitchell's (1989) report, 67 new concepts were presented on nine pages in a science textbook. In a survey of 123 teachers and content-area teachers, 62% reported using strategies to determine the meaning of unfamiliar words (Barry, 2003). Using word sight technique, students could associate sounds and words until they were automatic (Cunningham, 1995). Snow, Burns, and Griffin (1998) stated:

> It was postulated that readers' background knowledge was the key that enabled the reader to understand text. Also, skilled readers differ from unskilled readers in their use of general world knowledge to comprehend text literally as well as to draw valid inferences from texts, in their comprehension of words, and in their use of comprehension-monitoring and repair strategies. (p. 62)

Finally, teachers who provided students with opportunities to decode text and draw meaning from experience can have a significant impact on children's vocabulary (Duke, 2003). The National Reading Panel (2000) suggested that teaching vocabulary directly, teachers clarify meanings and utilization of new words, and that students take a hands-on approach to learning vocabulary.

Comprehension. The main purpose of reading is to comprehend the content. Comprehension transpires when the reader uses strategic analysis and skills to understand text (Farstrup & Samuels, 2002). Rose (2005) stated that using the following reading strategies improves students' understanding of text:

- Monitoring comprehension: Successful readers know when they understand a passage and when they do not. When they do not understand, they know to pause and utilize strategies to improve their understanding,
- Using prior knowledge: Thinking about what is already known about the subject helps readers make connections between the story and their knowledge,
- Making predictions: Good readers often make predictions as they read through a story, using both the knowledge they bring to a text as well as what they can derive from the text,
- Questioning: When children ask questions about what they read and subsequently search for answers, they are interacting with the text to construct meaning. Good questions are based on a child's knowledge base and what further information she desires,
- Recognizing story structure: Children will understand a story better if they understand how it is organized (i.e., setting, plot, characters, and themes), and

- Summarizing: When they summarize a story, readers determine the main idea and important information and use their own words to demonstrate a real understanding of the text. Understanding text requires both strategies and motivation. (p. 5)

Even though the NRP stated the previous reading strategies, Dymock & Nicholson (2010) suggested that teachers focus on five instructional reading strategies. Rosenshine (2012) added other factors associated with developing students understanding of complex text are reviewing, presenting new information in increments, providing models, and using the scaffolding approach.

Adolescent Literacy

The National Assessment of Educational Progress (2005) stated more than 60% of middle and high school students scored below "proficient" level in reading achievement. Even though the National Assessment of Education Progress stated that eighth through twelfth graders made some improvement in reading, the percentage of students performing at or above the Basic level did not change significantly from 2009 to 2011 (National Center for Education Statistics 2009, 2011). Regardless of why students are not reading on grade level, students are leaving high school without sufficient reading skills to be considered college and career ready (National Assessment of Educational Progress, 2005). Before many eighth-grade students progress to the next level of learning, they do not have partial mastery of grade-level knowledge and skills (U.S. Department of Education, 2014).

Secondly, literacy in this global technological society expands far beyond students' ability to read words from textbook. As Bronfenbrenner, McClelland, Wethington, Moen, and Ceci (1996) noted, "In a technological society, the demands for higher literacy are constantly increasing, creating ever more grievous consequences for those who fell short and contributing to the widening economic disparities in our society" (p. 25). Adding to the reading problem, the United

States Department of Education implemented a new phase of Common Core Performance Standards causing students to make judgments about higher-level text, to evaluate different genres, and to complete research across curriculums (Common Core State Standards, 2010). To accomplish these tasks, students must possess critical thinking skills (Martinez, 2006). Computer-assisted instruction is one way that school districts help at-risk reading students close the learning gap.

Computer Assisted Instruction (CAI). Teaching students to read can be viewed as a daunting task because at-risk students lack effective reading strategies, such as decoding words and comprehension skills (Ganske, 2000). On the other hand, most proficient readers view reading as "natural" process that is part of their daily occurrence (National Institute for Literacy and Center for Education Statistics, 2014). Students processing information at different intervals results in teachers constructing lessons that are rich in language and that address multiple learning styles (Black & Wiliam, 2009). Authors of National Research Council Report, Preventing Reading Difficulties in Young Children (as cited in Snow, Burns, & Griffin, 1998) concluded that most effective teachers constructed a unique blend of instructional ingredients for every child with whom they work. Moving into a more technological phase of instruction, school districts are using computer-assisted learning to improve student learning.

With technology advancements, school districts are implementing computer-assisted instruction into the curriculum so that at-risk students can acquire explicit reading skills to excel academically. Computer reading programs focus on skill attainment through practice in phonemic awareness, alphabetic, fluency, vocabulary, and comprehension (National Reading Panel, 2000). These computer programs provide interactive lessons that are self-paced, that can be repeated as needed, and that may provide animation, graphics, and auditory cues for self-

correction (Academy of READING®, 2014). Knowing computer programs are included in the curriculum, educators are transitioning from lectured based instruction to viewing how computer-assisted instruction impact student learning (Purcell, Heaps, Buchanan, & Friedrich, 2013).

READ 180 is a multimedia reading program that helps students with reading disabilities accomplishes grade-level literacy tasks. Researchers developed the program at the Cognition and Technology Group at Vanderbilt University, and the program is now dispersed through Scholastic Inc. The program entails hyperlinked instructional videos, closed captioning, graphic organizers, comprehension strategy prompts, and continuous student progress monitoring. Having the ability to tailor lessons to fit the readers' needs by customizing the program's features and hyperlinks has been shown to motivate students and to improve students' reading performance (Hasselbring, Goin, & Wissick, 1989; Jonassen & Mandl, 1990). Additionally, READ 180 Net Generation has been transformed to align with *Common Core State Standards*, which includes the critical analysis and synthesis of texts that reflect the literature found in the real world (National Governors Association Center for Best Practices (NGACBP), Council of Chief State School Officers (CCSSO), 2010). This compilation of READ 180 research contains 40 correlational and descriptive and quasi studies taking place in a variety of settings in school districts across the country from 1999 to 2012.

Based on research from 2006 to 2011, Striving Readers studied four school districts that used READ 180 for a period ranging from 1 to 5 years. The research shows significant increases in reading achievement for struggling students. In Newark, New Jersey, significant impacts were shown for all students, including an important student population group of boys, African

Americans, and students with disabilities. READ 180 was shown to have a significant overall impact on incarcerated students in Ohio Department of Youth Services facilities.

Cypress-Fairbanks Independent School District (CFISD) used Reading 180 to help students who were reading below proficiency. READ 180 students in Grades 4-5 and 7-12 were included in the Scholastic Reading Inventory (SRI), a measure of reading comprehension, comprising a total sample of 2,799 students with valid pretest and posttest SRI data. Based on research, all students improved using Read 180. Students with disabilities improved from 40% to 56% and from 16% to 60%. However, ninth graders with disabilities remained the same from 2008-2009.

Deer Valley Unified School District adopted READ 180 to improve at-risk students reading skills of elementary and middle school students on the Arizona's Instrument to Measure Standards (AIMS) and who also performed poorly on the SRI. Findings showed that students demonstrated significant gains on the AIMS Reading Test. Overall, the percentage of READ 180 students meeting the standard increased significantly from 9% in 2010 to 42% in 2011. Students in the fifth and sixth grades made the largest improvements, with the percentage of students meeting or exceeding standards increasing by 38% for the fifth graders and 45% for the sixth graders. Data continued to show that disability students met or exceeded AIM reading standard increasing from 11% in 2010 to 27% in 2011. In addition, the percentage of READ 180 ELLs meeting or exceeding the reading standard increased from 6% in 2010 to 37% in 2011.

Another component of Scholastic Inc., WiggleWorks, an integrated learning system for developing literacy, provides built-in-instruction and incorporates engaging features to motivate students in reading. To endorse reading, WiggleWorks focuses on the five key areas of Reading First: Phonemic Awareness, Phonics, Fluency, Vocabulary, and Comprehension. WiggleWorks

(2014) reported Lynn Hickey Schultz, Ed.D. of Harvard University, conducted a validation study to examine the effectiveness of the program. The study consisted of 283 students in the experimental group and 368 in the comparison group. The Iowa Test of Basic Skills (ITBS) in Vocabulary, Word Analysis, Language, and Reading were measured. The experimental group showed a significant gain in reading over the comparison students on the composite ITBS language arts score. However, after controlling for differences in students' initial scores, regression analyses showed greatly significant differences ($p < .0001$) between students who utilized WiggleWorks program than students in the control group (WiggleWorks, 2014).

Compass Learning, a computer-assisted instructional program, provides research-based lessons for elementary, middle school, and secondary education. The program entails Compass Learning Odyssey, which focuses on improving competency; Renzulli Learning, which provides online activities based on student's interests and learning styles; and Teacher Academy, which provides educators with data. During the 2011 school year, Burlington Area School District in Burlington, WI used Compass Learning to improve 1876 students in grades 1-8 reading/language arts skills. Even though the study showed positive results, there was no control group to compare the treatment group. To compensate for the absence of a control group, Burlington School District compared students' median percentile rank change across the school year to NWEA MAP's (Measure of Academic Progress) national norm group (WiggleWorks, 2014).

Compass Learning (2014) stated Compass Learning helped Burlington students grow in comparison to students across the nation. Students in fifth grade began the school year either meeting or not meeting the state reading and language arts standards. However, at the end of the year, these fifth-grade students exceeded in both reading and language arts. Similarly, Burlington sixth grade students increased 15 percentiles from fall to spring. Seventh grade students gained a

median of 13 percentiles in reading and 10 percentiles in language usage during the school year. Eighth grades students did not increase as did the previous grades, but students reading scores improved.

More specifically, the Accelerated Reader program, commonly referred to as AR, is an independent computer-based reading management program produced by the Wisconsin Educational Corporation Renaissance Learning. Students read appropriate grade-leveled books that fall within their zones of proximal development (ZPD) and take brief, plot-based quizzes. Based on research, Renaissance Learning claims that by using the Accelerated Reader program, teachers motivate students and that "self-selected reading at students' independent reading levels resulted in success, which ignite enthusiasm, improved attendance, lessened discipline problems, and promoted better attitudes" (Renaissance Learning, 2013). Addition to the program's belief, the Accelerated Reader website stated that AR is the world's most popular reading management software. Used in nearly 60,000 schools, AR provides teachers with an easy and effective way to monitor all forms of guided reading practice (Accelerated Learning, 2014). Being a research-based program, much of the Accelerated Reader study was done by the Institute for Academic Excellence, a subsidiary of Advantage Learning that provides research and professional development services. Nevertheless, different schools have implemented AR to improve students reading.

Goodman (1999) implemented AR on 282 seventh and eighth graders in Arizona for a year. The study lacked an experimental and control group to compare results, but Goodman reported students improving in vocabulary and making gains in comprehension in grade equivalent scores, but not significant gains.

Scott (1999) conducted a four-month experimental research with learning disabled students. The experimental and control group showed progression. Because students read independently at different amount of times, Scott's methodology was flawed. Nevertheless, both groups showed gains in attitude.

Vollands, Topping, and Evans (1999) conducted a six-month quasi-experimental action research evaluation of AR looking at two elementary schools with at-risk readers. In each school, there were an experimental and a control group. The outcome assessment reading quotients for both the experimental and control group indicated a statistically significant growth over the experimental period, and the control group indicated a larger gain from a higher baseline (Vollands et al., 1999, 2006). However, the students' reading rates were not equal causing the classes in the two groups to be labeled non-comparable.

McGlinn and Parrish (2002) used AR reports, reading levels, and teacher records to determine how AR benefited limited English proficient fourth and fifth graders. McGlinn and Parrish found a profound change in students reading habits with a large increase in independent reading and improved attitudes toward the task of reading. Groce (2005) examined how educators utilized the AR program within their language arts curriculum by observing, analyzing, and interacting with 67 teachers from two school districts. Groce's findings revealed that if AR is not used in isolation, AR cannot meet students' needs and contributes to students being life-long readers; thus, educators must give alternative reading assessments to track students' progress. AR is not intended to be the only measure of reading ability, and AR is more conducive when paired with other reading assessments and teaching methods that employs direct instruction (Accelerated Reader, 2014).

Accelerated Reader program has been utilized in studies showing negative, neutral, and positive impact on student learning. First, Mackh's (2003) study showed a decline in students' reading achievement. Next, Melton et al.'s (2004) study revealed that students had no significant development using the program. Finally, Putman's (2005) research showed that students progressed in reading self-efficacy and value of reading.

Furthermore, Melton et al. (2004) conducted a quantitative research study using fifth-grade African American and Caucasian students. The treatment group consisted of 322 Accelerated Readers, and the control group consisted of 277 non-Accelerated Readers. Terra Nova standardized reading test was used as the measuring instrument. The results showed the Accelerated Reader treatment group did not outperform the control group. In fact, Melton et al. wrote, "It should be noted that students who did not participate in the Accelerated Reader program showed a significant increase in reading achievement growth when compared to students who had participated in the Accelerated Reader program for a year" (p. 23).

Computer-assisted learning has shown to significantly impact student learning; however, research has shown that not all CAI did not impact student learning. Dynarski, Agodini, Heaviside, Novak, and Campunzano (2007) found no effects on reading achievement on students in first and fourth grade. In like manner, students at Texas middle schools received laptops for every student, extensive software, and a vast amount of professional development did not impact reading in comparison to schools without numerous technology (Texas Center for Educational Research, 2007).

Student Achievement. NCLB has caused educators to view their teaching methods differently (Coleman & Pimentel, 2012). Before the measurement of AYP, administrators and teachers provided instructional practices with minimum scrutiny of federal guidelines. This is not

to blame anyone or to state that teachers are not providing students effective teaching strategies or that schools do not make a difference in student achievement (Hattie, 2012). Developers of NCLB believed that students and teachers would passively take a hands-off approach, which did nothing to solve adolescent literacy problems (Wheatley, 2001). Regardless of who is to blame, NCLB requires that school districts impact student achievement.

Coleman (1966) interviewed 600,000 students and 60,000 teachers in more than 4,000 United States' schools. Coleman's findings suggested that the clear majority of differences can be contributed to natural ability, to socioeconomic status of the student, and to a student's home environment. To further support Coleman's findings, the Office of English Language Acquisition reported that there were over three million children with limited English language skills in U.S. schools nationwide. Now, students are expected to meet or to exceed benchmarks where passing is set by the school district; CRCT and the newly developed Georgia Milestone are set by the state. Advancing to the next learning phase depends on students being prepared for the rigor of CCSS; therefore, school districts are reviewing instructional programs to enhance student achievement.

First, not only providing students with an explanation of what they are doing correctly but also providing them with ways to correct their errors in a timely manner is critical to the effectiveness of a school (Marzano, 2001). To further elaborate, Marzano (2001) identified nine instructional strategies to improve student achievement:

1. Identifying similarities and differences
2. Summarizing and note taking
3. Reinforcing effort and providing recognition
4. Completing homework

5. Representing knowledge
6. Participating in learning groups
7. Setting objectives and providing feedback
8. Generating and testing hypotheses
9. Using cues, questions, and advance organizers (p. 146).

Moreover, research continuously shows that giving students' feedback after an assignment has a greater chance of impacting student achievement; in addition, being able to give students feedback in specific levels of growth has a better impact than assigning a letter grade (Clark, 2011). Struggling readers, most of the time, associate failing grades as a sign of weakness causing negative views about reading. Stiggins (2001) cited one necessary condition for integrating assessment into the teaching and learning process is to assess student achievement accurately. Stiggins thought that teachers and administrators need to understand what their students should achieve and what knowledge skills and competencies they must master because of undergoing learning experiences provided by the teacher. Teachers cannot assess, let alone teach, standards that have not been defined clearly (Wiggins, 2012); consequently, teachers should afford students opportunities to be familiar with the standards and should promote and demonstrate how to implement the standards so that students can master standards (Stiggins, 2004).

Continuing to improve students' schema, Montgomery County, Maryland, Public Schools System used Students Achieving Independent Learning (SAIL) to help at-risk students obtain habits, develop attitudes, and utilize tools that would assist at-risk students with becoming independent readers and learners. In 1982, Collins and Smith's theoretical work was instrumental to developing SAIL. Collins (1989) used proponents of SAIL to assist at-risk

students with reading; thus, at-risk students began to implement the four reading self-monitoring strategies: predict-verify-decide, visualize-verify-decide, summarize-verify-decide, and think aloud.

Researcher Hattie (2012) conducted several meta-analyses of student achievement. Based on his studies, Hattie proposed that teachers provide direction and re-direction so that students understand the content; thus, teachers and students can maximize learning. Through his extensive research, he compared the effect size of many features that influence learning outcomes in schools and mentioned that many ideas work in education. Hattie posited discovering which strategies and creations work in education and where to begin to impact student achievement is critical.

Hattie's findings showed in Visible Learning that visible learning occurs when teachers see learning through the eyes of students and help them implement the highest level of learning-teaching and creating. Hattie found that the 10 most effective influences relating to student achievement are: student self-reporting grades (d= 1.44), formative evaluation (d=0.9), teacher clarity (d=0.75), reciprocal teaching (d=0.74), feedback (d=0.73), teacher-student relationships (d=0.72), meta-cognitive strategies (d=0.69), self-verbalization/ questioning (d=0.64), teacher professional development (d=0.62), and problem-solving teaching (d= 0.61) (2008).

At-Risk Students. This study examines the relationship between reading intervention during extended learning for at-risk eighth students and their third nine reading benchmark scores. Georgia's Department of Education defined an at-risk student as "a student with detailed needs that may deter academic success, graduation, or ability to successfully be college or career ready" (Georgia Department of Education, 2011). Coinciding with previous research, the National Assessment of Educational Progress (2007) reported that only 31% of eighth-grade

students with disabilities could successfully derive meaning from grade-level text (Vaughn, Wexler, Leroux, Roberts, Denton, Barth, & Fletcher, 2012). More alarmingly, research stated that the average eighth-grade proficiency rate for students with disabilities across all state reading assessments was only 38.1% in 2010–2011 (Vang & Thurlow, 2013). Adding to the data, studies showed that 29% of students started the ninth grade with reading proficiency levels two or more years below grade level and that 71% read at only the "basic" level or lower (National Assessment of Education Progress, 2005). With Common Core State Standards mandating students to think abstractly instead of concretely, educators must find ways to assist at-risk students. As stated by Crabb (1987):

> Every attempt to help people must first begin with an effort to understand people; understanding people offers opportunities to learn about the whole person not merely what you want to see. Knowing and understanding that many at-risk students come to school with a myriad of problems other than the fact that they are struggling readers is essential to understanding the whole child. (p. 21)

More specifically, Becker's (2002) research revealed children were more likely to experience educational failure if teachers did not understand the following about at-risk students:

> (a) come from a low-income home, (b) are African American, Hispanic, or Native American, (c) are male, (d) have a learning disability, attentional disorder, or emotional disorder, (e) enter first grade without foundational abilities in language (i.e., a large spoken vocabulary and knowledge of syntax), literacy (i.e., the ability to identify sounds in words and recognize letters), and mathematics (i.e., counting skills), (f) have to repeatedly deal with stressful events such as marital discord, parental job losses, and violent acts, (g) live with just one parent, (h) have friends who are not good role models

for academic achievement and engagement, and (i) move to new schools multiple times throughout their elementary school years. (p. 194)

Achievement Gap on Gender and Socioeconomic Status (SES). Although some progress has been made in improving the literacy accomplishment of students in American schools (Lee, Grigg, & Donahue, 2007; Salahu-Din, Persky, & Miller, 2008), gender must be viewed to understand its impact in the educational setting, and low-socioeconomics must be studied to assess why this subgroup still does not read or write well enough to meet grade-level demands set forth by CCSS. Research shows that females perform better on reading assessments than males (National Assessment of Educational Progress, 2009). Furthermore, typically, students from low-socioeconomics are labeled based on CRCT measurement as Level 1, meaning students did not score 800. Based on Noll (2010), African American male students and Hispanic students face challenges in their educational development. Within the African American male and Hispanic student subgroups, almost a third of these students do not graduate from high school and close to 50% drop out.

No Child Left Behind legislation addresses equity among groups based on ethnicity, socioeconomic status, student disability status, and English-proficiency, but not by gender. Subsequently, the results from examining the data from a longitudinal study showed that girls in grades kindergarten to 5 are more likely to read than boys in grades kindergarten to 5, and girls are more likely to be successful with reading (McIntosh, Reinke, Kelm, & Sadler, 2013). However, much of the research has focused on the impact of gender differences due to the widening gap between the average educational achievement of boys and girls (Halpern, 2012). Hernandez (2011) reported that students who are not reading competently by the third grade are four times more likely to be labeled a drop-out, who more than likely never receives a diploma.

If students do not possess basic reading skills during their early schooling, the chances of them being high school graduates are six times more likely to occur. Even though NCLB (2001) does not focus on the significance of gender, schools must view all relevant factors that contribute to student achievement. In addition, from various research, Duckworth and Seligman, (2006); Kuhn and Holing, (2007); Pomerantz, Altermatt, and Saxon, (2002) revealed that in the last decade females have received higher grades in many subjects than males; thus, females continue to earn higher grades at the college level. Duckworth and Seligman (2006) further stated that girls also graduate from high school with higher grade point averages than males. Finally,

Research suggests that one impact of the achievement gap between middle/upper income level students and students from impoverished homes lies in their vocabulary differences **(**Reardon, Murnane, & Duncan, 2011). Studies indicate these vocabulary deficits appear very early in low socioeconomic environments and rapidly progress unless vocabulary instruction is prioritized (Beck & McKeown, 2007). At-risk students do not come to an educational setting with an understanding of syntax and semantics, which results in poor academic performance **(**August & Shanahan, 2006).

To help at-risk students in reading and to close the achievement gap in reading, NCLB (2001) legislation placed emphasis on all children receiving a rigorous curriculum being taught by a highly-qualified teacher. This mandate helps at-risk students who are in danger of failure to meet grade level standards and end-of-year state tests. Tucker and Stronge (2005) stated teachers have begun to review data, to monitor students' development, and to differentiate instruction. Furthermore, school administrators have started implementing one phase of formative assessment through benchmark tests so that teachers can document students' progress (No Child Left Behind Act: Accountability, 2008, Including Individual Student Growth). These formative

assessments, as well as summative assessments, allow teachers to have data so that they can help close the achievement gap between at-risk reading students and on grade or above grade-level students (Black & Wiliam, 2009).

Motivation. Literacy is an essential part of students' lives. Students read chore lists, e-mails, magazines, and novels, search the Web, and much more (Watson & Watson, 2011). On the opposite, when students must comprehend in an academic setting, many struggling readers are not motivated to read passages aligned with an educational curriculum (McRae & Guthrie, 2009). Brophy (1986) explained motivation to learn is acquired "through general experience but stimulated most directly through modeling, communication of expectations, and direct instruction or socialization by significant others (especially parents and teachers)" (p. 40). Nevertheless, motivation to learn continues to affect adolescent literacy in academic settings.

Continuously, research shows that when educators provide students with interesting topics and allow students to choose topics of interest, students' comprehension improves (Guthrie, 2007). Dating back to 1987, Good and Brophy emphasized students having opportunities to select from multiple reading text. Jiménez and Duke (2011) surveyed fourth-grade students about expository text topics of which they liked to read. From their responses, half of the students were interested in studying about robotics, and the other half were interested in learning about working animals. All students in the group were asked to read six texts, three on working animals and three on robotics, to think aloud as they did so, and to provide an oral recall after each set of three. When students read on the topic of reported interest to them, students' comprehension score was higher on the topic of interest.

Research conducted by Stanovich (1986) indicated that reading becomes more awkward as students spend more time with increasingly difficult texts. Students making choices

concerning their learning felt a sense of independence, which caused them to be active participants in learning (Reis, McCoach, Little, Muller, & Kaniskan, 2011). For instance, Purcell-Gates, Duke, and Martineau (2007) assessed second and third graders' reading skills when they were given a chance to read and write about issues outside of school. These students showed a higher growth in reading comprehension. On the contrary, students whose assignments entailed reading a chapter from textbooks and answering open-ended questions showed lower rates of comprehension growth. Providing students with engaging materials have shown to improve comprehension.

Extended Learning Time. To ensure that at-risk students are college and career ready, school districts offer extended-day for students whose lifestyles or circumstances are not aligned with the traditional school day. The New Hampshire Department of Education (2014) defined extended learning as the primary acquisition of knowledge and skills through instruction or study outside of the traditional classroom procedure.

With Georgia adding more rigorous English language arts standards, teachers are continuously suggesting more time to teach low-achieving students (CCSSO & NGA, 2010). If feasible, at-risk students should receive daily extra instructional reading time based on students' grade and reading ability (Carnine et al., 2006). Decrease in budgets has caused teachers to contemplate the negative effects on student learning. Conversely, Farbman and Kaplan (2005) proposed that extended time assists teachers with helping students understand content without feeling pressured to rush during instructional class time. Even though more research needs to be conducted on the effectiveness of extended learning, the following research on extended learning has proven to be advantageous (National Center on Time and Learning, 2012).

Hausner (2000) reported that low-achieving students at the Project Accelerated Literacy (PAL) after-school kindergarten literacy program literacy scores increased by more than 16 percentile points. However, students in the second grade did not show continuous growth. Hausner implied that at-risk students may need more than computer-assisted instruction to retain the gains made because of the early intervention program. In a like manner, Durlak and Weissberg (2007) reviewed relevant data and analyzed 73 after-school programs' effectiveness on students learning and social development. Their meta-analysis of after-school programs that focused on personal and social development suggested that the programs have a positive impact on students' grades, academic achievement, and self-esteem.

Driven by willingness to make a difference in the educational setting, school districts are implementing Nontraditional School Programs (NSP). NSP curriculum focuses on innovative instructional practices and on differentiating the standards students learn so that students can comprehend rigorous assignments in the regular learning environment (Ender & Wilkie, 2000). To close the achievement gap in reading, public schools offer computer-assisted learning, one being Academy of READING® to meet CCRPI requirements.

History of Academy of READING

The Academy of READING®, formerly known as the AutoSkill Component Reading Subskills program, is an intensive and comprehensive research-based reading intervention software tool designed to help at-risk students. The program is designed to build accuracy and automaticity in sound matching, letter-sound matching, decoding, phonics, and fluency. AutoSkills (2014) informed Academy of READING® is based on neuroscience and reading research that identifies how the brain functions while reading; from studying these components, the program utilizes progress monitoring, integrates lessons that link the Common Core State

Standards, provides research-based strategies to meet Response to Intervention (RTI*)* requirements, and provides teachers with an array of data to close the literacy gaps. For this research, executive functioning strategies, which are based on brain research, will be addressed.

One component of executive functions is metacognition. Kaufman (2010) defined metacognition as setting, planning/strategizing, sequencing, organization of materials, time management, executive/goal-directed attention, task persistence, working memory, and set shifting. As stated by Academy of READING (2014), Academy of READING® was designed to guide students through different phases that aided them in developing their metacognition skills. First, Academy of READING® administers the students a screening test that consists of several maze reading passages. Students are then assigned a "training stream," and then move through an individually assigned series of tutorials, activities, and assessments with the goal of mastering 80-100 % of the material on each skill assigned. Students who begin at the lowest levels (Below Basic and Basic) are considered below grade level. From these results, students must complete more material to complete their training stream than those who score Proficient, Advanced, or Graduate. After students have completed their training stream, they take the post-assessment, again consisting of several maze reading selections (AutoSkills, 2014).

During each phase, students have opportunities to visit The Trophy Room and the ability to change avatars. Using a structured approach, Academy of READING® provides a placement test and coordinates individualized programs that tailor to learners' needs that offer additional training and additional practice. Developers of Academy of READING® believe that motivation has a profound effect on students' willingness to engage in the educational process. To keep at-risk students interested in learning, students were afforded a plethora of opportunities to receive

rewards between lessons, which increased their chances of mastering reading standards (AutoSkills, 2006).

As students' progress through Academy of READING's phases, students should recognize words and decode words that require them to be self-regulated to perceive images accurately, inhibit impetuous responses, recollect information, self-monitor, and self-correct. These requirements further illustrate the importance of developing executive functioning skills. Added to these components is the ability to read fluently, which necessitates the use of the additional executive functions of pace, attention, and stability. Students must speak clearly so that the computer can understand spoken language. Additionally, Academy of READING® provides participants with activities that help students develop their executive functions in cueing, directing, and coordinating the act of reading for meaning. Moving through each stage, students are reading for mastery. Being able to comprehend the complex text, students continuously exhibit executive functions such as judge, revise, shift, hold, manipulate, create, prolong, organize, and plan. Providing students with a structuring mechanism helps students use literacy strategies as they comprehended text (Huelser & Metcalfe, 2012). Consistently practicing, students begin to develop their metacognitive understanding through each zone (AutoSkills, 2006).

Students do not always have existing schema for new information; therefore, students are provided with a plethora of experiences to aid in developing their cognitive skills (Martinez, 2006). The previous research has shown that allowing students to receive Academy of READING® instructions at least three times a week for 30 minutes a day, students will make a percent gain. Building on students' schema helps them use information to read extended text. Cognitive, flexibility, and working memory are components of Executive Functions, which are

essential to developing sufficient readers (Kaufman, 2010). Putting these key components together, Academy of READING® creates an ideal learning setting for students as they build fundamental reading skills while focusing on five essential academic components that were addressed by National Reading Panel (2000): phonological awareness, phonics/word study, fluency, vocabulary, and comprehension.

Effectiveness of Academy of READING. In 1986, Drs. Christina Fiedorowicz and Ronald Trites developed the concepts of subtypes, and the researchers studied the impact of AutoSkill Reading program with 15 reading disabled males. Research showed, "Each had failed to acquire normal reading proficiency despite average intelligence, socio-cultural opportunity, conventional instruction, and freedom from gross sensory, emotional or neurological handicaps" (Academy of READING, 2014, p. 24). Next, training was administered to participants based on Subtypes O, A, and S, which represented the students' reading disabilities (Fiedorowicz, & Trites, 1987). Type O students were categorized as students needing oral reading; type A students were categorized as students needing auditory-visual matching-to-sample procedures; finally, type S students were categorized as students needing visual matching-to-sample procedures. After research was completed, data showed that on word recognition participants made a 1.1 level gain instead of the predicted .1. "The research conducted on AutoSkill was well conceived, implemented, and showed convincing results of a reading technology's ability to increase student reading achievement on a variety of measures" (Schacter, 2000). Having a clear perception on neurological aspects underlying what hinders students from becoming proficient readers was essential to guiding stakeholders in preparations for the future (Restak, 2001).

As a result of the first study conducted by Fiedorowicz in 1986, Fiedorowicz and Trites (1987) conducted a more logical study consisting of a pre-and post-test assessment battery including:

1. The AutoSkill Reading Program Test Battery to assess reading word recognition;
2. The Gallistel-Ellis Test of Coding Skills to assess phonetic knowledge;
3. The Qualitative Analysis of Silent and Oral component reading subskills;
4. The Wide Range Achievement Reading to assess the reading of cloze paragraphs; and the Student Problem Individual Reading Evaluation to assess paragraph reading fluency, retention comprehension. (p. 23)

Furthermore, the researchers constructed larger sample sizes, used an Untrained Control Participants and an Alternative Computer-Trained Control Participants, administered longer training period, and involved teachers in training the students. The total study consisted of 115 students. There were 74 participants in the treatment group. The researchers divided the participants into the Subtypes of O, A, and S needing oral reading, auditory-visual matching-to-sample procedures, and visual matching-to-sample procedures. AutoSkills' researchers trained 26 participants in Type O group; 22 students were trained in Type A; 26 students were trained in Type S; 17 students were placed in the Untrained Control Group. Grouping the participants lead these researchers to view the impact of AutoSkills.

After research was completed, Fiedorowicz and Trites (1987) reported systematic training of deficient component reading skills. Per subtype classifications, students did develop reading skills in general, including reading word recognition, phonetic knowledge, paragraph reading fluency, and comprehension. Allowing students to receive additional time was conductive to students increasing their reading scores. The Untrained Control Group in

comparison to the AutoSkill trained group did not progress on all the tasks. Fiedorowicz and Trites' (1987) research showed that AutoSkill was effective in the management of reading disabled participants.

Using AutoSkills' research, researchers implemented Academy of READING®. Based on the studies, AOR has been instrumental in student achievement. At Faust Junior High School in Chambersburg Area School District 2001-2002 School Year, eighth grade students training on Academy of READING showed statistically significant gains in of 2.4 grade levels on Stanford Diagnostic Reading Test after 11.5 hours of time on task; 92% of 48 students showed gains on Stanford Diagnostic Reading Test; 82% showed gains on Cloze Paragraph reading test, and 65% of students scored above grade eighth grade level on Stanford Diagnostic Reading Test (Academy of READING, 2014).

In regards to the effectiveness of Academy of READING®, Independence Middle School (2002) conducted a case study by surveying their at-risk population. Their at-risk population achieved 39% or less on the TerraNova test or was deemed Basic or Below Basic on the Pennsylvania System of School Assessment (PSSA). Approximately 86% of these struggling students performed below grade level after a Cloze Paragraph assessment. Each student benefited from 30 minutes a day for three days a week of "time on task," which caused their Stanford Diagnostic Reading Test (SDRT) to improve. Students demonstrated average gains of 2.5 grade levels on comprehension section of the SDRT. Another point to note, students with 15 or more hours of time on task demonstrated average gains of 2.6 grade levels (AutoSkill, 2006).

In an additional case study that was like the previous one, Shiloahview Elementary used the DIBELS, a reading intervention program, as the main test to measure students' fluency. From the results, 109 students from grades 3 to 6 were identified. The school district reused the

DIBELS to benchmark students' results and administered the test three additional times. Based on the students' data, at-risk students progressed 30%, causing 12% of Below Basic students to be labeled on task. During the May testing date, students showed a 27% increase with 5 hours and 29 minutes on task (AutoSkill, 2006).

From 2010 to 2011, Dr. Edina Torlakovic, Senior Research Scientist at School Specialty Literacy and Prevention, conducted a randomized control trail (*RCT*) study of the use of the Academy of READING® with 77 special education students in grades 2-11 at Whitehall City School District. The treatment group consisted of 33 students, and the control group consisted of 39 students. Students were placed on either Tier II or Tier III Response to Intervention Pyramid (RTI). Students in the treatment group were 'pulled-out' from class to train in the Academy of READING® three times a week for 30 minutes per session over 19 weeks. Nevertheless, the control group did not receive Academy of READING®. Students received the following measures: (a) Gates-MacGinitie Reading Test (GMRT), (b) System to Enhance Educational Performance (STEEP), (c) Ohio Achievement Assessment (OAA) (d) Academy of READING, (e) Placement Test (AoR PT), and (f) Academy of READING® Oral Reading Fluency Benchmark Assessment (AoR ORFBA).

The results indicated that the treatment group reading scores improved as compared to the control group who did not participate in Academy of READING®. The results continued to show the treatment group improving significantly in reading achievement, other areas of reading such as comprehension, vocabulary, and fluency. Basically, Special Education at-risk students in the treatment group showed a significantly ($p \leq .05$) greater gain than the control group (U.S. Department of Education, 2014).

Despite the positive results presented, AutoSkill (2007) showed that the Academy of READING® product was receptive to small experimental studies that found improved brain functioning using pre-and post-imaging and reading skills for dyslexic readers who were given a three-week, phonologically driven instructional treatment. However, the *Best Evidence Encyclopedia* found no studies for secondary education that met their criteria for experimental and control studies on Academy of READING®. Lacking secondary information, researchers did not rate the effectiveness of Academy of READING® (Johns Hopkins University (CDDRE), 2011).

Morgan, White, Portal, Vanayan, and Lasenby (2002) conducted a qualitative research study by surveying 1,128 administrators, department heads, and teachers about the effectiveness of Academy of READING®. Research showed over 40% of teachers and department heads were unsure about computer-based interventions' effectiveness, and over 65% were unsure about the effectiveness of Academy of READING®. Only 20% of Administrators were unsure about general computer-based interventions, and 30% were unsure about the Academy of READING®. The surveys indicated that "while few respondents in all three groups specified that the software package is ineffective, over 2/3 of all teachers and department heads indicated that they were 'not sure' whether the software was effective" (p. 12-15).

The previous studies show that schools are using computer-assisted reading programs to impact student learning. Through case studies, randomized studies, and testimonials, Academy of READING® has shown to improve student achievement. The Academy of READING® program provides lessons aligned to Common Core State Standards (CCSS) and adheres to the Response to Intervention (RTI) (Academy of READING, 2014). Additionally, Academy of READING® impacts at-risk students, regardless of their gender or socioeconomic status, and

shows tremendous results (U.S. Department of Education, 2014). However, there are limited numbers of empirical research that show the effectiveness of Academy of READING® program (Morgan et al., 2002).

Clark (1994) proposed that achievement gains in studies of educational technology are flawed. Adding to this statistic, Clark further stated that studies lack methodological adequacy. Blok, Oostdam, Otter, and Overmaat's (2002) review of computer-assisted programs showed that 10 of the 42 studies did not have a control group. Slavin (2008) conducted a meta-analytic research to view the effectiveness of computer-assisted programs and other educational programs. Slavin used the Comprehensive Meta-Analysis Software Version 2*,* a statistical analysis software*,* to calculate effect sizes and to perform meta-analyses (Borenstein, Hedges, Higgins, & Rothstein, 2005). Dynarski et al. (2007) and Campuzano, Dynarski, Agodini, and Rall (2009) evaluated six supplemental programs, including Academy of READING®. The results indicated these highly ranked randomized studies using large samples with a minimal effect size ranging from -0.01 to +0.11, which shows the programs ineffectiveness.

In contrast, READ 180 and Voyager Passport, which combine computer and non-computer instruction in the classroom, used instructional practices that are conducive to learning. READ 180 and Voyager Passport' s quasi experiments produced a greater effect sizes. Slavin and Lake (2008) ranked computer-assisted instructional programs based on effectiveness as strong effectiveness, moderate evidence of effectiveness, limited evidence of effectiveness, and no qualifying category. Cheung and Slavin (2013) study on 20 computer-assisted programs were viewed negatively. Inopportunely, there were few high-quality studies for analysis that included effect size. After further review of the data, Slavin and Lake placed Academy of READING® in the no qualifying category suggesting the ineffectiveness of the program.

Summary

NCLB (2001) mandates that schools across America be held accountable for all students' learning. Therefore, administrators are restructuring the learning environment and are finding best practices for all students (Black & Wiliams, 2006). Thus, districts are investing in various forms of learning such as Academy of READING® so that struggling learners' reading skills can improve.

Learning is no longer viewed as merely directed instruction, but computer-assisted learning programs are used to create an educational climate where students interact with computer-based programs (Lei & Gupta, 2010). A significant number of studies showed diversified results by using a variety of structured tasks. Through generating and testing hypotheses, teachers guided students to produce positive outcomes, especially in the areas of time on task, cost effectiveness, and increased academic performance (Norris, Smolka, & Soloway, 2000). Current research on computer-assisted instruction in reading has improved student achievement; nevertheless, not all research studies reported provided positive effects.

Based on the research reviewed, empirical studies did reflect some of the pedagogies associated with Academy of READING®. First, the cognitivism and the socialism theories used in Academy of READING® focus on building students' schema. Moreover, enhancing students' prior knowledge will help them learn beyond a rote memory (Clark, 2011). Even though additional studies are needed to show the effectiveness of executive functions in education, research showed positive results on student learning. Furthermore, since empirical research on Academy of READING® is limited, additional empirical research is needed to determine the effectiveness of Academy of READING® on at-risk students' reading scores and close the achievement gap in education.

CHAPTER THREE: METHODOLOGY

Design

A causal comparative design was used to compare the performance of at-risk students in eighth grade on third nine-week reading benchmark test and Criterion Reference Competency Reading Test (CRCT) scaled scores after using Academy of READING® during extended learning. The research problem addressed in this study was that very few current empirical research studies exist on the effectiveness of the Academy of READING® software program, designed to improve eighth grade students' reading achievement; however, several studies were used during its origination, and statistics from different school districts show positive outcomes from helping students on Response to Intervention (RTI), special needs, and at-risk students regardless of socioeconomic status (Academy of READING, 2014). This study will fill gaps in literature by determining results (if any) that Academy of READING® program may have on reading achievement of at-risk students.

In 2010, Georgia implemented the CCSS in English language arts and mathematics and adapted the Georgia Performance Standards (GPS). Presently, standards in Georgia are titled the College and Career Ready Georgia Performance Standards (CCGPS). For the 2014-15 school year, students in Georgia will take a new assessment aligned to the CCGPS. Therefore, the Department of Education will not release information pertaining to the validity and reliability of the Georgia Milestone. For this study, it must be noted that in 2015, Georgia Department of Education (2015) changed the English and reading assessment to Georgia Standards of Excellence (GSE).

This ex post facto study analyzed data gathered during the 2013-2014 school year. A causal-comparative design was suitable because the cause and effect had already occurred and

was examined after the fact (Gay, Mills, & Airasian, 2011). Gall, Gall, and Borg (2007) stated a causal-comparative design is one that seeks to describe a cause-and-effect relationship using an at least one independent variable and a dependent variable. To further clarify the variables, the independent variables, use of Academy of READING® on the treatment group as compared to students on Response to Intervention who did not receive Academy of READING®, gender and socioeconomic status, and the dependent variable examined in the study was that of the third nine-weeks benchmark scale scores and CRCT reading scaled scores.

In addition, the researcher had no control over the independent variables, and the researcher did not choose the participants or the class to which they were assigned (Glatthorn & Joyner, 2005). The study used an ex post facto design instead of a correlational design for two reasons. First, the preset measures were used by principals to assign students to the control and treatment groups such as low reading scores on CRCT and academic failure, and the data was already gathered. Next, correlational research consists of one group and two or more variables, whereas an ex post facto design consists of two or more groups and one variable (Gall et al., p. 307, 2007). Finally, an ex post facto study is nonexperimental.

Research Questions

Research questions for the study are:

RQ1: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the third nine-week reading benchmark assessment when participating in Academy of READING® during extended learning classes versus those non-participating eighth graders?

RQ2: Is there a difference based on gender on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ3: Is there a difference based on socioeconomic status on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ4: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the Criterion Reference Competency Test when participating in Academy of READING® during extended learning classes versus those non-participating eighth graders?

Null Hypotheses

The null hypotheses are:

$H_0$1: There is no significant difference in the reading comprehension scaled scores of eighth graders on the third nine-week reading benchmark assessment when participating in Academy of READING® versus nonparticipating eighth graders.

$H_0$2: There is no significant difference based on gender in the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$3: There is no significant difference based on socioeconomic status in the third nine-week Reading Benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$4: There is no significant difference in the reading comprehension scaled scores on Criterion Reference Competency Test of eighth graders when participating in Academy of READING® versus non-participating eighth graders.

Participants and Settings

Administrators from a middle school located in rural Georgia assigned students to group based on 2012-2013 Georgia Criteria Reference Competency Test (CRCT) and academic

achievement. The school identified the students in the study and grouped classes heterogeneously focusing on gender, race, and disability. Therefore, no bias was present in the study. Students or parents were not contacted because the data were presented by grade level within the school. The study did not include the identity of the students and teachers. The researcher presented the study to the principal, and then to the superintendent for approval.

Participants in the treatment group consisted of 16 eighth grade students who did not pass the Criterion Reference Reading Competency Test or who received research-based strategies that were mandated by RTI Tier II guidelines. Georgia established a level of adequate performance for students at 800 or higher, which means a student meets or exceeds state requirements. Using the Georgia's score of an 800, administrators assign students into the treatment group based on students' CRCT scaled score and students' RTI guidelines. To meet the needs of at-risk students, administrators implemented additional reading support through a research-based computer program during extended learning to accommodate needs of struggling readers. Based on research, Bradley, Danielson, and Doolittle (2007) suggested that these principles be administered in a timely and rigorously method:

- Research based and data-driven, scientifically based classroom instruction must be provided to students. All students are entitled to receive first-rate, research-based instruction in the general education classroom.
- Monitoring students' progression is essential to the development of the program. Universal screening and progress monitoring provide information about a student's learning rate and level of achievement, both individually and in comparison, with the peer group. Constantly finding the best practices ensures that the students' needs are at the forefront. These data are then used when determining which students need

closer monitoring or intervention. Throughout the RTI process, student progress is monitored frequently to examine student achievement and gauge the effectiveness of the curriculum. Decisions made regarding students' instructional needs are based on multiple data points taken in context over time.

- Tiered instruction. A multi-tier approach is used to efficiently differentiate instruction for all students. Every student in the building is afforded the opportunity to be placed on the tier and afforded different educational practices. The model incorporates increasing intensities of instruction offering specific, research-based interventions matched to student needs.
- Parental involvement. Parents are kept abreast about their child's progress, the instruction and interventions used, the staff selected to deliver the instruction, and the academic or behavioral goals for their child. (p. 2)

Furthermore, the teacher of treatment group was a Special Education teacher trained in Academy of READING® and certified in Language Arts. Students participating in Academy of READING® received computer-assisted research-based reading instruction for 45 minutes per day, five days per week, from October 2013 to May 2014. The curriculum of Academy of READING® was self-paced, and students were assessed with a diagnostic placement test to identify the skill set deficiencies needed to place students in the appropriate instructional level. Levels were designed to provide strategy based instruction and remediate identified gaps in reading. In addition, students were given reading passages pertaining to standards that were addressed on reading third nine-week benchmark. Based on the school's policy students received an academic grade at the end of the nine weeks.

The Control Group consisted of 29 students who did not use Academy of READING® during the 2013-2014 school year. Classroom instruction for the Control Group consisted of research-based strategies that were outlined in their RTI plan. During regular academic time, all students were exposed to essential questions and state standards, which defined objectives that assisted low-achieving students with understanding state standards (Black & Wiliam, 2006). Formative and summative assessment strategies were used to help all students. Academy of READING® provided students with formative assessments, a form of checking students understanding of standards during instruction, and summative assessment, a form of signaling the end of students' mastery, so that students could be successful in the regular educational setting, could pass stated mandated tests, and could show improvement on the Georgia Student Growth Model Index.

The setting of this study was a middle school located in a rural, low-socioeconomic area of Southeast Georgia. This educational setting was chosen because it provided an organizational program that used research-based strategies based on RTI guidelines. Teachers and students collaborated to achieve quality educational goals for all students. Teachers were trained how to implement formative and summative strategies, how to implement researched-based practices relating to being a Learning Focused School, and how to use data to identify areas of deficiency to improve instruction in reading.

Treatment administered in this study was Academy of READING® during extended learning classes at a Title I, rural Learning Focused School. During the 2013-14 school year, the student population comprised approximately 1,034 students; there were 355 students in the eighth grade. Males included 42% of the population, and females included 58% of the

population. The racial breakdown was comprised of the following: 43% whites, 52% African-Americans, 4% Hispanics, and 1% two or more races (Georgia Department of Education, 2014).

Instrumentation

Before the implementation of the study, students were screened with a universal screener using the STAR Reading Program. The study utilized third nine-weeks reading benchmark scores in conjunction to the 2013-14 Criterion Reference Reading Competency Test.

STAR Reading Program: The STAR Reading Program is an online assessment that provides students with cloze reading passages and traditional reading comprehension passages to measure students' reading success. The program is constructed to provide teachers with data quickly and accurately. Based on the Renaissance Learning (2014), teachers are provided with four reports to help provide students essential intervention.

1. Diagnostic: This area shows students' grade equivalent, percentile rank, estimated oral reading fluency, scaled score, instructional reading level, and Zone of Proximal Development.
2. Growth: This area shows the progression of a group of students over a specific period.
3. Screening: This area provides teachers with data that detail whether they are above or below their benchmark assessment throughout the year.
4. Summary: This area assists teachers with whole group test results for a specific test date or range. (p. 4)

Benchmark: The benchmark test is administered in the form of formative assessment to prepare students for the Criterion-Reference Competency Test, an annual measurement of student achievement, and a summative assessment to signal the end of the nine weeks. The

1. school district used Riverside's Data Director Program, a researched-based product of Houghton Mifflin Harcourt Publishing Company, to create formative assessment and data management solutions to promote continuous school improvement and student growth. Through intensive assessment training with a research-based consultant in formative and summative assessment, teachers are continuously trained on how to revise summative assessments (Benchmarks) and how to develop new formative assessments. Teachers meet by department at the grade level and utilize the data from the formative assessments to correlate test items to state assessments.

Additionally, Data Director offers test items in Math, Science, Reading, and Social Studies, in grades 1-12, which are correlated to Georgia Performance State Standards to provide students with meaningful and rigorous assessments. Reading passages have been assigned a Lexie® measure and Flesh Kincaid readability level, ensuring that assessment is written at student's reading level based on these formulations, FKRA = Flesch-Kincaid Reading Age, ASL = Average Sentence Length (i.e., number of words divided by number of sentences), and ASW = Average number of Syllable per Word (i.e., number of syllables divided by number of words). Specific mathematical formula is: FKRA = (0.39 x ASL) + (11.8 x ASW) - 15.59, (Flesh, 1948). These techniques were data driven to help find best teaching practices for both students and teachers (Institute of Education of Science, 2009).

Criterion Reference Competency Test (CRCT): State law requires that students in grade 8 pass the CRCT in math and reading, which are determining factors for schools to make Annual Yearly Progress, AYP, now part of the College Career Performance Readiness Index. Scores are reported in terms of raw scores, scale scores, and Performance Levels, ranging from does not meet, meets, and exceeds category. Riverside Publishing Company, a major testing company for

Georgia, reports validity and reliability used to measure student achievement (Georgia Department of Education, 2013).

The Georgia Department of Education (2013) indicated each test item on the CRCT was reviewed by Riverside Publishing Company, a division of Houghton Mifflin Harcourt Company, a charter member of the Association of Test Publishers, for appropriateness using the Standard Error of Measurement (SEM). A SEM of 10, for instance, indicates a true score probably lies within 10 points of reported score. A smaller SEM indicates a more reliable score. To obtain this information, each item was analyzed by bias and fair reviewers, ensuring that each item did not advantage or disadvantage any specific cultural group. After an item passed these reviews, it went out for field tryout. Statistics were analyzed to determine if it discriminated. Finally, test forms were assembled from these validated items for a national standardization for norm and criterion referenced assessments.

The Director of Assessment Research and Development Georgia Department of Education stated the Criterion Reference Competency Test is reported using several statistical measures. First, index is Cronbach's alpha reliability coefficient (Cronbach, 1951). Secondly, Standard Error of Measurement (SEM) is used to describe test scores reliability for CRCT. Table 2 shows reliability and SEM for CRCT scores in terms of Cronbach's alpha along with raw score SEM for all grades and subjects of 2013 CRCT. Also, table 2 depicts that reliability ranges from a low 0.87 (in reading) to a high of 0.92 (in math), and standard error of measurement ranges from 2.23 to 3.14, which is consistent) (Georgia Department of Education, 2013).

Table 2

Reliability Coefficients (Cronbach's Alpha) and Raw Score SEM for Subject Area Tests by Grade

6th Grade	Reliability	SEM
Reading	.87	2.37
English/Language Arts	.90	2.72
Math	.92	3.14
7th Grade		
Reading	.87	2.41
English/Language Arts	.89	2.59
Math	.92	3.13
8th Grade		
Reading	.86	2.23
English/Language Arts	.88	2.71
Math	.92	3.15

Georgia Milestone. Common Core State Standards come from the National Governors Association and were developed by students, teachers and administrators to provide a quality standard of education. In doing so, common core standards focus on these points:

- Conceptual Understandings
- Progress in the Early Grades
- International Benchmarking
- Students and Parents can clearly Understand Goals and Expectations
- Advance Accountability

With new standards being implemented, Georgia Department of Education will form a new assessment, Georgia Milestone. The new testing system will include open-ended questions

to better measure students' content mastery. With some exceptions for special education students with specific testing accommodations, Georgia Milestones will be administered entirely online by fifth year of implementation, compared to 35% online administration of EOCT in 2013-2014. Georgia Milestone will be developed by CTB/McGraw-Hill. The Director of Assessment Research and Development Georgia Department of Education, reported because Georgia Milestone is a new assessment, the validity and reliability will not be available 2015-16 (see Appendix B).

Procedures

Permission to obtain data necessary for this study was granted by the district's Superintendent (see Appendix C). The researcher followed all requirements as stated by the Institutional Review Board (IRB) (see Appendix A). Due to chain of command, the researcher also gained permission from the principal of the school. The Director of Flexible Learning Program and Coordinator of Thomson-McDuffie Data team provided additional data. All student test data will remain confidential and coded to ensure privacy of each participant. Reading benchmark test will be scanned using Data Director, which will be correlated to Academy of READING®.

Based on the design of the program, the assessment of Academy of READING® was designed so that Grade Equivalent reading level scores is consistent with scores on other major standardized tests. Test results were reported in multiple formats, to enable interpretation of student skills from multiple perspectives. Student's proficiency was reported in score levels: (a) Developmental Level Based on nine key comprehension levels, (b) Performance Level Below Basic, Basic, Proficient, or Advanced, and (c) Grade Equivalent according to grade level and within grade level based on month of instruction; for example, Grade 6.3 reflects Grade 6, month

3. Data Director was designed to code students' performance on each benchmark to pattern data on Academy of READING®. Finally, the researcher used IBM Statistical Package for Social Sciences (SPSS) to compile data.

Data Analysis

This quantitative, causal comparative study determined Academy of READING® effectiveness when used in extended learning classes. The dependent variable examined third nine weeks reading benchmark scores and Criterion-Reference Competency Test subset reading scores based on independent variables, use of Academy of READING® on the treatment group, gender, and socioeconomic status. Since there was neither manipulation of independent variable nor random assignment of participants, a causal/comparison design was used to compare two groups. An independent sample *t*-test was used to determine if there was a significance mean difference between two groups (Gall et al., 2010).

The independent sample *t*-test is relevant because it is used for comparing sample means to see if there was sufficient evidence to infer means of corresponding population between the control and treatment groups' distributions will differ (Campbell & Stanley, 1966; Creswell, 2008). Two samples were measured on some variable of interest. An independent sample *t*-test determined if means of two sample distributions was significantly different from each other. Alpha level, maximum probability that you reject null hypothesis, which is akin to controlling Type I error (Howell, 2011), specified whether a significant change existed between students who participated in Academy of READING® program as opposed to students who did not participate in research based reading program.

Summary

The purpose of this quantitative casual comparative study was to examine the differences between the Academy of READING® software program and students' third nine-weeks reading benchmark scores as well as students' CRCT scaled reading scores. Chapter three discussed the design and procedure that will be used to conduct the research. Chapter four presents the results of the research, and chapter five presents the analysis of the results, suggestions for social change, recommendations for action, and recommendations for future study.

CHAPTER FOUR: FINDINGS

The purpose of this causal comparative study was to determine if the Academy of READING® program affected eighth grade at-risk RTI students reading scaled scores on third nine-week reading benchmark and Criterion-Reference Competency Reading Test. All data analysis utilized the SPSS PASW Statistical 22.0 software.

Research Questions

RQ1: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the third nine-week reading benchmark assessment when participating in Academy of READING® during extended learning classes versus those non-participating eighth graders?

RQ2: Is there a difference based on gender on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ3: Is there a difference based on socioeconomic status on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?

RQ4: Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the Criterion Reference Competency Test when participating in Academy of READING® during extended learning classes versus those non-participating eighth graders?

Null Hypotheses

The researcher developed these hypotheses based on the research questions presented: The null hypotheses for this study are:

$H_0$1: There is no significant difference in the reading comprehension scaled scores of eighth graders on the third nine-week reading benchmark assessment when participating in Academy of READING® versus non-participating eighth graders.

$H_0$2: There is no significant difference based on gender in the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$3: There is no significant difference based on socioeconomic status in the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

$H_0$4: There is no significant difference in the reading comprehension scaled scores on the Criterion Reference Competency Test of eighth graders when participating in Academy of READING® versus non-participating eighth graders.

Descriptive Statistics

The sample for the study was comprised of 45 RTI students. The independent variable class groups were AOR participants and Non AOR participants (see Table 3). The research question pertaining to gender was reported as (treatment male n=11, M=46.55, SD =8.395) and (treatment female n=5, M=56.80, SD=12.458). The research question pertaining to socioeconomics was reported as (low SES n= 2, M = 47, SD=1.414) and (high SES n= 14, M = 50.14, SD=11.326). The dependent variables for this study were third nine-week reading benchmark scores and Criterion Reference Competency Reading scores (see Table 4).

Table 3

Descriptive Statistics for Independent Variables

Variable	*n*	*%*	*M*	*SD*
Class group				
AOR participants	16	35.6	2.17	1.09
Non AOR participants	29	64.4	2.02	.96

Table 4

Descriptive Statistics for Dependent Variables

Variable	*N*	*Min.*	*Max.*	*M*	*SD*
Third Nine-Week Benchmark score	45	20	80	48.27	13.66
CRCT score	45	792	867	818.38	15.29

Academy of READING®, a computer-based intervention, was administered to at-risk RTI eighth grade students for 5 days, 45 minutes a week during extended learning time. Students' achievement level outcome was based on the following criteria: minutes on task, points on task, percentage on task, points for reading, conduct, and skills mastered (see Appendix E). Moreover, Table 5 displays Academy of READING® achievement level outcome as a group for the 2013-2014 academic year. Table 5 provides a comprehensive perspective on how the AOR students received each nine-week grade.

Table 5

Academy of READING® Achievement Level Outcomes

	Min. on Task	Pts. On Task	% On Task	Pts. Read	Conduct	Skills/ Mastered	Total Pts.	Grade Average
1	3051	33	1145	27	44	12	134	78.6
2	1398	26	979	10	36	18	99	70.0
3	1302	32	1152	10	36	10	105	73.0
4	924	19	990	34	38	9	106	68.2
5	1328	29	1133	2	36	12	111	83.0
6								
7	1058	11	1165	7	34	9	88	71.0
8	1478	24	852	9	39	8	30	75.0
9	1648	19	834	20	60	13	61	46.0

Assumption Testing

The following assumptions were tested prior to the statistical analysis:

Null Hypothesis One ($H_0$1):

There is no significant difference in the reading comprehension scaled scores of eighth graders on the third nine week reading benchmark assessment when participating Academy of READING® versus non-participating eighth graders.

Assumption Testing $H_0$1

The null hypothesis of the first research question was addressed by conducting an independent samples *t*-test. The assumption of homogeneity of variance was tested using Levene's Test of Equality of Variances, F(43) = 2.25, p=. 141, indicating that the variances of the two populations are assumed to be approximately equal (significance not less than .05). The Shapiro-Wilk test did not demonstrate normality for the AOR participants (p = .034).

Conversely, the Non AOR participants (p = .276) could be assumed. Because the independent variables were not normally distributed, the researcher used a nonparametric Mann-Whitney test, U = 278.500, z =41.929, p =.267, which revealed no significant differences in the groups.

In addition, a histogram revealed normality for third nine-week reading benchmark level scores. The data fell within the bell-shaped curved. The assumption of normality was evaluated using box-and-whisker plots. The boxplots demonstrated eight outliers that consisted of five outliers for the AOR participants and three outliers for the non-AOR participants (see Figure 2); however, none of these cases were extreme outliers (Field, 2009). Finally, the researcher reviewed the data with and without the outliers, which continued to reveal normality for the third-nine week reading benchmark level scores so that the data would not reflect bias.

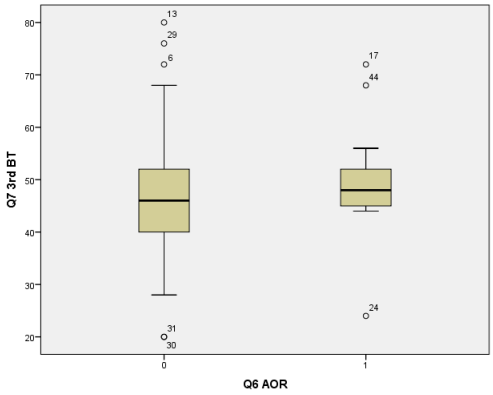

Figure 2. $H_0$1 Boxplots for Non AOR and AOR on Third Nine-Week Benchmark

Null Hypothesis Two ($H_0$2)

There is no significant difference based on gender in the third nine weeks reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning.

Assumption Testing Ho2

An independent sample *t*-test was run to determine if there were differences in third nine-week benchmark scaled scores after participating in AOR between male and female. The Levene's test, F(15) = 4.00, p=.109 indicated that the variances of the two populations were tenable (significant not less than .05). However, the Shapiro-Wilk test, indicated a violation of normality for the males, p=.005, and the females were normally disturbed p=.332.

Next, the histogram showed the assumption of normality was tenable. The boxplots demonstrated that case 10 for the male was an outlier. Since the data was small, the researcher eliminated bias by compiling the data with and without the outlier (sees Figure 3). Removing case 10 caused the Levene's test of equality of variances, F(15) = 23.42, p=.001, to reveal the populations were not tenable. Therefore, the researcher used the pooled variances version of the independent sample *t*-test, a nonparametric Welch's F(1.960), z = 4.422, p = .228 test, indicating that not all scores had the same average score on the measure of third nine-week benchmark.

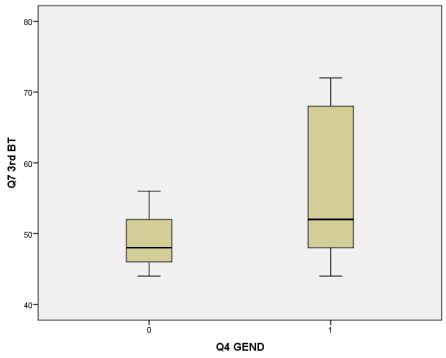

Figure 3. $H_0$2 Boxplots for Male and Female AOR Participants

Null Hypothesis ($H_0$3)

There is no significant difference based on socioeconomics in the third nine week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of Reading® instruction during extended learning.

Assumption Testing $H_0$3

To obtain the answer to this hypothesis, an independent sample *t*-test was conducted to determine if there was a significant difference between the 14 low SES students and two high SES students based on the third-nine week reading benchmark scaled scores. The test of homoscedasticity was conducted to assess the equality of the variances between the two groups using the Levene's test, $F(14) = 1.22$, $p = .287$. The results were tenable due to $p > .05$ could be assumed.

The Shapiro-Wilk test indicated a violation of normality being that is *p* less than .05 for the high SES group because the sample size consists of two participants. Thus, no data was reported, which equates to p=.001; on the other hand, the Shapiro-Wilk test indicated normality for the high SES group; p is greater than .05 (p=.104). The evidence demonstrated that normality for all groups at $p > .05$ could not be assumed. To further investigate the significant differences in third nine-week benchmark scaled scores, a nonparametric Mann-Whitney's test revealed no significant differences in the groups ($p = .600$). The data showed p was greater than .05.

Again, a histogram revealed normality for the third nine-week reading benchmark achievement level scores fell within the bell-shaped curve. Boxplots demonstrated that cases 3, 10, and 15 were outliers for the high SES group (see Figure 4). However, the following cases were not extreme outliers.

Low SES Participants *High SES Participants*

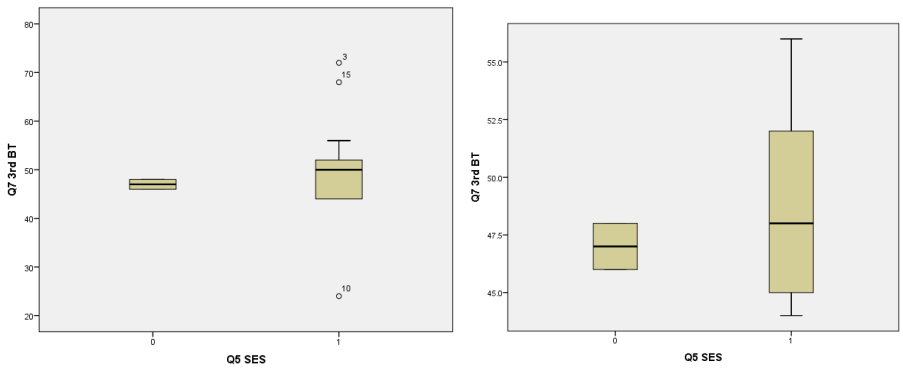

Figure 4. $H_0$3 Boxplots for Low SES and High SES participants

Null Hypothesis ($H_0$4)

There is no significant difference in the reading comprehension scaled scores on Criterion Reference Competency Test of eighth graders when participating in Academy of READING® versus non-participating eighth graders.

Assumption Testing Ho4

There were 16 students in the treatment group, AOR participants, and 29 students in the control group, Non AOR participants. Again, an independent sample *t*-test was utilized to determine if there was a significant difference between the at-risk AOR participating students and non-participating at-risk eighth graders on the CRCT Reading scaled scores. The Levene's Test of Equality of Variances, F(43)=.266,p=.609, indicated that the variance of two populations were assumed to be approximately equal (significance not less than .05) **(**Good, 2005).

In addition, the Shapiro-Wilk test (p = .077) for the non-participating group and Shapiro-Wilk test (p = .377) for the participating group suggested that normality was a reasonably assumption. Visually, a relatively bell-shaped curve was displayed in the histograms. Nevertheless, the boxplots reflected that the non-participating group displayed case 40 as an outlier, which was not an extreme outlier (see Figure 5).

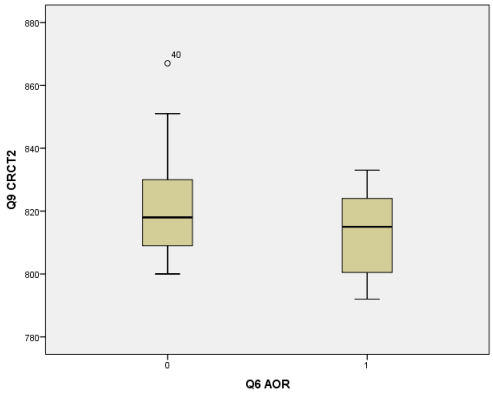

Figure 5. $H_0$4 Boxplots for AOR Participants and Non AOR Participants on CRCT

Results

Inferential analyses were conducted in this study for four research questions through the calculation of an independent samples *t*-test.

Hypothesis Testing $H_0$1

The results showed that the independent sample *t*-test determined there was no significant difference between the means of student achievement outcomes on the third nine week reading benchmark test scale scores between at-risk students who participated in Academy of READING® (n=16, M=49.75, SD=10.605) and at-risk students who did not participate in Academy of READING® (n=29, M=47.45, SD=15.193). An independent *t* test did not reveal a significant difference in the two groups, t (43) = -.537, p= .594 (see Table 6). The effect size, η2= .006, was small. The researcher inferred that although at-risk students who participated in Academy of READING® third nine-week benchmark scaled scores were higher than at-risk students who did not participate, there is not a significant difference in these averages. The researcher failed to reject the null hypothesis.

Table 6

$H_0$1 Independent Samples t-Test

t	df	Sig.	Mean Difference	SE Difference	95% CI of the Difference	
					Lower Bound	Upper Bound
-.537	43	.594	-2.302	4.287	-11	6.345

Hypothesis Testing $H_0$2

The independent sample *t*-test determined there was no significant difference between the means of student achievement outcomes on the third nine- week reading benchmark test scaled scores between male (n=10, M=48.80, SD=4.02) and female (n=5, M= 56.8, SD= 12.46). An independent t test did not reveal a significant difference between the two groups t(13)= .-1.902, p= .080 (see Table 7). The effect size, η2= .218 was a moderate effect. The researcher failed to reject the null hypothesis.

Table 7

Final $H_0$2 Independent Sample t-Test

t	df	Sig.	Mean Difference	SE Difference	95% CI of the Difference	
					Lower Bound	Upper Bound
-1.902	13	.080	-8.000	4.205	-9.36	8.60

Hypothesis Testing $H_0$3

The independent sample *t*-test determined there was no significant difference between the means of student achievement outcomes on the third nine-week reading benchmark test scaled

scores between high SES students (n=2, M=47, SD=1.41) and low SES students (n=14, M= 50.14, SD= 11.33). The results also showed that t(14)= -.381 , p= .287 (see Table 8). Even though the high SES group was N=2 and the low SES group mean score was slightly higher at 3.14%, there was not a significant difference between the scaled scores. The effect size, η2= .010, was small. The researcher failed to reject the null hypothesis.

Table 8

$H_0$3 Independent Sample t-Test

t	*df*	*Sig.*	Mean Difference	SE Difference	95% CI of the Difference	
					Lower Bound	Upper Bound
-.381	14	.287	-3.143	8.255	.-20	.14

Hypothesis Testing $H_0$4

An independent sample *t*-test was conducted to determine if a difference existed between the mean scores between participating at-risk students and non-participating at-risk students. The independent sample *t*-test determined there was no significant difference between the means of student achievement outcomes on the CRCT scaled scores between treatment, participating in AOR (n=16, M= 813.38, SD= 13.29), non-participating (n=29, M=821.14, SD=15.82). The independent *t*-test revealed t(43) =1.66, p= .104 (see Table 9). The p value was greater than .05, p=.104. The effect size, η2= .060 was a small effect. This suggested although the non-participating group has higher CRCT scaled scores, there is not a significant difference in these averages. The researcher failed to reject the null hypothesis.

Table 9

$H_0$4 Independent Sample t-Test for CRCT

t	*df*	*Sig.*	Mean Difference	SE Difference	95% CI of the Difference	
					Lower Bound	Upper Bound
1.66	43	.104	7.763	4.668	-1.65	17.18

Summary

The independent samples *t*-test has three underlying assumptions (Creswell, 2013). Moreover, the independent-samples *t*-test is a robust test. Meaning, the t test is relatively insensitive (having insignificant effect) to violations of normality and homogeneity of variance, depending on the sample size and the type and magnitude of the violation. During the study, null hypothesis one did not demonstrate normality for the AOR participants (p=.034). Likewise, null hypothesis two did not demonstrate normality for the males (p=.005). Because the sample sizes were considered equal if the larger group is not more than one and a half times larger than the smaller group, the sample sizes did not impact the results (Morgan, Leech, Gloeckner, & Barrett, 2004).

Conversely, null hypothesis three revealed normality was not tenable in the high SES group (p=.001). Tabachnick and Fidell (2007) states the variance between the high SES and low SES is more than 4 or 5 times larger than the variance in the other group; therefore, the groups are very different. The high SES groups was N=1, and low SES was N=13. Thus, with a small sample, there is greater potential for a sampling error. Conclusions must be tentatively generalized to the target population and the effect size.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Discussion

The purpose of this casual comparative study was to investigate if using Academy of READING® during extended learning in a Title I public middle school located in southeastern Georgia made a significant impact on RTI at-risk students' third nine-week term reading benchmark scaled scores and Criterion Reference Competency Test scaled scores. Since the implementation of NCLB, Georgia school leaders have increasingly turned to computer-assisted programs, such as Academy of READING®, to improve student achievement in reading. The literature reviewed in this study focused on phonemic awareness, phonics, vocabulary development, reading fluency, and reading comprehension strategies, and student achievement. Most studies, which are conducted by the developers of Academy of READING®, do present a significant increase in student achievement; however, the four research questions conducted in this study indicate there is no significant difference between AOR participants and non-participating students scaled scores.

The first research question, "Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the third nine-week reading benchmark assessment when

participating in a research-based computer program during extended learning classes versus those non-participating eighth graders?" aimed to ascertain if the overall scaled scores between the treatment group and the control group were significantly different.

This question encompassed a third nine-week benchmark test like the state assessment test. The results of the independent *t*-test showed the overall scaled mean scores of the treatment group were higher than the control group. Additionally, the effect size for the study was small (p=.006), suggesting lack of evidence to infer that the groups differed in population. Nonetheless, controlling for internal and external validity, the researcher believed a period of 5 days, 45 minutes using this structured reading program was a reason for the differences between the treatment group and the control group (Weissberg, 2007). For example, Table 5 depicted that students received a grade average based on their participation in AOR as well as their classroom performance. Because the students' outcomes were detailed, the teacher monitored the participants' achievement in a standardized, reliable, and reasonable manner, and the students assessed their progression, whereas non-participating at-risk students were not in a structured, evidence-based reading environment (Schafer & Sweeney, 2012).

Next, the academic setting focused on phonemic awareness, phonic, fluency, vocabulary, and comprehension possibly helped at-risk AOR participants exhibit reading achievement gains (Adam, 2011). This result supports Blanchard (2000), whose research revealed that phonics software improved student learning in comparison to the school's program titled Herman Method for Reversing Reading Failure. The control group showed a mean of 52.53-point gain, and the treatment showed a mean of 49.25-point gain. Contrary to these findings, the researcher inferred that although the AOR participants third nine-week benchmark scaled scores were higher than non-AOR participants, there is not a significant difference in these averages. Rosenshine (2012)

suggested other factors associated with developing students understanding of complex text are reviewing, presenting current information in increments, providing models, and using the scaffolding approach.

The second research question, "Is there a difference based on gender on the third nine week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?" looked specifically to determine if the program increased the treatment group's mean reading scaled score when compared within the group. The No Child Left Behind Act of 2001 does not address the impact that gender has on student achievement. Conversely, Sadker and Silber (2007) debated that gender differences in learning needs to be studied further.

In this study, even though the subgroups were small, the results determined no significant difference between the male participants (n=10, M=48.80, SD=4.02) and the female participants (n=5, M= 56.80, SD= 12.46), p=.080 when both groups participated in Academy of READING®, a research-based computer program. The effect size for the study was moderate (p=.218). Given the smaller samples for these subgroup analyses, caution is warranted in generalizing these results; however, Sawilowsky and Hillman (2004) used sample sizes up to 80 and showed that power calculations based on the *t*-test were appropriate in smaller samples, even when the data were decidedly non-normal.

In a comparable manner, while the sample size in this study was small, females had a difference of eight scale points higher than male students. The results of this study indicated that the Academy of READING® program may be effective in providing a comprehensive intervention to struggling readers since male and female statistical mean scores were somewhat equivalent. However, there is not enough evidence to suggest that Academy of READING®

impacted student achievement. From the previous research in Chapter 2, the question then becomes whether girls in the treatment group would have done better than the males if they had not used AOR. Since research shows that females do better at reading tasks, the research falls in line with previous research on achievement by gender (National Center for Education Statistics, 2011).

The third research question addressed in this study was "Is there a difference based on socioeconomic status on the third nine-week reading benchmark scaled scores of at-risk eighth grade students who receive Academy of READING® instruction during extended learning?" The results of this research study for benchmark assessment did not show a significant difference in the low SES students' and the high SES students' benchmark scaled score. Also, the effect size for the study was small (p=.010). Only two students in the treatment group participating in AOR did not receive free or reduced lunch. Having a small sample size for the high SES group made statistical analysis of their data somewhat unreliable. Nevertheless, in this study, the researcher used free or reduced lunch as a SES measure because SES is a commonality in education research and is connected to federal government guidelines, which are used for federal funding in schools (United States Department of Agriculture, 2016).

In the discussion of low SES and high educational results, several studies show that on standardized tests of academic achievement, low SES students and schools do not perform as well as high SES students and schools (Perry & McConney, 2010). Reardon, Murnane, and Duncan (2011) showed that other educational outcomes were affected by family socioeconomic status, which included examination scores, high school graduation rates, and grade retention. Moreover, when free or reduced lunch statistics and education outcomes are compared, a negative correlation is produced since low socioeconomic students have a vocabulary deficit

(Beck & McKeown). The findings do not suggest that high SES students do not have difficulties in comprehension. In general, socioeconomic status effects are prevalent when they are used to designate the status of a school (Harris, 2007). Even though the sample size was small, this finding is consistent with prior research.

The fourth research question focused on the state assessment test. "Is there a difference in the reading comprehension scaled scores of at-risk eighth graders on the Criterion- Reference Competency Test when participating in a research-based computer program during extended learning classes versus those non-participating eighth graders?"

The data for this study showed that the non-participating group had a higher mean score M= 821 than the participating group M=813. However, the mean difference M=8 was not significant enough to suggest that AOR impacted student achievement. The effect size, p= .060, was small. Unfortunately, this study does not reciprocate the outcome of the literature review on this topic because the results of this research study did not show a significant difference in the participating group's CRCT scaled score and the non-participating group's CRCT scaled score.

Believing that technology positively impacts at-risk students' reading, Georgia school leaders have increasingly turned to computer-assisted reading programs, such as Academy of READING®, to increase student achievement. Even though non-AOR eighth grade at-risk students demonstrated a statistical difference of eight scale points higher than the AOR participants, the researcher concluded using computerized programs that focus on the following reading skills: phonics, fluency, vocabulary, and comprehension can have a profound effect on at-risk reading skills (Academy of READING®, 2014).

However, the results from this study suggest that AOR does not significantly impact students' reading scaled scores on the third nine-week reading benchmark and Georgia CRCT.

As the literature explains in Chapter Two, research-based interventions that help at-risk students improve test performance are critical, as passing the Georgia Standards of Excellence is a requirement for grade promotion in grades three through eight (Georgia Department of Education, 2014). To meet these criteria, school systems must provide at-risk students with additional reading support (No Child Left Behind Act of 2001, 2013). The significant relationship between the variables reveals that the two tests, while not identical in content, are closely correlated and are appropriate for measuring student performance.

The results of the previous studies further enhance the research in the field by providing a causal comparative quantitative viewpoint of AOR, a research-based computer program at the eighth-grade level of learning, using the Response to Intervention tiers. While empirical studies on Academy of READING® is limited, additional empirical research is needed to determine the effectiveness of the program on eighth grade at-risk students' benchmark scaled scores and CRCT scaled scores when administered during extended learning time (Cheung, & Slavin, 2005, Dynarski et al., 2007; Erdner, Guy, & Bush, 1997).

Conclusions

The results of this study indicated that while the use of Academy of READING® showed no significant benefit for at-risk eighth grade students, students did demonstrate improvements. Henceforth, one can conclude that AOR is not the only factor contributing to students' ability to score comparably with other RTI at-risk students. Most of the literature reported by Academy of READING® implied a positive impact on student achievement. As a result, when at-risk students use AOR, during extended learning for 5 days a week, 45 minutes a day, one assumes that at-risk students' scaled scores should increase.

The following outcomes should be noted. First, the benchmark scaled scores in the treatment group participating in AOR were higher than the control group, non-participating AOR. Only viewing students who participated in AOR based on gender and socioeconomic status did not show a significant difference due to the smaller samples for both subgroups. Finally, students in the control group', nonparticipation in AOR, mean scores were higher than the treatment group', participation in AOR, on the CRCT scaled scores. The study showed no significant difference between the two groups' scaled score.

Regardless of this information, the implementation of computer-assisted reading programs into the classroom has been a major topic of contention for decades. Much of the published research from this study showed the benefits of teaching phonics by using automaticity and labels it an invaluable piece for a child's ability to read (Adams 1990; Armbruster, 2010; Beverly et al., 2009; Cassidy et al., 2010; Pikulski & Chard, 2007). However, researchers still do not agree on the best educational practices to improve at-risk reading scores.

The researcher's study will add more positive research to the debate on administering a computer-assisted research-based reading program that enhances students' EFs skills by focusing on the NRP's belief that providing at-risk students with phonemic awareness, sound symbol, decoding and fluency, automaticity, and comprehension can be conducive to academic achievement. Along with the NRP's concepts and the following theoretical viewpoints, connectivism, cognitivism, and socialism were some of the underlying beliefs that support educational practices and enhanced the development of Academy of READING® (AutoSkill, 2006).

First, the idea of improving schools through the concept of connectivism is the basis for students using computer-based reading programs. Siemens (2005) stated that learners recognize

and interpret patterns and are influenced by the diversity of networks. Knowing that technology is impacting student learning, educators must find ways to incorporate technology into their curriculum (U.S. Department of Education, 2014). Secondly, the theory of cognitivism is relevant to the fact that having prior knowledge influences how readers make sense of new information (Anderson, 1974). Fiedorowicz and Trites (1987) created Academy of READING® using the schema theory to show how dyslexic students retrieved and added information. Another essential aspect of AOR is mirroring the scaffolding theory that was coined by Vygotsky's theory of Zone of Proximal Development, which is a component of socialism, (Vygotsky, 1978). Table 5 showed that ZPD was applied in AOR as the teacher conferences with students about their progress and observed students working dependently as well as independently in a structured environment. Being in a structured environment that focused on lessons that were below grade level might have impacted students' participation grades, which were below expectation. Guthrie (2007) stated that when educators provide students with interesting topics and allow students to choose topics of interest, students' comprehension improves. Although Academy of READING (2014) developers provide positive literature, the current study results do not support a significant difference on students' scaled scores.

Implications

Closing the achievement gaps between different subgroups in the United States has been a problem, which causes educational advocates to implement innovative techniques to improve reading skills. First, contrary to previous studies where students used AOR for 3 days a week, 30 minutes a day during afterschool, in this study, RTI at-risk students received AOR instructions 5 days a week, 45 minutes a day for an entire school year of AOR during extended learning time unless students were absent. Using AOR for additional time, the researcher predicted that at-risk

AOR students benchmark scaled scores and CRCT scaled scores would improve significantly. Table 5 analyses indicated that students were focused during the first week of the program; however, as students continued to participate in the program, their focus decreased, which could have caused low weekly grades. This study showed that having too much structure, in terms of achievement level outcomes, might affect students' attitude toward AOR, which could have impacted their scaled scores (McRae & Guthrie, 2009). Therefore, reviewing theoretical cases on increasing computer-based instructions in a structured classroom needs to be revisited.

Vygotsky (1978) theory of socialism was used to enhance learning. The social aspect of the AOR classroom appeared to be less advantageous than the computer-based instructions used by the intervention students. Table 5 analyses suggest that out of 100 points that could be received, students' highest average on conduct was a 60 during week nine. Students' ability to adhere to classroom expectations of learning in the ZPD needs to be studied further. Finally, Table 5 results show that AOR participants achievement level outcomes in all categories are significantly low, which leaves the researcher to question the methodology of implementing AOR during extended learning time. These analyses did not suggest that all participants did not perform as expected during the implementation of Academy of READING®. While the independent sample *t*-test analysis used to examine this study data showed that there was not a significant difference between the non-AOR participants and the AOR participant's scaled scores on the third nine-week benchmark assessment or CRCT, the study adds to the knowledge of literature that suggests computer research-based programs, encompassing EFs' components and focusing on phonics systematically students, will have positive outcomes (Academy of READING, 2014; Kulik, 2003; Fletcher-Flinn & Gravatt, 1995, NRP, 2000; Ryan, 1991; Torgesen et al., 1999).

Although this research cannot be the sole decision-making information a school or school division uses before contemplating the purchase of Academy of READING®, it does indicate that further study of the program should be considered. While Academy of READING® researchers determined that significant improvement occurred with the use of AOR at all levels, this study at the middle school level indicated that AOR use did not provide a significant impact on eighth grade at-risk RTI third nine-week benchmark and CRCT scaled scores.

Limitations

The study examined whether AOR had an impact on at-risk RTI students scaled scores. Some students in both groups have had issues with attendance, truancy, and tardiness. Thus, mortality may be a threat to the internal validity of this study. Students who surpassed other students could have learned other research-based strategies in other areas of the curriculum logically in the control group or treatment groups. Gall et al. (2007) proposing history or learning over a period can be revealed in students' scores. Although the review focuses on quantitative measures of reading, qualitative and correlational research can provide additional insights about the effectiveness of Academy of READING®. The study participants all came from the only middle school existing in the county. The population selected was from an "experimentally accessible population" (Gall et al., 2007, p. 388).

Having small samples sizes in gender and socioeconomics could have contributed to small effect sizes. Although the convenience sample was not diverse, Gall et al. (2007) stated that it is better to use convenience sampling than not to conduct a study. Nevertheless, the control group and the treatment group were established by the administrators. Generalizing the results was limited because the sampling technique was not a random sampling technique (Glatthorn & Joyner, 2005). However, experimental mortality, or attrition, can threaten internal

validity if it causes "differential loss of participants across treatments" (Gall et al., 2007, p. 396). Moreover, the study did not explore how long an individual had been at a certain SES level. Having this complete history could have provided a better interpretation of the results.

Finally, this research only viewed the effects of AOR based on students' scaled scores. There are several separate ways to measure the effectiveness of AOR. These alternatives will be discussed as future studies need to be conducted. Implementing new instructional methods can be costly; therefore, districts must view various approaches that tailor to the entire structure. Reviewing the different modalities of AOR, districts can have a complete viewpoint on the effectiveness of AOR.

Recommendations for Future Research

The purpose of this causal comparative study was to determine if the Academy of READING® program affected eighth grade at-risk RTI students reading scaled scores on third nine-week reading benchmark and Criterion-Reference Competency Reading Test; however, the following are recommended for future research.

- A true experimental design should be conducted to determine if Academy of READING® is responsible for the significant differences in the mean scores or if the treatment groups' results were caused by other contributing factors.
- A design comparing two groups or individual students' pretest and posttest using the End of Grade Assessment (EOG) and the Criterion- Referenced Competency Test (CRCT), would be interesting to ascertain the difference between the two summative assessments.
- A meta-analysis with large sample sizes on how dyslexic students' brain processes information between genders might provide suggestions on how to assist at-risk students (Wilhelm, 2005).

- Finally, a qualitative research design would allow the researcher to examine the personal perspectives of the students and the teacher.

Even though these suggestions will aid future studies, NCLB (2001) requires schools to show Adequate Yearly Progress in their test scores and to demonstrate that students are college and career ready; not meeting these expectations, schools in Georgia are termed "failing" (Georgia Department of Education, 2014). Future research on the effectiveness of Academy of READING® will lead inevitably to the improvement of not only reading achievement in RTI at-risk eighth grade but to education in America.

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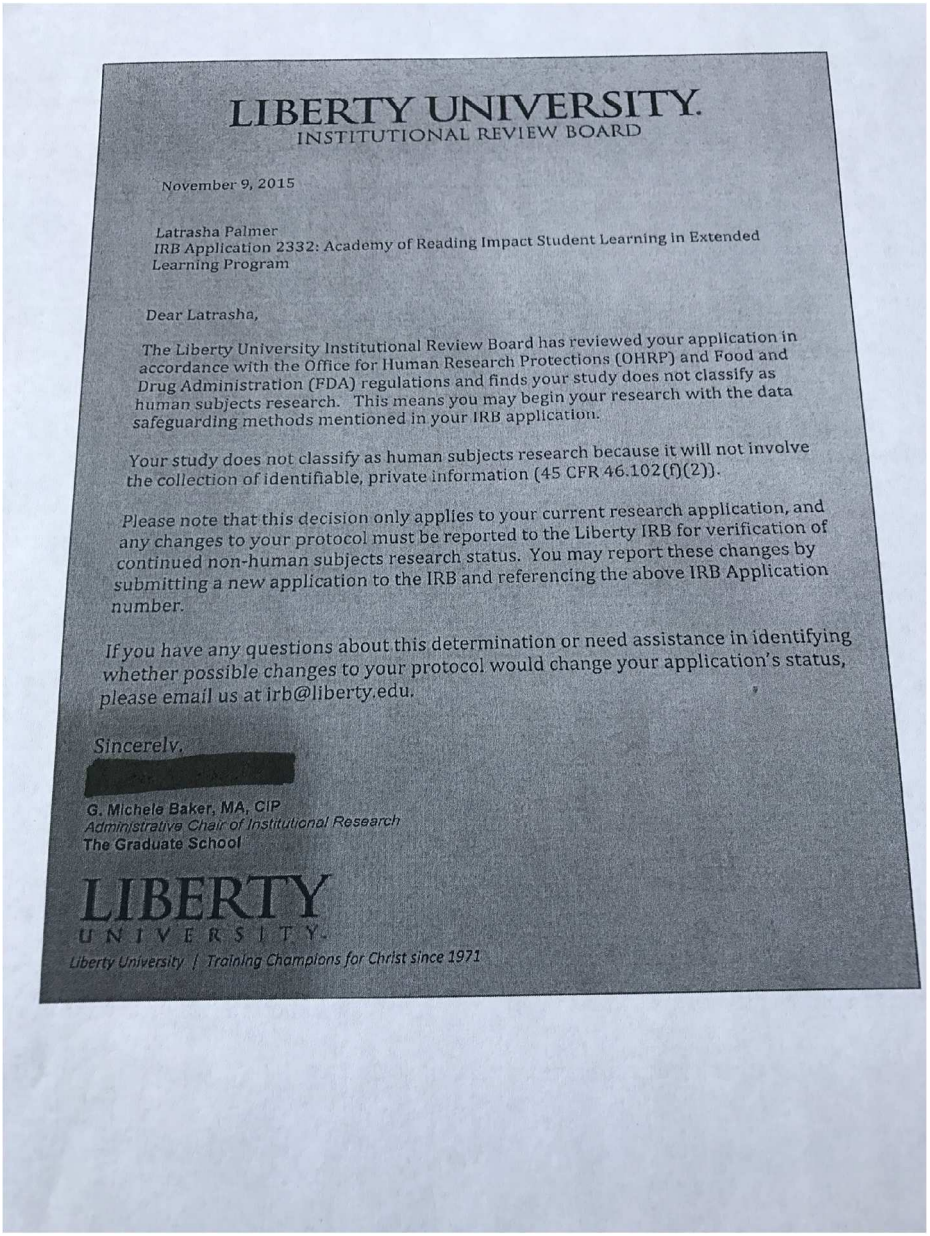
APPENDIX A

Copy of IRB Letter



LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

November 9, 2015

Latrasha Palmer
IRB Application 2332: Academy of Reading Impact Student Learning in Extended Learning Program

Dear Latrasha,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because it will not involve the collection of identifiable, private information (45 CFR 46.102(f)(2)).

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application's status, please email us at irb@liberty.edu.

Sincerely,

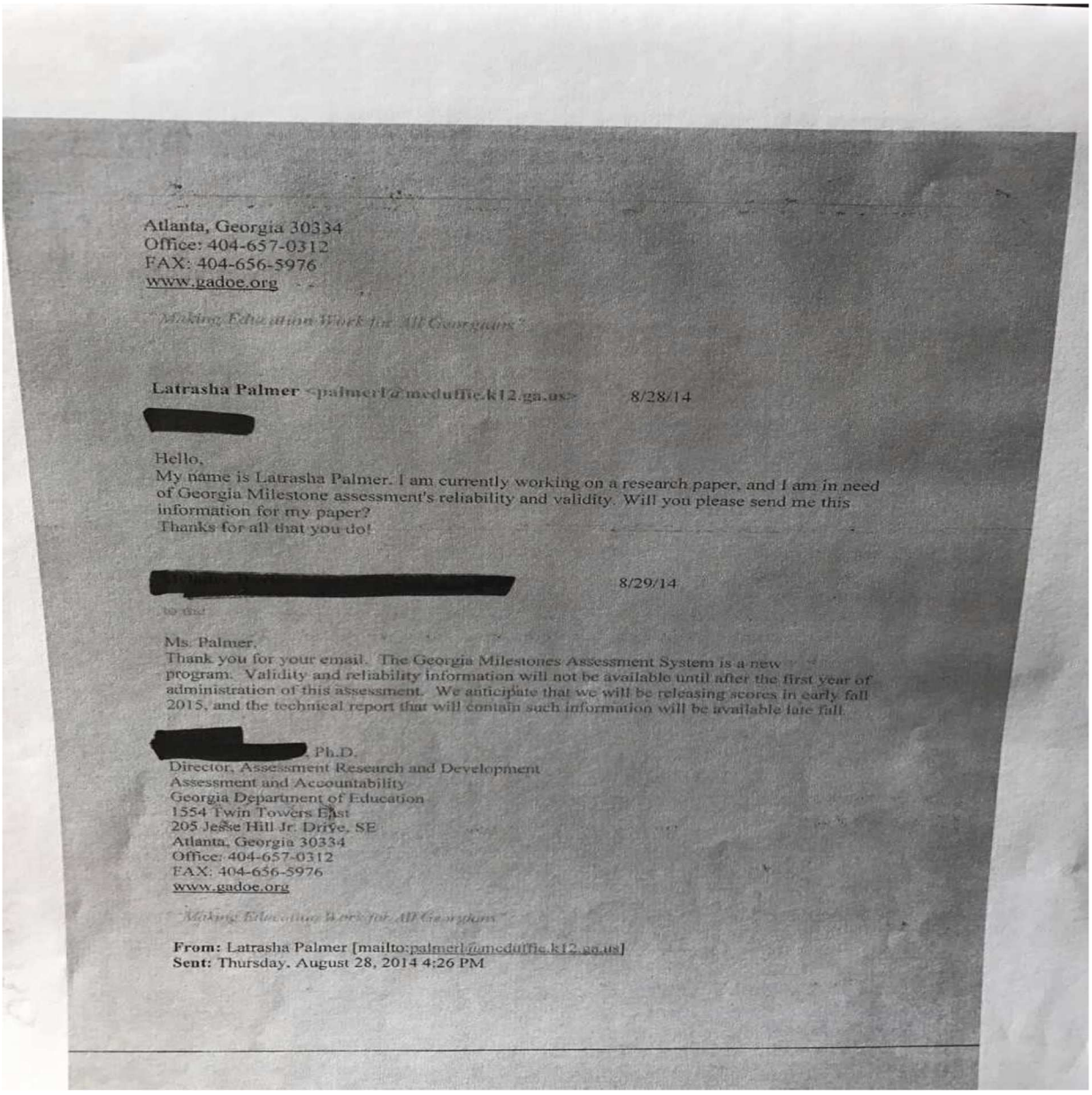
[redacted]

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

LIBERTY
UNIVERSITY.
Liberty University | Training Champions for Christ since 1971

APPENDIX B

Copies of Transcript from Georgia Department of Education



Atlanta, Georgia 30334
Office: 404-657-0312
FAX: 404-656-5976
www.gadoe.org

"Making Education Work for All Georgians"

Latrasha Palmer <palmerl@meduffie.k12.ga.us> 8/28/14

[redacted]

Hello,
My name is Latrasha Palmer. I am currently working on a research paper, and I am in need of Georgia Milestone assessment's reliability and validity. Will you please send me this information for my paper?
Thanks for all that you do!

[redacted] 8/29/14

Ms. Palmer,
Thank you for your email. The Georgia Milestones Assessment System is a new program. Validity and reliability information will not be available until after the first year of administration of this assessment. We anticipate that we will be releasing scores in early fall 2015, and the technical report that will contain such information will be available late fall.

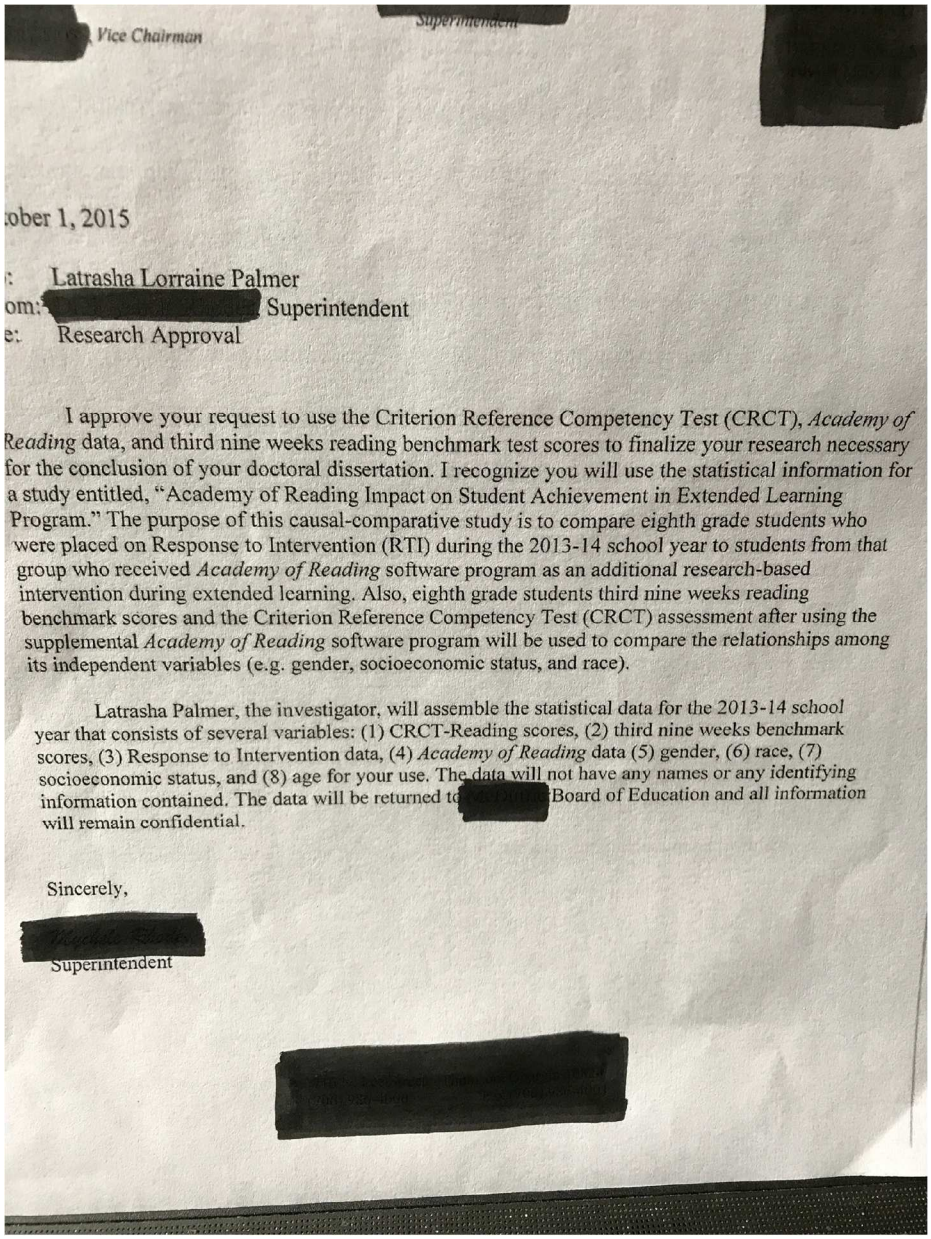
[redacted], Ph.D.
Director, Assessment Research and Development
Assessment and Accountability
Georgia Department of Education
1554 Twin Towers East
205 Jesse Hill Jr. Drive, SE
Atlanta, Georgia 30334
Office: 404-657-0312
FAX: 404-656-5976
www.gadoe.org

"Making Education Work for All Georgians"

From: Latrasha Palmer [mailto:palmerl@meduffie.k12.ga.us]
Sent: Thursday, August 28, 2014 4:26 PM

APPENDIX C

County Permission to Conduct Research



[redacted] Vice Chairman

[redacted] Superintendent

[redacted]

ober 1, 2015

: Latrasha Lorraine Palmer
om: [redacted] Superintendent
e: Research Approval

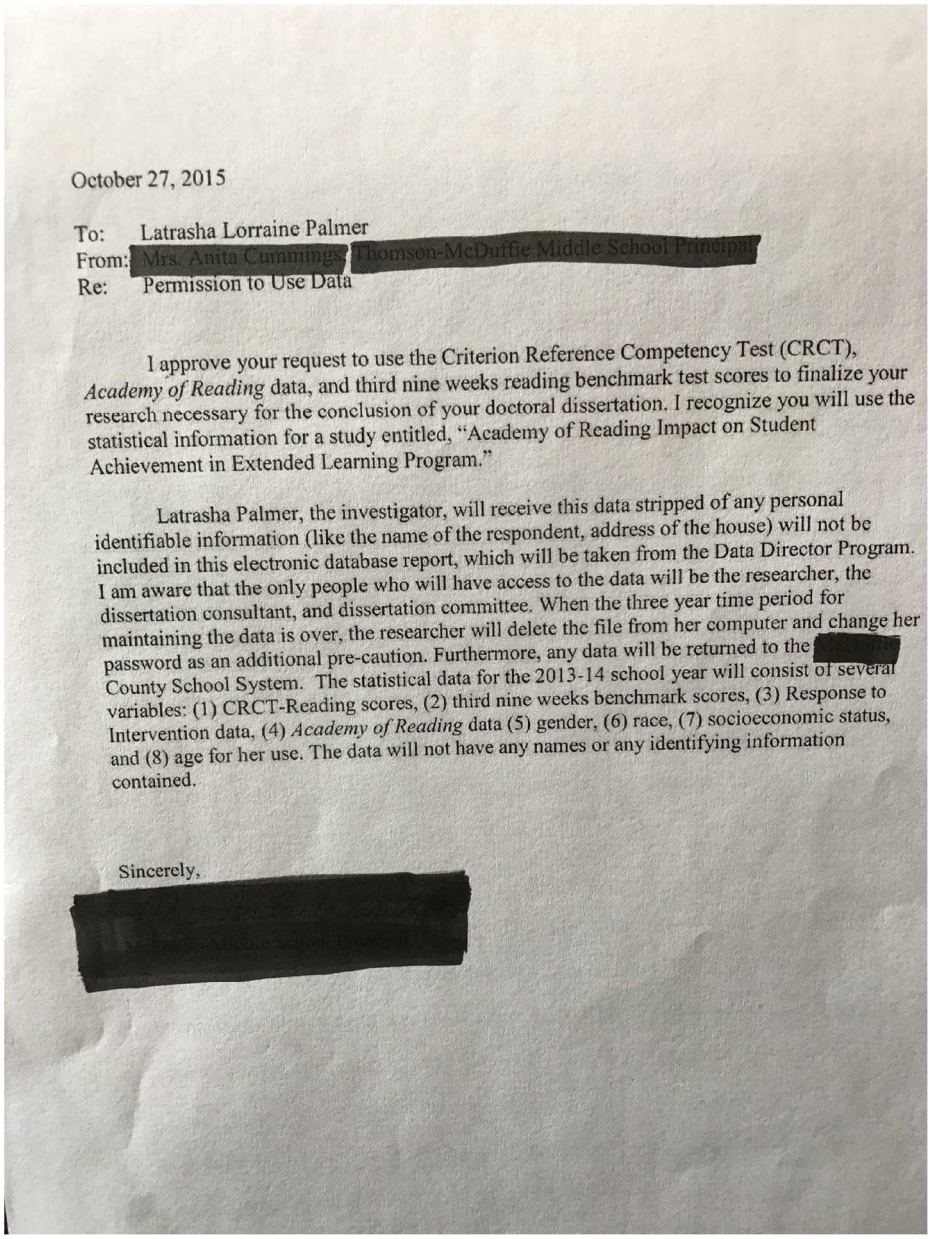
I approve your request to use the Criterion Reference Competency Test (CRCT), *Academy of Reading* data, and third nine weeks reading benchmark test scores to finalize your research necessary for the conclusion of your doctoral dissertation. I recognize you will use the statistical information for a study entitled, "Academy of Reading Impact on Student Achievement in Extended Learning Program." The purpose of this causal-comparative study is to compare eighth grade students who were placed on Response to Intervention (RTI) during the 2013-14 school year to students from that group who received *Academy of Reading* software program as an additional research-based intervention during extended learning. Also, eighth grade students third nine weeks reading benchmark scores and the Criterion Reference Competency Test (CRCT) assessment after using the supplemental *Academy of Reading* software program will be used to compare the relationships among its independent variables (e.g. gender, socioeconomic status, and race).

Latrasha Palmer, the investigator, will assemble the statistical data for the 2013-14 school year that consists of several variables: (1) CRCT-Reading scores, (2) third nine weeks benchmark scores, (3) Response to Intervention data, (4) *Academy of Reading* data (5) gender, (6) race, (7) socioeconomic status, and (8) age for your use. The data will not have any names or any identifying information contained. The data will be returned to [redacted] Board of Education and all information will remain confidential.

Sincerely,

[redacted]
Superintendent

[redacted]



October 27, 2015

To: Latrasha Lorraine Palmer
From: [redacted]
Re: Permission to Use Data

I approve your request to use the Criterion Reference Competency Test (CRCT), *Academy of Reading* data, and third nine weeks reading benchmark test scores to finalize your research necessary for the conclusion of your doctoral dissertation. I recognize you will use the statistical information for a study entitled, "Academy of Reading Impact on Student Achievement in Extended Learning Program."

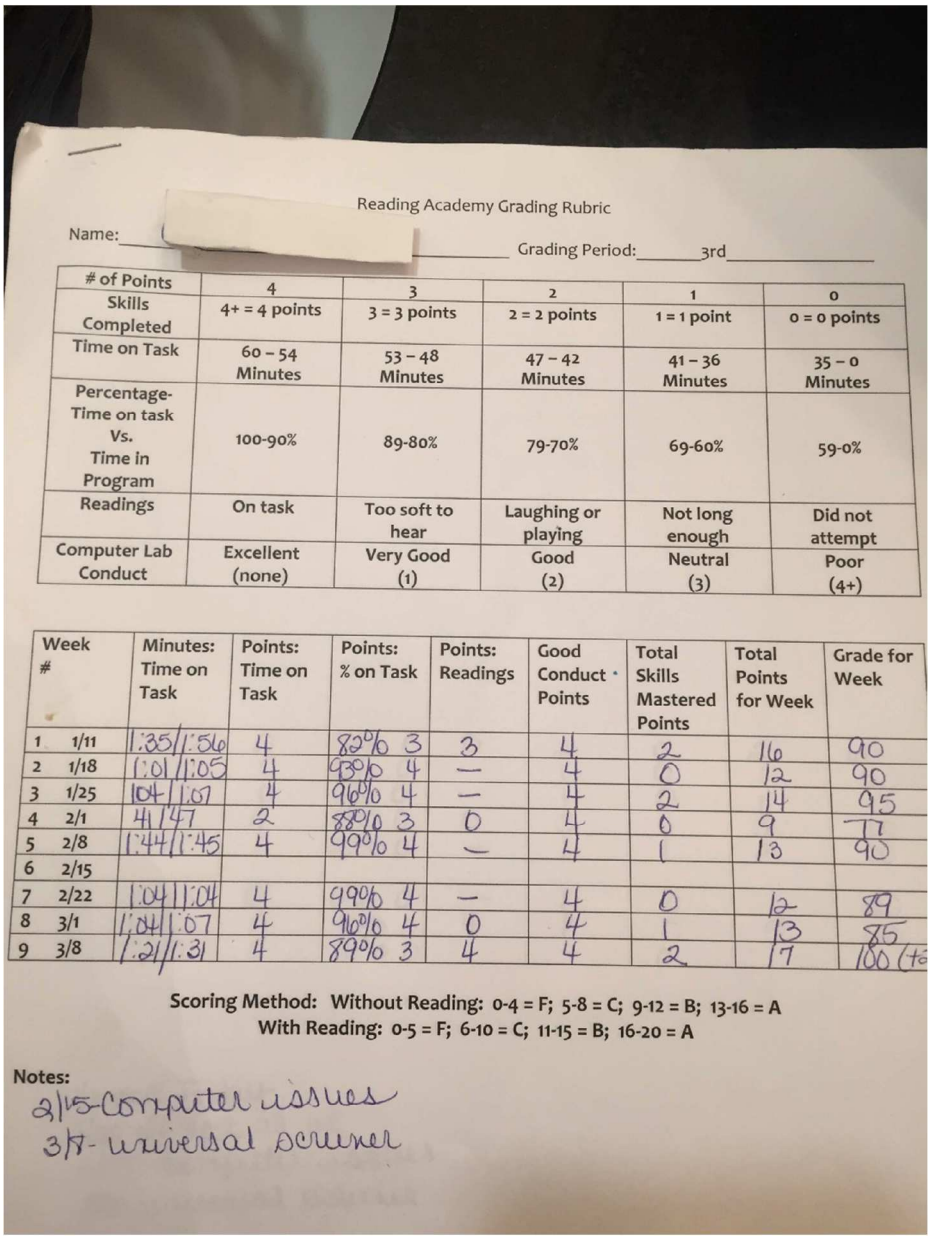
Latrasha Palmer, the investigator, will receive this data stripped of any personal identifiable information (like the name of the respondent, address of the house) will not be included in this electronic database report, which will be taken from the Data Director Program. I am aware that the only people who will have access to the data will be the researcher, the dissertation consultant, and dissertation committee. When the three year time period for maintaining the data is over, the researcher will delete the file from her computer and change her password as an additional pre-caution. Furthermore, any data will be returned to the [redacted] County School System. The statistical data for the 2013-14 school year will consist of several variables: (1) CRCT-Reading scores, (2) third nine weeks benchmark scores, (3) Response to Intervention data, (4) *Academy of Reading* data (5) gender, (6) race, (7) socioeconomic status, and (8) age for her use. The data will not have any names or any identifying information contained.

Sincerely,

[redacted]

APPENDIX D

Rubric for Academy of READING



Reading Academy Grading Rubric

Name: [redacted] Grading Period: 3rd

# of Points	4	3	2	1	0
Skills Completed	4+ = 4 points	3 = 3 points	2 = 2 points	1 = 1 point	0 = 0 points
Time on Task	60 – 54 Minutes	53 – 48 Minutes	47 – 42 Minutes	41 – 36 Minutes	35 – 0 Minutes
Percentage- Time on task Vs. Time in Program	100-90%	89-80%	79-70%	69-60%	59-0%
Readings	On task	Too soft to hear	Laughing or playing	Not long enough	Did not attempt
Computer Lab Conduct	Excellent (none)	Very Good (1)	Good (2)	Neutral (3)	Poor (4+)

Week #	Minutes: Time on Task	Points: Time on Task	Points: % on Task	Points: Readings	Good Conduct Points	Total Skills Mastered Points	Total Points for Week	Grade for Week
1 1/11	1:35/1:56	4	82% 3	3	4	2	16	90
2 1/18	1:01/1:05	4	93% 4	—	4	0	12	90
3 1/25	1:04/1:07	4	96% 4	—	4	2	14	95
4 2/1	41/47	2	88% 3	0	4	0	9	77
5 2/8	1:44/1:45	4	99% 4	—	4	1	13	90
6 2/15								
7 2/22	1:04/1:04	4	99% 4	—	4	0	12	89
8 3/1	1:04/1:07	4	96% 4	0	4	1	13	85
9 3/8	1:21/1:31	4	89% 3	4	4	2	17	100 (+6

Scoring Method: Without Reading: 0-4 = F; 5-8 = C; 9-12 = B; 13-16 = A
With Reading: 0-5 = F; 6-10 = C; 11-15 = B; 16-20 = A

Notes:
2/15-Computer issues
3/8- universal screener