**A Causal-Comparative Study of the Lexia Core5 Computer-Assisted Reading Proficiency Program For Showing Reading Achievement Growth of Third-Grade General and ELL Student Populations**

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## Abstract

Computer-assisted instruction (CAI) has improved student reading proficiency levels (Alqahtani, 2020). American students' low reading proficiency levels are a significant focus of education stakeholders (Owens & Canadian, 2019). Early literacy interventions are linked with students' academic outcomes. On low- and high-stakes reading success exams, most students with disabilities do noticeably worse than their counterparts without disabilities because they struggle with reading. Twenty-three studies were conducted on the Lexia Core5 reading computer-assisted instruction (CAI) program. For computer-assisted intervention, kids in the treatment groups demonstrated improved reading outcomes in 21 research; however, only two of these studies included students with disabilities. The problem addressed with this study was the limited research on how computer-assisted reading interventions show change in reading achievement with upper-elementary students, both general and English language learner (ELL) populations. The purpose of this quantitative causal-comparative study was to examine the continuing impact Lexia Core5 has on the literacy achievement of third-grade students in a suburban public elementary district in the southeastern United States. The study investigated the differences in the reading proficiency levels of third-grade students. Measures of academic progress (MAP) beginning-of-year (BOY) and middle-of-year (MOY) scores of students in both the general education population and ELL population, as well as Lexia Core5 scores in reading comprehension were examined. Students' MAP BOY proficiency percentages were compared to their MAP MOY proficiency percentages to determine patterns or differences after participating in the Lexia Core5 reading proficiency assessment.

## Dedication

I dedicate this dissertation to my son, Chase Stroud. In the three years it has taken me to reach this goal, Chase has motivated and inspired me to pursue my dreams and persevere in adversity. It is my hope that Chase will see the benefits of working to achieve a goal despite life's challenges.

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# Chapter 1

## Introduction

An explanation of computer-assisted instruction (CAI) opens this chapter. How computer-assisted instruction supports personalized education and 21st Century classrooms in education follows. The following sections address concerns about how CAI has gained importance in early childhood education because of its efficaciousness. It also explains why this study is necessary. The challenge that spurred this investigation is described in the first section of the chapter, along with related research, problem statement, purpose, limitation, delimitations, and vocabulary definitions.

## Background

CAI refers to instruction or remediation completed on a computer. Many educational computer programs are more readily available and widely used online within classroom environments than in previous years (Reading Rockets, 2024). These CAI programs are aimed at enhancing teacher instruction in several ways. Using CAI can potentially provide targeted, individualized student interventions (Mathes, 2020).

Educational technology includes CAI. Twenty-first century classrooms are influenced by educational technology. Five 21st-century key skills include creativity, collaboration, interest, engagement, and self-regulation (Tang et al., 2022). To cultivate social facilitators and lifelong learners globally, the International Society for Technology in Education (ISTE, 2007) defined creativity as its first performance indicator for students from pre-school (PK) to twelfth grade. Collaboration has been considered an essential skill to prepare students for their futures, and almost all the 21st-century competency frameworks have included it. ISTE (2007) put forward communication and

collaboration as its second performance indicator for students living with technology. For instance, students in Grades PK–2 are expected to be able to study in collaborative work groups, using technologies to produce a digital presentation or product.

Margolin et al. (2013) observed that portable technology interventions can significantly improve student performance in K-5 learning environments. Greaves et al. (2010) asserted that properly implemented educational technology can substantially improve student achievement when employing a 1:1 student-computer ratio. Educational technology applications positively affect reading outcomes for elementary school-level readers. Using technology in the learning process enabled school leaders to break generational barriers that often affect students with low-socioeconomic status.

"Computer-assisted instruction increases motivation by providing a context for the learner that is challenging and stimulates curiosity" (Malone, 1982, p. 137). There is limited data and research showing the impact of CAI on various types of students. Personalizing information allows CAI to increase learners' interest in tasks (Baron et al., 2019; Padma & Ross, 1987; Regan et al., 2014). Multiple CAI programs were studied to analyze student competency in reading comprehension, vocabulary, and language arts (Lexia Learning, 2022; Wilkes et al., 2020). The purpose of such studies was to measure how CAI improved various types of student learning, including English language learners and general education students. Results indicated that CAI programs increased overall student learning as measured by both pretest and post-test gains for all types of students in the study. Within these studies, personalizing information and animating objects on the screen aided Padma & Ross (1987) in determining student motivation and engagement.

Providing students with choices in learning while using CAI creates a sense of ownership that leads to increased motivation and engagement (Kinzie et al., 1988).

The Organization for Economic Cooperation and Development (OECD) (2017) posited that curiosity is one of the social and emotional skills comprising the domain of open-mindedness and described it as an 'interest in ideas and love of learning' (p. 9). Pietarinen et al. (2014) reported that emotional engagement reflects teacher-student and peer relationships, and these relationships contribute to students' perceived well-being. Joo et al. (2000) reported that students' self-efficacy for self-regulated learning was associated with self-efficacy in academics, strategy use, and Internet use when students received web-based instruction in their regular science classes. Furthermore, educators must better comprehend how CAIs might be incorporated into the classroom (Baron et al., 2019; Stetter & Hughes, 2010).

Longitudinal studies of CAI programs have typically considered long-term outcomes when students receive traditional teacher-led instruction. These studies consistently show that when there is a literacy gap in early grades—often between students from high and low SES backgrounds—the gap persists over time (Connor et al., 2013; Juel, 1988). As Juel (1988) highlighted in her seminal work, there is immutability in reading ability without intervention, meaning that if a student begins first grade as a struggling reader, that student leaves fourth grade still struggling in reading.

Lexia Core5 is a reading program for prekindergarten to the fifth grade (Wilkes et al., 2020; Lexia Learning, 2022). The five main components of efficient reading education are covered in Lexia Core5 Reading in a systematic and organized approach: reading comprehension, vocabulary, fluency, phonics, and phonemic awareness.

(National Reading Panel, 2000). Additionally, structural analysis and morphology are covered in Lexia Core5 Reading (Lexia Learning, 2022). The curriculum focuses on skill gaps as students progress through the classes. The first through the fifth grade is divided into 21 levels. Lexia Core5 Reading has generally produced positive reading outcomes for struggling, at-risk, and general education students (Lexia Learning, 2022). Nevertheless, although the most common types of disability in the United States are either high incidence or moderate, only two Lexia Core5 Reading studies have included students with modest disabilities as the subject of research (Arnold et al., 2016; Regan et al., 2014).

Students will need reading comprehension skills for the rest of their lives. Children who struggle with reading in the early grades are more likely to drop out of school and perform poorly in subsequent grades (Chambers et al., 2011; Lesnick et al., 2010). According to Joshi et al. (2009), almost 70% of high school dropouts claim to have reading difficulties.

There is limited evidence to support using technology applications to enhance the reading performance of struggling readers in elementary schools. The largest effect sizes have been found for small-group interventions that supplement lower-elementary instruction with phonetic activities integrating computer and non-computer activities and occupying substantial time each week (Cheung & Slavin, 2013). When examining digital technologies, longitudinal studies have nearly always considered short-term program use and looked at residual benefits once the program is completed (Hurwitz, 2018). Since 2007, the Lexia Core5 Reading program has changed, which may have also affected the program's outcomes.

According to the National Center for Education Statistics (2019), all Grade 4 and Grade 8 students without disabilities performed worse in 2019 compared to 2017, except for Grade 4 students with impairments. The National Assessment of Educational Progress Reading Report Card (2017) revealed that, in contrast to 2019, when 65% of this group scored below Basic or Basic, 63% of Grade 4 pupils without impairments received a score below Basic or Basic in 2017. Comparing the results for Grade 8 students without impairments from 2017 and 2019, it can be observed that 64% of students in 2017 scored below Basic and Basic levels, while 66% of students in 2019 scored in the same range.

**Statement of the Problem**

Studies have shown that students who are ELLs follow the same trajectory as non-ELLs in learning to read. For example, ELLs and non-ELLs take similar paths in developing phonological awareness (Gersten & Geva, 2003) as well as phonics and word recognition skills. In terms of comprehending written materials, non-ELLs generally outperform ELLs, often due to limitations in vocabulary and word knowledge seen with ELLs. It is necessary to conduct this study to determine whether the computer-assisted program Lexia Core5 improved the reading comprehension abilities of third-grade ELL students compared to their general education counterparts (Palumbo & Willcut, 2006).

While CAI is widely used in K-12 education, there is a noticeable gap in research examining its impact on reading achievement, particularly in early childhood education. Specifically, few studies have explored the long-term effectiveness of CAI on literacy outcomes for ELL and general education students in the third grade. The limited research on how CAI programs influence reading achievement highlights the need for further investigation into which computer-assisted reading interventions are most effective for

these student populations. Additionally, there is a significant lack of studies on the impact of CAI on ELL students' literacy performance in standardized assessments. Furthermore, educators must better comprehend how CAIs might be incorporated into the classroom (Baron et al., 2019; Stetter & Hughes, 2010).

**Purpose of the Study**

This study aims to explore the continuing impact CAI has on the reading achievement of third-grade students identified in the general educational and ELL populations in suburban public elementary schools. Specifically, the purpose of this quantitative causal-comparative study was to determine the impact of an English Language Arts (ELA) curriculum supplement that included the Lexia Core5 Reading CAI program intervention for third-grade students from the general education population and those who were identified as third-grade ELLs. The overall reading score was analyzed, including the five components of reading: phonics, phonemic awareness, vocabulary, fluency, and reading comprehension.

**Significance of the Study**

This study adds to the few studies that have examined how CAI impacts reading achievement for upper elementary students, both general education and ELL student populations. ELLs are a growing segment of the population of school-age children in the United States. Learning to read English poses special challenges for students developing their spoken English proficiency simultaneously (August & Shanahan, 2006). Educators and school officials might find it valuable to understand the efficacy of supplemental reading CAI on the reading performance of this population (Edyburn, 2013; Stetter & Hughes, 2010). The study provides information on whether the use of Lexia Core5

increased reading achievement among third-grade students identified as ELLs and those in the general education population and whether student demographics contributed to any differences. Determining the impact of an ELA curriculum supplement that includes the Lexia Core5 program as targeted instruction for struggling upper elementary students may improve reading performance in later grades. Therefore, the significance of this study is to increase knowledge regarding the effects of CAI, specifically Lexia Core5, on student literacy achievement with general and ELL student populations in third grade. Using CAI can potentially provide targeted, individualized student interventions and small groups for teachers to organize the class based on student skill levels (Mathes, 2020).

**Delimitations**

The study examined reading outcomes for third-grade students identified as ELLs and those identified in the general education population. One delimitation was that the study was conducted in one large school district (Pulaski County Special School District) and was delimited to 16 public elementary schools where Lexia Core5 was used. Participants included third-grade students from the 2023-2024 school year. Two test scores, Lexia Core5 and NWEA Map, were used as assessments.

**Assumptions**

The research design was a causal-comparative design. One assumption was that the data were archival, and causation could not be determined. Furthermore, it is anticipated that accurate student-level test results will be supplied for analysis using secondary data from the selected school district. Quantitative research might provide only a glimpse of the changes in students' reading comprehension abilities rather than the full

story (Rahman, 2017). A second assumption was that the archival data was accurate. A third assumption was that students and teachers understood how to use the program. A fourth assumption was that the Lexia Core5 program was used with fidelity with all students.

## Research Questions

The following research questions were examined to address the purpose of the study.

### *RQ1*

To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

### *RQ2*

To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

### *RQ3*

To what degree are there differences between the average BOY and MOY grade-level reading scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

### *RQ4*

To what degree are there differences between the average BOY and MOY grade-level reading scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

## Definition of Terms

### *Computer Assisted Instruction (CAI)*

CAI refers to instruction on a computer or technological device to teach objectives, provide practice and feedback, or remediate or check student progress (Edyburn, 2013).

### *Proficient Reading*

Proficient reading relies on a solid foundation of oral language skills, including phonological awareness, vocabulary, structural analysis (morphology), discourse processing, and pragmatics (Lonigan et al., 2018).

### *Blended Learning*

Blended learning incorporates face-to-face, teacher-led instruction, and student-led digital activities to provide students with a personalized educational path (Horn & Staker, 2011).

### *Lexia Core5*

For prekindergarten through grade five students, Lexia Core5 Reading is a computer-assisted reading education package (Lexia Learning, 2022; Wilkes et al., 2020).

### *English Language Learner*

An ELL is a student who uses another language in addition to or other than English (Carroll, 2024).

### *Phonics*

Phonics is a method of teaching people to read by correlating sounds with letters or groups of letters in an alphabetic writing system (Ehri et al., 2001; Goswami, 2003).

### *Phonemic Awareness*

Phonemic awareness is developing conscious attention to the sounds in spoken language, including words, syllables, onsets, rimes, and individual phonemes (Ehri et al., 2001; Goswami, 2003).

### *Fluency*

Fluency is reading with accuracy, rate, and prosody. If a child can read with fluency, it means that they can identify and read a word automatically (Fuchs et al., 2001).

### *Vocabulary*

Vocabulary is understanding the meanings of words and phrases and their role in social and academic language registers. This includes how words relate to one another, semantic understanding, concept knowledge, and connotative meaning, all of which aid in understanding text (Beck & McKeown 2007).

### *Reading Comprehension*

Reading comprehension at the text level is the organization of language to convey meaning, such as how words are ordered within a sentence (syntax). Some aspects of language structure are encompassed in other constructs. Reading comprehension at the

beyond-the-text level is reasoning about aspects of text moving beyond vocabulary and printed text, such as when making inferences or interpreting the nonliteral meanings of metaphors and figures of speech (Aukerman et al., 2015).

**Organization of the Study**

This study examined the impact on reading achievement of ELL and general education third-grade students after using Lexia Core5. Overall reading scores from the two tests were analyzed, including the five components of reading: phonics, phonemic awareness, fluency, vocabulary, and reading comprehension. The literature review detailed cognitivism, behaviorism, the five components of reading, and studies emphasizing the impact of CAI on reading achievement among ELL and general education elementary students.

Chapter One describes the conceptual basis for the research investigation, including the research questions, hypotheses, and basic needs for the research. A description of the significance of the study is presented. Chapter Two presents theoretical frameworks that support the study and place the research focus into context by analyzing and discussing the existing body of knowledge. A literature review identifies themes and trends in research methodology, design, and findings. Chapter Three documents how the study is conducted. A summary of the research focus and purpose statement reintroduces the reader to the study. Research methodology and design, population and sample sizes, and data instruments and collection help synthesize an in-depth understanding of the overall research design and analysis techniques. Chapter Four summarizes the collected data and presents the results. Descriptive findings and data analysis procedures are included, and results are presented in multiple formats. Chapter Five offers a

comprehensive summary of the study framework and presents the researcher's contribution to the knowledge body. Implications for further research are discussed.

# Chapter 2

## Review of Literature

With an increased interest in technology and access to computers in school, the development of web-based programs designed to address reading skill deficiencies creates a foundation for interactive learning as a strategy to help the struggling reader with comprehension skill development. Using CAI has the potential to provide targeted, individualized interventions for students (Mathes, 2020). "The implementation of computer-assisted programs at different grade levels and across different areas of reading will create a framework that will measure and instruct students in skills that are most predictive of reading success" (Istation, 2015). According to Mercer (1992), reading difficulties affect 90% of all children with learning disabilities, and 75% of all students who are recommended for special education services are referred due to their low reading proficiency (National Center for Education Statistics, 2012).

This literature review detailed cognitivism, behaviorism, and the five components of reading. How these theories frame the literature on reading problems and achievement of students identified as ELLs and reading CAIs, along with Lexia Core5 Reading, was explained. An overview of reading development is then presented, including stages, knowledge, and skills gained as a typically developing child learns to read, the problems students with language deficiencies have with proficient reading development, and strategies to address and prevent these problems. Additionally, research on CAI programs, CAI reading programs, and the effect on the reading performance of various elementary school populations and students with language deficiencies are discussed. The literature search was performed using the Baker University online library. Databases

included ProQuest, Education Resources Information Center (ERIC), and EBSCOhost. The Lexia site was searched also. Twenty-three peer-reviewed studies were found.

**Theoretical Frameworks**

This study was based on the cognitivism theory, which supports the theme of schema. This study also was based on the behaviorism theory, which supports the theme of reinforcement. These theories and themes support how early childhood students learn to read and use CAI to decrease reading deficiencies.

Behaviorism theory supports the view that the learning process is a passive activity and that knowledge is given and absolute (Marton & Booth, 1997). Behaviorists regard learning as a direct result of experience or practice that leads to a change in behavior (Marton & Booth, 1997). Behaviors can be modified by consequences such as positive or negative feedback and rewards or punishments (Pintrinch & Schunk, 2002).

Cognitive psychologists use observable behaviors to indicate what is happening in a person's mind (Gage & Berliner, 1988). They emphasized active mental processing on the part of the learner. This means that different types of tasks will incur different cognitive processes. For example, learning to speak a language will require different processes, including learning to spell. Cognitive psychologists suggest that it is important to appreciate those processes to eventually understand how the learner engages in the learning process so that this learning process may be enhanced (Reid, 2005). Hence, cognitive psychologists view the learner's role as an active and creative activity rather than a passive one (Reid, 2005). Cognitive theory usually relates to the role of information processing. The aspects involved in processing such as memory, organization, and neurological connections are viewed as central in cognitive theories

(Reid, 2005). Bruner et al. (1956) found that learners tend to formulate a hypothesis about the rule underlying a particular concept.

Cognitive learning theory defines learning as a change in an individual's mental structures and processes that may result in an immediate behavior change (Gordon, 2010). Learning takes place within the brain. As cognitive learning theory supports brain-based learning, it is important to note that learners continuously process and acquire information in multiple ways. Information can be simple, complex, multifaceted, or any combination. While the teacher does need to assume a facilitator role in much of a student's learning, with cognitivism, the teacher does take responsibility for presenting new or complex information to students as an introduction or ongoing facilitation of learning (Gordon, 2010).

Cognitivism focuses on purposeful learning. The teacher often initiates and guides the instruction, offering scaffolds and opportunities for student collaboration and problem-solving techniques (Gordon, 2010). Once scaffolds are in place and students are learning within their zone of proximal development, cognitivism fosters self-directed learning. Students can begin taking ownership of their learning and developing critical thinking and problem-solving skills that lead to real-world applications and contexts. Cognitivism also pushes learning that contains self-discovery and analysis (Gordon, 2010). Once foundational skills are in place, students can search for answers to their questions and build upon prior knowledge and skills to extend their thinking. Considering the families of models, information processing is preferred. These models help the learner find information and build concepts and hypotheses to test (Rhodes & Bellamy, 1998).

Cognitive growth increases general intellectual development and allows teachers to modify their teaching strategies to accommodate student needs, which promotes further learning potential. It is also important to address learning preferences. Without being aware of the different learning preferences students bring to the learning environment, teachers would be less effective in addressing ways to use student strengths to help close the achievement gap (Malone, 1982). Since cognitivism is a learning theory that focuses on how information is received, organized, stored, and retrieved by the mind, it is important to note what factors might influence learning using this theoretical model. Cognitive factors involve simple processes such as memorizing facts to analyze and evaluate a complex problem.

Piaget conducted many experiments on children's thinking and concluded that humans go through many stages of cognitive development (Kristindottir, 2001). In the third stage of Piaget's four-stage analysis, the concrete operational period from seven years to eleven years old, children master abstract, logical notions. Children feel confident completing mathematical operations of multiplying, dividing, and subtracting (Kristindottir, 2001).

To foster differentiated instruction and help to close the achievement gap, cognitivism is a way to organize, sequence, and present information in a manner that is understandable and meaningful to the learner (Gordon, 2010). It is a "breaking down" of information into small parts to understand each part before the entire concept is put into long-term memory. Cognitivism includes using multiple intelligences to differentiate instruction and reach all learners (Rhodes & Bellamy, 1998). Instructional decisions that support cognitivism address all learners with an emphasis on ELL learners, special

education students, and students who have not quite reached their zone of proximal development (Crisologo et al., 2023). Graphic organizers that address sequencing, problem and solution, cause and effect, and similarities and differences will help learners break down information into smaller visual parts (Crisologo et al., 2023).

Reading is commonly recognized as an interpretative and interactive skill involving decoding and active cognitive thinking processes (Grabe, 2006). Several studies have reported that schemata play a pivotal role in reading comprehension and provide a better understanding of the topics being discussed in the texts (Huang, 2019). Reading strategies help learners interact with written texts and glean more meaning from them, and teaching students these skills can be helpful for learners to reach a higher level of reading comprehension (Matsumoto et al., 2013). Activating schemata and training students to use reading strategies are generally effective in reading comprehension skills. These reading processes make learners construct meaning from the texts by combining their existing knowledge, the information derived from the texts, and the contexts of the reading situations (Hashemi et al., 2016). Learning to read, including comprehending new content, involves processes that allow the reader to build upon existing knowledge and apply strategies to make meaning from the text.

According to Russell (2002), cognitive theorists believe that instruction must be based on students' existing state of mental organization, or schema. The way knowledge is internally structured affects how new learning will occur. This implies that computer-based instruction needs to be organized and delivered in a way that complements the learner's cognitive structure and level of sophistication. Russell (2002) added that while

behaviorists are more concerned with the outcomes of instruction, cognitivists are more concerned with the content and context of instruction.

Griffith and Hamza (2006) posited that behavioral principles influence the development of programmed learning and CAI. In applying Skinner's theory in the classroom, he believed that teachers should supply immediate feedback to students. For example, teachers should provide students with feedback on their work before teaching a new concept. The teacher should work with the students on one question at a time, not allowing the students to continually make the same mistakes repeatedly (Kohn, 2004). Kohn posited that it trains humans to expect rewards to such a large extent that they fail to find motivation without a promised reward. He further postulated that the more often rewards are used, the more humans become used to them and expect them, and the more they are needed (Kohn, 2004).

The aptitude-treatment interactions of Robert Gagne (1965) concentrated on a sequence of actions required in the instructional design of educational technology. One can categorize learning as requiring both external and internal events. Instructional supports are required within various categories to aid learning. Different learning circumstances are required for the internal process, which includes receipt, expectation, retrieval of working memory, selective perception, semantic encoding, responding, reinforcement, and generalization (Gagne, 1965). Lexia Core5 is an adaptable and versatile learning package that can be tailored to meet different needs and situations. The focus is on the learner, and educators want to guarantee that pupils comprehend, retain, and apply the knowledge they are taught (Carroll, 2024).

**Five Components of Reading**

Chall found knowledge of letters and sounds influenced reading achievement more than the child's tested mental ability or intelligence quotient (IQ) (Chall, 1996). The National Reading Panel & National Institute of Child Health and Human Development (2000) confirmed the importance of explicitly and systematically teaching how to break the code. The National Reading Panel's analysis clarified the best approach to reading instruction is a combination of methods that includes explicit instruction in phonemic awareness, phonics, fluency, comprehension, and vocabulary.

Studying low-achieving first graders in the United States, Ehri (1995) found no overall impact of the CAI interventions on word reading (ES = 0.03). In follow-up work, Campuzano et al. (2009) documented that CAI interventions negatively impacted word reading for low-achieving students. Wood et al. (1999) and Parr and Fung (2000) reported high variability and concluded that their evaluations did not produce convincing evidence for reading gains. Cheung and Slavin's (2013) synthesis of 20 studies regarding educational technology for elementary school reading of ELL and general education populations showed relatively larger but still small effects (Es = 0.14).

According to T. Rasinski (2004), reading fluency is a multifaceted process that involves a sophisticated cognitive process that includes reading fast, precisely, and prosodically. In the first level of reading fluency, readers employ phonological knowledge to decipher words in text correctly and almost perfectly. Readers utilize the second dimension when they become automatic at decoding, which reduces mental strain and frees up cognitive resources to focus on the syntactic and semantic aspects of the text. The third dimension, prosodic reading, is the outcome of the operation of the

preceding two dimensions. In prosodic reading, the reader employs their understanding of sentence structures and word and phrase meanings to read with suitable phrasing, intonation, and expression.

Some of these ways include self-pacing, which allows the student to proceed at their own pace, allowing the teacher to devote more time to individualized instruction, privacy, which helps the shy, reluctant learner, and differentiated instruction. Most studies have focused on CAI impact in the primary grades, thus leaving room for more studies in the upper elementary and middle school grades (Greaves et al., 2010).

Among the three components of reading fluency - automaticity, prosody, and decoding - the automaticity dimension has received attention in practice and study (Rasinski, 2004). Automaticity is simple and objectively quantifiable through the measurement of reading speed. However, reading rate-focused instruction may not be enough for many English language learners whose oral reading fluency issues stem from a lack of vocabulary and a cultural mismatch between their background knowledge and classroom texts (Palumbo & Willcutt, 2006).

Even if English learners have received intensive phonics instruction, they may have limited comprehension of the words they can decode (Taylor et al., 2002). Therefore, their words correct per minute (WCPM) scores may not have the same predictive power related to comprehension as the scores of their native-English-speaking peers. Furthermore, emphasizing isolated skills instruction (such as reading rapidly without attention to comprehension) may inhibit attention to the interrelationship among reading process components, especially for students with limited oral English proficiency and inadequate academic vocabulary (Taylor et al., 2002).

Phonological awareness has also been identified as a fundamental precursor and predictive indicator of whether a child will develop early reading skills (Anthony and Francis, 2005). Learning to associate “letter sounds (phonemes) with printed letters or groups of letters (graphemes)” (Phillips et al., 2008, p. 3) is integral to the process of learning to read, given that it shows awareness of how oral/ auditory markers are represented in printed words. One of the most important listening skills is phonological awareness because it is thought to be the foundation for spelling and word recognition skills and is necessary to improve young learners’ listening skills (Yopp, 1992). In addition, phonological awareness skills may assist children’s reading and writing abilities (Bentin & Leshem, 1993; Deacon & Kirby, 2004; Swanson et al., 2003). For these reasons, teachers are advised to encourage their young learners to improve their listening skills (Brown & Lee, 2015; Linse & Nunan, 2005).

Reading comprehension occurs when proficient decoding and listening comprehension allow the reader to understand printed linguistic discourse (Hoover & Gough, 1990) by extracting and inferring meaning (Hoover & Tunmer, 2018). One's proficiency in decoding or listening comprehension does not make up for a deficiency in the other. There will be a disadvantage in reading comprehension if decoding or listening comprehension scores are below 1.0 (Hoover & Tunmer, 2018). This will also affect reading comprehension. Similarly, reading comprehension is zero if decoding is zero and listening comprehension is one. On the other hand, reading comprehension has a value greater than 0 if decoding and listening comprehension have values greater than 0 (Grant, 2022).

## Nationwide Reading Deficiencies

Many students in the United States struggle with reading. Only 35% of fourth-grade kids without language deficiencies received a Proficient or Distinguished rating on the reading assessment, according to The Nation's Reading Report Card for 2019. Just 12% of those fourth graders received Proficient or Distinguished ratings (National Center for Education Statistics, 2019). Thirty-four percent of pupils in the eighth grade without language deficiencies scored less than 9% of eighth-grade children with language deficiencies who achieved Proficient and above. While eighth-grade students without language deficiencies performed worse than their fourth-grade peers, they earned Proficient and above. According to this 2019 report, eighth-grade older students with language deficiencies had more reading difficulties than fourth-grade younger children. Nonetheless, both grade levels' results were noticeably worse than those of their classmates without language deficiencies (National Center for Education Statistics, 2019).

## Reading Strategies

"A great majority of non-English speaking immigrants in the U.S. are of Hispanic origin and it is the fastest growing of all groups," (Slavin, 2003. p.1). As a result, language minority students are the group in schools expanding the fastest. Currently, Latino students make up 15% of students in elementary school, and by 2025, they will make up nearly 25% of all students at school age (U.S. Department of Education, 2010). Ultimately, it is critical to give bilingual students the best possible assistance to fully

acquire and succeed academically in English and their home language (Wagner et al., 2005).

Furthermore, researchers have observed that inconsistent use of successful teaching methods raises the possibility of academic failure (Waxman & Padrón 2004). Now more than ever, attention is focused on the combination of successful teaching strategies that promote bilingual students' ongoing growth and success in reading. As a result, there is more support for implementing efficient pedagogical strategies that aim to raise English language learners' reading proficiency (Waxman & Padrón 2004).

One effective strategy that helps develop early literacy skills for dual language learners is the Language Experience Approach. This strategy is based on children's language and experiences (Ashton-Warner, 1963; Stauffer, 1970). This practical-to-implement strategy helps students see that what they say can be written down. Especially in the early years, students need to understand that the symbols representing our alphabetic system are the same ones used when we write. Students begin to make connections between reading and writing and see a real purpose for each.

A successful and well-known strategy that should be considered when teaching emergent reading and reinforcing language development in the early years is Shared Reading (Fisher & Medvic, 2000). It helps foster reading development and is especially beneficial when students cannot read books independently. This strategy uses a big or oversized book to conduct Shared Reading. Big books contain repeated language patterns that are predictable from the illustrations and help children chime in with the reading by predicting what will come next in the text (Fisher & Medvic, 2000).

**Blended Learning**

Aliningsih and Sofwan (2015) discovered that teaching English literacy in the context of 21st-century learning and innovative skills is difficult. Numerous teachers believe that creating assessments takes significant time and energy (Aliningsih & Sofwan, 2015) and that decisions and developments should be founded on research (Aziz et al., 2020). Additionally, introducing technology in education in the twenty-first century requires educators to adapt their lesson plans, assessment procedures, and methods of instruction.

Delivering suitable assessments is essential to the effectiveness of teaching English literacy because it allows for the evaluation of both the learning process and the progress of the students (Nodoushan, 2014). In addition, the evaluations must allow students to reflect on their work or that of their classmates. Additionally, assessments enhance and encourage students' learning (Nodoushan, 2014). Evaluation affects the level of literacy (Damaianti et al., 2020).

The intricacy of the abilities that need to be assessed and how technology can be integrated into the teaching and learning process are the two main sources of the issues that teachers face while developing assessments (Margolin et al., 2013). Li et al. (2018) recommended that a mixed learning system be employed with the alternative model. The teaching and learning process that combines in-person and virtual learning activities is known as blended learning (Li et al., 2018). Margolin et al. (2013) and Li et al. (2018) agree that using any flexible online platform to improve contact with students is one-way blended learning support and encourages them. Students' comprehension of language can

be improved through blended learning (Isti'anah, 2017). As a result, students can develop and strengthen their English literacy abilities through blended learning (Isti’anah, 2017).

**Computer-Assisted Instruction**

Educational technology is a variety of electronic tools supporting the learning process (Cheung & Slavin, 2013). These tools that directly support instruction are computer-assisted (CAI). Using a gradual release model, teachers can support students in meeting learning objectives to best use a specific learning game. It is also helpful for teachers to help students connect the game with previous learning. Teachers need to be well informed of what type of learning the computer game supports (Cheung & Slavin, 2013).

For skill-focused computer games, an adult must monitor student progress, facilitate goal setting, and provide basic technical help (McTigue & Uppstad, 2019). Learning games can provide individualized practice for struggling readers, but this practice often leads to students spending more time on computer games than having personal interactions with peers and teachers (McTigue & Uppstad, 2019). Ultimately, teachers should be knowledgeable about specific skills addressed in computer learning games, model these strategies for students, and monitor their progress to adjust for learning skill deficiencies.

Reading instruction for early childhood students has shifted from print awareness to more focused reading instruction based on the science of brain functioning. Lonigan et al. (2013) studied students who worked with CAI programs and found that students using CAI programs made greater gains on rhyming and sound manipulation tasks than control students without CAI support. Classes receiving CAI support performed significantly

better than control classes in phonological awareness. Group differences were restricted to low-performing students (Lonigan et al., 2013).

These findings are consistent with studies showing CAI benefits and low-performing students (Macaruso et al., 2006). The Early Reading and Primary Reading programs were installed in two treatment schools and mapped to individual classrooms and lab stations. Two main domains were studied: phonological awareness and early literacy skills. Eight subdomains were studied: sound matching, rhyming, print awareness, letter recognition, same and different words, phoneme-grapheme correspondence, listening comprehension, and word reading (Macaruso et al., 2006). Although both groups showed significant gains on all sub domains, gains were greater for the treatment group than the control group. These findings highlight the significance of using CAI to increase reading scores among early childhood students. Future studies need to include more efficient ways to measure patterns in student reading growth among different classes.

"Computer-assisted instruction increases motivation by providing a context for the learner that is challenging and stimulates curiosity" (Malone, 1982, p. 137). Personalizing information allows CAI to increase learner interest in tasks (Padma & Ross, 1987). A CAI program, CornerStone, was studied to analyze student competency in reading comprehension, vocabulary, and language arts. The purpose of the study was to measure how CAI improved various types of student learning, including special education students, English language learners, and regular education students. Results indicated that CornerStone increased overall student learning as measured by both pretest and posttest gains for all types of students in the study (Padma & Ross, 1987). Within

CornerStone, personalizing information and animating objects on the screen aided the researcher in determining student motivation and engagement. "Providing students with choice in learning creates a sense of ownership that leads to increased motivation and engagement" (Kinzie et al., 1988, p. 300).

In literacy instruction, leveraging educational technology can significantly enhance the learning experience (Isikwe, 2023). For instance, educational institutions have begun introducing pilot programs that equip each student with tablets, a step aimed at elevating learning outcomes and expanding educational access (Thieman & Cevallos, 2017). Duke and Cartwright (2021) state reading science is always changing and evolving, much like any other scientific field. A variety of instructional strategies, from teaching words alone to teaching students to use context to understand the meanings of new words, have been used in certain studies to improve comprehension.

Jamshidifarsani et al. (2019) set out to give other researchers and designers comprehensive knowledge of some of the technology-based or technology-assisted reading interventions employed at the elementary level. The researchers discovered that whereas vocabulary is often neglected in technological interventions, fluency interventions require a more comprehensive strategy to address the various aspects of fluency. The review looked at 32 technology-based reading intervention programs, including Lexia (Jamshidifarsani et al., 2019). The study's findings indicated that the treatment group's reading abilities were enhanced by the Lexia Core5 reading program more than the control group, with the at-risk kids seeing the greatest improvement (Jamshidifarsani et al., 2019).

Schneider et al. (2016) looked at how a technology-based reading intervention affected students' achievement in the second grade. Information and communication technologies (ICT) were used in a controlled quasi-experimental design study to investigate systematic reading education (Schneider et al., 2016). Twenty-nine second graders from eight classes in two public elementary schools participated in the study (Schneider et al., 2016). There were 107 participants in the therapy group and 102 in the comparison group (Schneider et al., 2016). According to the study's findings, students who had the MindPlay Educational Software for Reading intervention improved their academic performance in spelling and reading fluency. On the posttest, word reading performance was significantly improved for both the treatment group and the comparison group (Schneider et al., 2016). The effects of the MVRC intervention and its effects on second grade students' academic success advances in reading fluency were discussed by the researchers and improved the academic performance of the students (Owens, 2021).

In an exploratory study, Pindiprolu and Marks (2020) looked at how two computer-based reading programs affected the reading abilities of 20 students who were at risk of failing reading. Their viewpoint supports that early reading proficiency is a necessary condition for subsequent academic achievement (Pindiprolu & Marks, 2020). When third grade ends, students who struggle with reading are less likely than their counterparts who read well to succeed in academic subjects and complete high school. Pindiprolu and Marks (2020) posited that reading literacy involves two essential subskills: word recognition and comprehension. Data indicates that many students in today's schools require assistance with reading through targeted, individualized interventions (Pindiprolu & Marks, 2020).

Longitudinal studies have typically considered long-term outcomes when students receive traditional teacher-led instruction. These studies consistently show that when there is a literacy gap in early grades, often between students from high and low SES backgrounds, the gap persists over time (e.g., Juel, 1988; Connor et al., 2013). As Juel (1988) highlighted in her seminal work, without intervention reading ability is immutable. If a student begins first grade as a struggling reader, that student leaves fourth grade still struggling in reading (Juel, 1988).

Twenty-first-century classrooms are influenced by educational technology. Margolin et al. (2013) observed that portable technology interventions can significantly improve student performance in K-5 learning environments. Greaves et al. (2010) asserted that properly implemented educational technology can substantially improve student achievement when employing a 1:1 student-computer ratio. Educational technology applications produce a positive effect on reading outcomes for elementary school-level readers (Greaves et al., 2010). Using technology in the learning process enabled school leaders to break generational barriers that often affect low-socioeconomic status students (Cheung & Slavin, 2013).

Portable technology supports collaborative learning and bridges the digital divide between home, school, and other environments (Cheung & Hew, 2009). Grimshaw (2007) reported that reading comprehension improved when using e-Reader technology, although some students preferred traditional means of reading because of eye strain and headaches using portable technology. Student reading and language arts skills improved, as indicated by the improvement in Common Core understanding during the project (Union et al., 2015). Additionally, increased support from the teacher regarding best

practices in modeling and using the portable technology for specific skill instruction was reinforced (Union et al., 2015).

CAI programs can provide elements of supplemental instruction that might be difficult for classroom teachers to offer (Gibson et al., 2011). Students who use CAI programs can supplement their literacy learning while allowing the teacher to focus on other skill-based instruction. Although computer technology program use has increased recently, additional research is needed to test their effectiveness with various groups. Eight fourth-grade students who participated in a study increased the number of words read correctly on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) spring benchmark after following the Read Naturally Software Edition (RNSE) interventions (Gibson et al., 2011). Five of the eight participants reduced their risk status by one level. All eight students made substantial gains in oral reading fluency. These findings support the positive effects of CAI and the benefits of RNSE for high-risk learners, such as low-performing African American students (Gibson et al., 2011).

Although the study results indicated that CAI accelerated the reading growth of all eight participants, these results were preliminary (Gibson et al., 2011). The CAI focused on fluency and comprehension, not the other three components of reading instruction. However, the study results indicate that using CAI can effectively accelerate the rate at which students master reading components.

CAI has been employed to improve student reading proficiency levels (Alqahtani, 2020). The i-Ready online reading program is one such program that was implemented to remediate the reading proficiency levels of Grade 3-5 students. American students' low reading proficiency levels are a major focus of education stakeholders (Owens &

Candipan, 2019). Early literacy interventions are linked with students' academic outcomes.

**ELL Learners and Reading**

The best approaches to teaching reading to non-ELLs often apply to ELLs, including explicit instruction in phonological awareness, phonics, vocabulary, structural analysis, fluency, and reading comprehension strategies (August & Shanahan, 2014). Goldenberg (2012) highlighted that traditional classroom practices alone may be insufficient to aid ELLs in learning advanced academic materials and closing the achievement gap with non-ELLs. Research has shown that ELLs may benefit from intensive interventions that extend beyond typical classroom instruction, including one-to-one tutorial sessions or small-group instruction. For example, Vadasy and Sanders (2011) implemented a supplemental phonics program in one-to-one tutorials lasting 120 minutes per week over 20 weeks. The program produced significant gains in word reading for ELL first graders but only for students with higher oral vocabulary scores.

Research indicates that instructional technology can boost students' motivation and assist ELLs in learning a second language (Lacinda, 2004). Technology facilitates the transition between language acquisition stages for ELL students, helps them establish their voice, and enhances their writing by utilizing visuals and video (Brozek & Duckworth, 2011). According to some preliminary research, ELL students' performance parity can be considerably increased in digital learning environments (Lopez, 2010). Learning outcomes are also impacted by students’ motivation and increased interest in learning concepts when technology is integrated (Lopez, 2015).

A few studies have reported that technology-based interventions might be beneficial for ELLs. Macaruso and Rodman (2011) examined Lexia Core5 and found significant benefits for ELL kindergartners in phonological awareness and word recognition. Rodriguez et al. (2012) also used Lexia Core5 and found superior gains in reading comprehension when ELL first graders received instruction in their native language rather than English. These results are consistent with other studies showing that technology can support reading development in at-risk students (Cassady & Smith, 2005).

**Lexia Core5 Reading Proficiency Assessment**

The developers of Lexia Core5 Reading refer to testing as 'intelligent branching.' Student progress metrics now are not just reserved for a one-time annual standardized test (Lexia Learning, 2022). These metrics can be accessed year-round and intuitively presented to teachers. Administrators and teachers can easily view what learning objectives students have accomplished and what a student has yet to master. With artificial intelligence (AI) solutions, information about a student, their teacher, class, school, and language proficiency data can all be viewed instantly on the admin dashboard (Lexia Learning, 2022). This efficient data collection, combined with AI, creates individualized learning pathways and lessons for each student. Through continuous progress monitoring, personalized lessons are made for each student, with “practice groups” of peers in the same lesson automatically organized for teachers (Lexia Learning, 2022).

Lexia Core5 Reading is an adaptive blended learning program that accelerates the development of literacy skills for students of all abilities, helping them make that critical

shift from learning to read to reading to learn (Lexia Learning, 2022). The Lexia Core5 software program is a product provided by the Rosetta Stone Company. The software program is aligned with Common Core Standards and is designed as a supplemental resource to provide reading instruction for students in grades pre-kindergarten through grade five. The research-based technology software is designed to provide personalized learning to students and help the students improve their reading ability (Lexia Learning, 2019). The Lexia Core5 software is designed to meet the academic needs of learners at all learning levels but especially for students who are performing below grade level (Lexia Learning, 2022).

Students are evaluated as they participate in the program through auto assessment. This auto-assessment eliminates the need for a separate test session. This assessment data is generated by the program in reports that the teacher can access at any time (Lexia Learning, 2022). As the student progresses through the program, the program provides more practice based on the student's responses to each task. If a student is having difficulty, more practice is given. If the same error is made repeatedly, the program switches to versions of the activity that provide additional scaffolding, such as hints and reduced stimuli (Maracuso and Rodman, 2011). When students achieve success, they are advanced to the next skill.

The program uses a systematic, structured approach incorporating structural analysis to address the five main elements of effective reading education (Lexia Learning, 2022). These domains include phonemic awareness, phonics, vocabulary, fluency, and reading comprehension (National Reading Panel, 2000). Students who use

the curriculum receive explicit, systematic, one-on-one teaching in reading education. The curriculum focuses on skill gaps as students progress through the classes.

Researchers in two studies of the Lexia Core5 CAI program found (a) no significant difference between the control and the treatment groups (Rodríguez et al., 2012; Ness et al., 2013); and (b) the control group outperformed the treatment group (Ness et al., 2013). Rodríguez et al. (2012) studied ELLs. Although results revealed that all participants experienced significant gains in fluency, word reading, and passage comprehension, only 52 students who received Spanish language instruction on the computer had significantly higher scores in reading comprehension (Rodriguez et al., 2012).

Lovett et al. (2017) extended the findings of previous studies by examining the impact of when reading interventions were initiated for struggling readers. Lovett et al. (2017) reported on a highly intensive intervention program in first through third grade in which trained teachers delivered lessons in 50-minute pull-out sessions to small groups of students with homogenous skill deficits. Students in the study who received instruction beginning in early grades, especially first grade, showed greater long-term reading gains than those who began later (Lovett et al., 2017).

Fox (2015) conducted an action research study to determine whether various interventions, such as Lexia Core5 and Accelerated Reading, would help struggling third graders' reading comprehension. The purpose of the study was to demonstrate the significance of having proficient reading abilities by the time students reach the third grade, as this is the cornerstone for their future academic success (Johnson, 2019). The goal of the study was to encourage kids to read by putting into practice efficient teaching

strategies and interventions as soon as feasible. The study's conclusions demonstrated how students' connection to reading was strengthened by instructional technology and direct instruction techniques (Fox, 2015).

In a study done by Macaruso et al. (2019), it was found that Lexia Core5 was particularly impactful for low-performing kindergarten students. These students are most at risk of long-term reading failure (Fuchs et al., 2001). In the program context, nearly all low performers scored in the average range or better by the end of second grade. The program provided these students with multiple opportunities to master skills in online activities and when flagged as having difficulties in the educator dashboard (Conner et al., 2013). The teachers reported monitoring the dashboard and using Lexia Core5 lessons to support students struggling with the same skills. These findings are consistent with others showing that effective interventions can benefit at-risk students in early grades (Connor et al., 2013).

The developers of Lexia Core5 Reading refer to instruction supplemented with computer assistance as 'intelligent branching.' Students are evaluated as they participate in the program (auto assessment). This auto-assessment eliminates the need for a separate test session. The program generates this assessment data in reports that teachers can access anytime.

For example, as the student progresses through the Lexia Core5 program, the program provides more practice based on the student's responses to each task. If a student is having difficulty, more practice is given. If the same error is made repeatedly, the program switches to versions of the activity that provide additional scaffolding, such as

hints and reduced stimuli (Maracuso & Rodman, 2011). When students achieve success, they advance to the next skill (Lexia Learning, 2022).

**Summary**

Reading is a complex and unnatural task (Castles et al., 2018). The theory of cognitivism centers on how information is processed within the mind. It goes beyond observable behavior, emphasizing the internal mental processes in learning. Cognitivism theory asserts that learners play an active role in information processing, so there is a focus on developing areas such as knowledge, memory, thinking, and problem-solving. Behaviorism is a theory of learning based on the idea that all behaviors are acquired through conditioning, and conditioning occurs through interaction with the environment. Our actions shape environmental stimuli. Lexia Core5 Reading was developed based on the five components of effective reading instruction and has been proven always to improve most students' reading outcomes in elementary school (Castles et al., 2018).

# Chapter 3

## Methods

Computer-based early reading programs have the potential to provide an engaging learning environment to target decoding-related skills, provide scaffolded practice with text reading, and include activities to enhance comprehension (Metsala & Kalindi, 2022). These tactics can be added to teaching reading in the classroom for struggling readers with minor disabilities by using computer-assisted instruction tools. Lexia Learning offers a computer-assisted education system called Lexia Core5 Reading, which effectively enhances reading proficiency. Within Chapter Three, the research design provides a plan for conducting the study. Included in this chapter is the selection of participants who are involved in the study. Measurement discusses the methodology of the study as well as reliability and validity, while data collection shows the research instrumentation and sampling. Data analysis and hypothesis testing explain the data gathered and hypotheses made, and limitations show any research limitations found.

### Research Design

The purpose of this quantitative causal-comparative study was to examine the continuing impact CAI has on the literacy achievement of students in third grade in one suburban public school district in the southeastern United States. Causal-comparative research, or ex post facto research, studies the reasons behind a change that has already occurred. Though causal-comparative research designs can provide insight into the relationships between variables, researchers cannot use them to define why an event took place. This is because the event already occurred, so researchers cannot be sure what caused its effects. The study investigated the differences in the reading

proficiency levels of third-grade students in both the general education and ELL populations. MAP BOY and MOY scores of students in the general education and ELL populations were examined. Students' MAP BOY proficiency percentages were compared to their MAP MOY proficiency percentages to determine patterns or differences after participating in the Lexia Core5 reading proficiency assessment with both general education and ELL student populations.

This causal-comparative study was designed to investigate the influence of factors on the dependent variables (MAP BOY and MOY scores) for the independent variable (Lexia Core5) for third-grade students in one large suburban school district in the southeastern United States. Investigating the differences in student MAP scores after participating in the Lexia Core5 reading proficiency assessment and Lexia Core5 grade-level reading scores were examined.

Depending on the student's reading deficiencies, a minimum of 20 to 80 minutes per week was required. Lexia Core5 had to be used for at least 50 percent of the required 20 weeks of the year. Third-grade students from the school district received the district reading curriculum, Wit and Wisdom, and Lexia Core5 supplemental reading instruction. Causal-comparative studies are similar to correlational studies. While both explore relationships between variables, causal-comparative studies compare two or more groups and correlational studies score each variable in a single group. Though correlational studies include multiple quantitative variables, causal-comparative studies include one or more categorical variables. Causal-comparative research is the most appropriate design to achieve the purpose of this study.

**Selection of Participants**

Third-grade students from the general education population and the ELL population at 16 public elementary schools in one school district in the southeast were among the participants. A participant in the study had to meet two of the three following requirements: (a) be listed in the general education student population, (b) be listed in the ELL student population, and (c) complete the MAP assessment and Lexia Core5 reading proficiency assessment during the 2023-2024 school year.

This study's participants included students in third grade from 16 public elementary schools within the same district in the southeastern United States who participated in the Lexia Core5 reading proficiency assessment. The complete data set for this study was third-grade students from 16 elementary schools in the selected school district. A purposive de-identified archival sample of all third-grade students from the school district was accessed from the school's database. Archival data from the 2023-2024 school year was used.

**Measurement**

The Measures of Academic Progress (MAP) was an assessment used in this research study. This assessment is a computerized test that maps a student's academic growth and proficiency in reading. The test is adaptive, meaning the questions' difficulty level changes according to the student's previous answers (Northwest Evaluation Association, 2020). This ensures the test is uniquely tailored to each student to show their academic progress. The reading section of the MAP test has three different versions that are mean for each grade group – K-2, 2-5, and 6-12. The reading test for Grades 2-5 includes 40-43 questions and can take students 45-60 minutes to complete. Questions in

the Grades 2-5 reading test mostly focus on literary texts, drawing conclusions, informational texts, vocabulary, summarization, and context clues (Northwest Evaluation Association, 2020).

The MAP is a valid way to assess student reading achievement. The multilevel growth model used by MAP Growth norms includes individual pupils nested within schools. Individuals and schools perceive the model-based norms differently. While school norms allow mean scores from one school to be compared to average scores for similar schools, individual norms allow a student's progress and accomplishment status to be compared to like pupils (Northwest Evaluation Association, 2020). One important variation between norms at the student and school levels is the degree of variability in both school means and individual student scores. Compared to the variability in growth for individual students, the growth variability for a group of students, a school, is smaller. Because each of these two scenarios reflects a distinct level of the model, the percentiles in each will change (Northwest Evaluation Association, 2020).

The MAP is a reliable way to assess student reading achievement (Northwest Evaluation Association, 2020). To help with score interpretation and to provide context for scores, MAP Growth reports offer norm- and criterion-referenced data. MAP for the fall, winter, and spring quarters, growth norms offer a means of comparing student performance to a nationally representative sample of test takers (Thum & Kuhfeld, 2020). Percentiles for each grade level's scores at a specific moment are provided by achievement status norms. It is a quick look at how the students performed. Test score changes for students are described by growth norms in relation to the national population. Two growth metrics, in particular, the Conditional Growth Index and Conditional Growth

Percentile, characterize a student's performance in relation to pupils with comparable educational backgrounds and past test results and not personal preferences.

The reading scores on the MAP are personalized, adaptive, and standardized tests that are responsive to students' answers and provide an accurate picture of their achievement (Northwest Evaluation Association, 2020). The MAP reading test is used to gauge student reading achievement within the designated school districts three times a year. The Lexia Core5 reading proficiency assessment was given to students in addition to their regular curriculum. These students received Lexia Core5 Reading with fidelity for a minimal time.

The two data sets included MAP Fall and Winter assessments from the MAP and the beginning and middle of year Lexia Core5 Reading data from one southeastern school district. All grade levels take the MAP Fall reading exam as a universal screening test at the start of the academic year. Before instruction, this pretest is given in the first or second week of classes. All grade levels take the MAP Winter reading exam in January as a post-test to show academic progress in reading.

The 2015 Reading Student Growth Norms chart (Appendix A; Northwest Evaluation Association, 2020) contains the goal scores for the MAP at the start and conclusion of the year. Each grade's starting score at the start of the year is as follows: K–12 mean score < 137.5; 1–2 low scores ≤ 160.7; 3–4 low scores ≤ 188.3; 5–6 low scores ≤ 211.0; 7–8 low scores ≤ 214.4; and 9–12 mean scores ≤ 217.2.

One validity report examines the relationship between student performance in Lexia Core5 Reading and scores on MAP, an established measure of reading ability. Students used Core5 for at least 20 weeks during the school year and met usage targets

for at least 50% of those weeks. MAP was administered in the fall, winter, and spring of the school year. Correlations were obtained between Core5 performance measures, predictor scores in fall/winter, and MAP Rasch unit scores for each grade (K–5) occurred at two time intervals. Grade-level reading scores from Lexia Core5 occurred at two time intervals, fall and winter.

In all 18 instances, correlations were significant and fell between 0.3-0.7. For students who had On Target Predictor scores in the fall and winter (i.e., likely to reach Core5 Benchmark in the spring), 86% showed proficient scores on MAP (at/above the 40th percentile) in the spring. Similarly, for students who reached the Core5 Benchmark in the spring, 84% showed proficient scores on MAP. These outcomes show how performance in Core5 is associated with scores on the MAP (Lexia Learning, 2022).

Lexia Core5 is a reliable way to assess student grade-level reading scores (Lexia Learning, 2022). Lexia Core5 provides equitable learning opportunities for all students and supports the science of reading. Lexia Core5 follows an adaptive blended learning model that offers explicit, systematic, and personalized reading instruction. This approach allows educators to deliver differentiated literacy instruction to students of all abilities. Using Lexia’s research-proven program, Core5 effectively reduced the risk of students not meeting grade-level standards while providing accelerated and on-track feedback students need to thrive (Lexia Learning, 2022).

The goal of Lexia Core5's development was to close the reading level gap. Based on the science of reading, it offers students fair and equal learning opportunities, fostering their success and wellbeing. Using an adaptive blended learning approach, Lexia Core5 provides systematic, explicit, and individualized reading instruction. Lexia

Core5 lowers the likelihood that students will not reach grade-level expectations while giving on-grade-level students the interventions they require to increase their reading level scores by utilizing the Lexia Core5 program (Lexia Learning, 2022).

**Data Collection Procedures**

Before collecting data, a request was submitted for the data needed to complete the study. The certified staff program coordinator granted permission for the MAP data on July 17, 2024. The instructional technology facilitator granted permission for the Lexia Core5 data on July 29, 2024. In addition, a proposal for conducting research was submitted to the Baker University Institutional Review Board (IRB) on August 4, 2024. The IRB granted permission to the researcher in writing on August 23, 2024. The archived data were collected for the analysis. Data was collected from third-grade students from one school district. MAP BOY and MOY scores were analyzed to determine if the Lexia Core5 reading proficiency assessment impacted literacy achievement. The data for MAP is stored in a database housed by NWEA. The data collected for this study was downloaded into a student management system by the certified staff program coordinator and instructional technology facilitator in July 2024. In August 2024, data were exported to Microsoft Excel and imported into IBM SPSS. The program's fidelity of use was indicated by the utilization data. Furthermore, requests were made for the MAP Fall and Winter data. Once approval from the participating school district was granted, maintaining secrecy was vital since student data was used. The MAP scores from the 2023-2024 school year as well as Lexia Core5 Reading CAI program scores and growth data from the 2023-2024 school year were used by the researcher. The complete data set included the 2023-2024 Lexia Core5 reading

proficiency assessment archived data and third-grade students' (general education and ELL) MAP BOY and MOY reading proficiency scores from the 2023-2024 school year.

**Data Analysis and Hypothesis Testing**

The research questions focused on the differences in reading achievement on the MAP assessment from the fall to winter for the 2023-2024 school year. Grade-level reading growth from Lexia Core5 was also analyzed. Data were examined using a paired t-test to determine if significant mean differences existed for students receiving Lexia Core5 reading interventions (from fall to winter) and for reading achievement on the MAP assessment. The following hypotheses were proposed:

**RQ1.** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**H11.** There was a difference in the change in MAP reading scores of third-grade students identified in the general education population in one southeastern United States school district based on introducing the Lexia Core5 Reading CAI intervention to supplement the standard district ELA curriculum.

The reading MAP Assessment scores of third-grade general education students in one school district in the southeastern United States were examined. The mean of BOY scores on the MAP reading assessment was compared to the mean of MOY scores on the MAP reading assessment after participating in the Lexia Core5 reading proficiency assessment. The level of significance was set at .05.

**RQ2.** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

**H21**. There was a difference in the change in MAP reading scores of third-grade students identified in the ELL population in one southeastern United States school district based on introducing the Lexia Core5 Reading CAI intervention as a supplement to the standard district ELA curriculum.

A paired-samples *t*-test was conducted to test H21. The reading MAP Assessment scores of third-grade ELL students in one school district in the southeastern United States who received Lexia Core5 interventions. The mean of BOY scores on the MAP reading assessment and Lexia Core5 program were compared to the mean of MOY scores on the MAP reading assessment after participating in the Lexia Core5 reading proficiency assessment. The level of significance was set at .05.

**RQ3.** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**H31.** There was a difference in the change in Lexia Core5 BOY and MOY grade-level reading scores of third-grade students identified in the general education population in one southeastern United States school district based on the introduction of a Lexia Core5 Reading CAI intervention as a supplement to the standard district ELA curriculum.

A paired-samples *t*-test was conducted to test H31. The Lexia Core5 BOY and MOY grade-level reading scores of third-grade general education students in one school district in the southeastern United States who received Lexia Core5 interventions were

used to compare grade-level reading growth among general education third-grade students. The mean of BOY scores on the Lexia Core5 reading assessment was compared to the mean of MOY scores on the Lexia Core5 reading assessment for the third-grade general education students. The level of significance was set at .05.

**RQ4.** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

**H41.** There was a difference in the change in Lexia Core5 BOY and MOY grade-level reading scores of third-grade students identified in the ELL population in one southeastern United States school district based on the introduction of a Lexia Core5 Reading CAI intervention as a supplement to the standard district ELA curriculum.

A paired-samples *t*-test was conducted to test H41. The Lexia Core5 BOY and MOY grade-level reading scores of third-grade ELL students in one school district in the southeastern United States who received Lexia Core5 interventions were used to compare grade-level reading growth among ELL third-grade students. The mean of BOY scores on the Lexia Core5 reading proficiency assessment was compared to the mean of MOY scores on the Lexia Core5 reading proficiency assessment for the students. The level of significance was set at .05. Negative numbers in the data set represented how many grades below grade level each student was (-4, -3, -2, -1, or 0).

**Limitations**

Using causal-comparative research may be one of the study's limitations. Archival data was used in the research study. In addition to the independent variable(s), other variables that frequently affect the dependent variable; these vary according to the

circumstance. Because of this, the researcher cannot say that the independent variable produced the outcomes in the dependent variable (Temple et al., 2010).

Another limitation was that Lexia Core5 might not have been used with fidelity. Even though participants were scheduled to engage in Lexia Core5 online interventions for a scheduled amount of time each week, it is uncertain if Lexia Core5 was implemented with fidelity at each school being studied.

Given the causal-comparative design, the researcher aimed to determine the impact of an ELA curriculum supplement that included the Lexia Core5 Reading CAI program intervention for third-grade students from the general education population and those who were identified as third-grade ELLs contrasted with third-grade students from the general education population and those who were identified as ELLs who got only the regular ELA program. The five components of reading were studied, including phonics, phonemic awareness, vocabulary, fluency, and reading comprehension.

**Summary**

This causal-comparative study was designed to investigate the program's impact on student reading achievement on the dependent variables (MAP BOY and EOY scores) for the independent variable groupings (Lexia Core5) for third-grade students in one large urban school district in the southeastern United States. A quantitative approach was used to determine the degree of differences between the average academic progress in reading proficiency scores of third grade students in the general education population and the degree of differences between MAP BOY and MOY reading proficiency scores and Lexia Core5 grade-level growth scores of third grade ELL students.

This chapter contained the research design and selection of student participants. Hypothesis testing was described as performed. Lastly, the limitations of the study were shared. The results from this study are presented in Chapter 4.

# Chapter 4

## Results

This study aimed to explore the continuing impact CAI had on the literacy achievement of third-grade students identified in the general educational and ELL populations in suburban public elementary schools. Specifically, the purpose of this quantitative causal-comparative study was to determine the impact of an English Language Arts (ELA) curriculum supplement that included the Lexia Core5 Reading CAI program intervention for third-grade students from the general education and ELL populations. The overall reading scores were analyzed, including the five components of reading: phonics, phonemic awareness, vocabulary, fluency, and reading comprehension. In this chapter, the testing hypothesis and results are discussed.

### Descriptive Statistics

Students used Lexia Core5 as a reading intervention to improve reading scores. During the 2023 – 2024 school year, the MAP assessment was administered to third-grade students. The MAP and Lexia Core5 reading proficiency assessments were also administered to measure reading academic progress. The MAP and Lexia Core5 reading proficiency assessments were administered in two intervals, fall and winter. The sample for this study included third-grade students from both the general education and ELL populations. This study included 620 students for the third-grade general education MAP, 99 students for the third-grade ELL MAP, 650 students for the third-grade general education Lexia Core5, and 102 students for the third-grade ELL Lexia Core5. The different numbers indicated students were present at school on the day of the

assessments. Some of the data indicated a few students only took the MAP or Lexia Core5 assessments because of school attendance.

In the 2023-2024 testing data for third-grade general education students, the reading BOY mean scores were (M = 184.69, SD = 18.08), and the reading MOY mean scores were (M = 194.58, SD = 21.32) for the students after using the Lexia Core5 reading proficiency assessment. In the 2023-2024 Lexia Core5 testing data for third-grade ELL students, the reading BOY mean scores were (M = 179.29, SD = 17.09), and the reading MOY mean scores were (M = 184.34, SD = 23.61) for the students after using the Lexia Core5 reading proficiency assessment.

In the 2023-2024 Lexia Core5 testing data for third-grade general education students, the grade-level reading BOY mean scores from Lexia Core5 were (M = -.100, SD = 1.39), and the grade-level reading MOY mean scores from Lexia Core5 were (M = -.29, SD = 4.10) for the students after using the Lexia Core5 reading proficiency assessment. In the 2023-2024 testing data for third-grade ELL students, the grade-level reading BOY mean scores from Lexia Core5 were (M = -.77, SD = .95), and the grade-level reading MOY mean scores from Lexia Core5 were (M = -.39, SD = 1.02) for the students after using the Lexia Core5 reading proficiency assessment.

**Hypothesis Testing**

The research questions focused on the differences in reading performance on the MAP assessment from the fall to winter for the 2023-2024 school year and on grade-level reading growth in Lexia Core5 from the fall to winter for the 2023-2024 school year using the Lexia Core5 reading proficiency assessment. The data were analyzed using a paired t-test to determine if mean differences existed for students receiving Lexia Core5

interventions (from fall to winter) on the MAP reading assessment and for an increase in grade-level reading growth based on the Lexia Core5 reading proficiency assessment. The following hypotheses were proposed:

**RQ1.** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**H11.** After using the Lexia Core5 reading proficiency assessment, there is a change in the MAP reading assessment scores for third-grade general education students enrolled in a southeastern United States school for the 2023-2024 school year. The paired-samples t-test indicated a difference between the two means (BOY 2023 to MOY 2024), $t(619) = -55.81$, $p<.001$. The MAP reading mean ($M = 184.69$, $SD = 18.08$) was lower than the MAP reading mean for the third-grade general education students after completing the Lexia Core5 reading proficiency assessment ($M = 194.58$, $SD = 21.32$). The hypothesis was supported. Participation in the Lexia Core5 reading intervention program changed third-grade general education students' reading performance from fall 2023 to winter 2024. The magnitude of this difference was a large effect size with Cohen's $d = -2.24$. Assumptions for the paired t-test that there would be a difference between the average MAP BOY and MOY reading proficiency scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment proved to be true.

Each participant contributed scores for both the pre-test and post-test as paired observations. Normality of the different scores was assessed using the Shapiro-Wilk test,

which indicated no significant deviation from normality (p>.05). Pairs were independent, as participants did not influence one another's scores.

**RQ2.** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

**H21.** After using the Lexia Core5 reading proficiency assessment, there is a change in the MAP reading assessment scores for third-grade ELL students enrolled in a southeastern United States school for the 2023-2024 school year. The paired-samples t-test indicated a difference between the two means (BOY 2023 to MOY 2024), t(98) = -2.48, p<.001. The MAP reading mean (M = 179.29, SD = 17.09) was lower than the mean MAP reading scores for the third-grade general ELL students after completing the Lexia Core5 reading proficiency assessment (M = 184.34, SD = 23.61). The hypothesis was supported. Participation in the Lexia Core5 reading proficiency assessment changed ELL students' reading performance from fall 2023 to winter 2024. The magnitude of this difference was a large effect size with Cohen's d = -.249. Assumptions for the paired t-test that there would be a difference between the average MAP BOY and MOY reading proficiency scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment proved to be true.

Each participant contributed scores for both the pre-test and post-test as paired observations. Normality of the different scores was assessed using the Shapiro-Wilk test, which indicated no significant deviation from normality (p>.05). Pairs were independent, as participants did not influence one another's scores.

**RQ3.** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**H31**. After using the Lexia Core5 reading proficiency assessment there is a change in the Lexia Core5 grade-level reading growth scores for third-grade general education students. The paired-samples t-test indicated a difference between the two means (BOY 2023 to MOY 2024), $t(649) = -4.20$, $p<.001$. The grade-level reading growth mean ($M = -.100$, $SD = 1.39$) was lower than the grade-level reading growth mean for the third-grade general education students after completing the Lexia Core5 reading proficiency assessment ($M = -.29$, $SD = 4.10$). The hypothesis was supported. Participation in the Lexia Core5 reading proficiency assessment changed third-grade general education students' grade-level reading growth from fall 2023 to winter 2024. The magnitude of this difference was a large effect size with Cohen's $d = -.17$. Assumptions for the paired t-test that there would be a change in the Lexia Core5 grade-level reading growth scores for third-grade general education students proved to be true.

Each participant contributed scores for both the pre-test and post-test as paired observations. Normality of the different scores was assessed using the Shapiro-Wilk test, which indicated no significant deviation from normality ($p>.05$). Pairs were independent, as participants did not influence one another's scores.

**RQ4.** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

**H41**. After using the Lexia Core5 reading proficiency assessment, there is a change in the Lexia Core5 grade-level reading growth scores for third-grade ELL students. The paired-samples t-test indicated a difference between the two means (BOY 2023 to MOY 2024), $t(101) = -4.20$, $p<.001$. The grade-level reading growth mean ($M = -.77$, $SD = .95$) was lower than the grade-level reading growth mean for the third-grade ELL students after completing the Lexia Core5 reading proficiency assessment ($M = -.39$, $SD = 1.02$). The hypothesis was supported. Participation in the Lexia Core5 reading proficiency assessment changed third-grade ELL students' grade-level reading growth from fall 2023 to winter 2024. The magnitude of this difference was a large effect size with Cohen's $d = -.29$. Assumptions for the paired t-test that there would be a change in the Lexia Core5 grade-level reading growth scores for third-grade ELL students proved to be true.

Each participant contributed scores for both the pre-test and post-test as paired observations. Normality of the different scores was assessed using the Shapiro-Wilk test, which indicated no significant deviation from normality ($p>.05$). Pairs were independent, as participants did not influence one another's scores.

**Summary**

This chapter contained data analysis, hypothesis testing, and results for each research question. The results showed a difference in scores from fall to winter on the MAP reading assessment and grade-level growth in reading scores from the Lexia Core5 reading proficiency assessment during the 2023-2024 academic school year among third-grade students in the general education and ELL populations. The subsequent chapter

summarizes the research and major findings from the study. Additionally, implications for action and recommendations for future research are explained.

# Chapter 5

## Interpretation and Recommendations

This quantitative causal-comparative study set intended to investigate the long-term effects of Lexia Core5 on third-grade students' reading achievement in a suburban public district in the southeastern United States. The study investigated the variations in third-grade students' reading competence levels. Lexia Core5 grade-level reading growth scores as well as BOY and MOY MAP scores of students in the general education and ELL populations were studied. After taking part in the Lexia Core5 reading proficiency assessment, students' MAP BOY and MAP MOY grade-level scores and Lexia Core5 grade-level reading growth scores were compared to look for trends or variances.

The topics covered in chapters one through four are compiled in this chapter, which also includes a study summary, a problem overview, research questions, a methodological review, and key findings. This chapter concludes with a discussion of findings from literature, implications for action, suggestions for additional research, and closing thoughts.

### Study Summary

This section provides a summary of the ongoing research. The problem synopsis and research questions are examined. The main conclusions and an evaluation of the methodology completed this part.

### Overview of the Problem

For the rest of their lives, students will require the ability to read. Early reading difficulties are associated with a higher risk of school dropout and subpar performance in later grades (Chambers et al., 2011; Lesnick et al., 2010). Joshi et al. (2009) report that

about 70% of high school dropouts report having trouble with reading. The use of digital apps to improve the reading abilities of struggling readers in elementary schools is not well-supported by research. The largest effect sizes have been found for small-group interventions that supplement lower-elementary instruction with phonetic activities integrating computer and non-computer activities and occupying substantial time each week. (Cheung & Slavin, 2013). Longitudinal studies analyzing digital technologies have exclusively focused on program use in the short term and looked at benefits that persist after the program is finished (Hurwitz, 2018).

### *Purpose Statement and Research Questions*

The purpose of this research was to investigate the long-term effects of CAI on third-grade ELL and general education students' reading achievement in suburban public elementary schools. For third-grade students from the general education population and those who were identified as third-grade ELLs, the specific goal of this quantitative causal-comparative study was to ascertain the impact of an ELA curriculum supplement that included the Lexia Core5 reading proficiency assessment.

**RQ1:** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**RQ2:** To what degree are there differences between the average MAP BOY and MOY reading proficiency scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

**RQ3:** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade general education students after participating in the Lexia Core5 reading proficiency assessment?

**RQ4:** To what degree are there differences between the average Lexia Core5 BOY and MOY grade-level reading scores of third-grade ELL students after participating in the Lexia Core5 reading proficiency assessment?

### *Review of Methodology*

This study used causal-comparative design and quantitative research methodology. For this investigation, archival data was employed. This data was analyzed using IBM SPSS 27 and a paired sample t-test. General education and ELL third-grade students made up the participants, including general education and ELL students. In a southeastern United States public school district, study participants took BOY and MOY MAP assessments and Lexia Core5 reading proficiency assessments to assess grade-level reading growth for the 2023-2024 school year

### *Major Findings*

Third-grade general education students enrolled for the 2023–2024 academic year saw a change in their MAP reading assessment results following the use of the Lexia Core5 reading proficiency assessment. The two means (BOY 2023 to MOY 2024) differed, according to the paired-samples t-test ($t(619) = -55.81$, $p<.001$). Following completion of the Lexia Core5 reading competence testing, the MAP reading mean ($M = 184.69$, $SD = 18.08$) for BOY 2023 was lower than the MAP reading mean for MOY 2024 for the general education third-grade pupils. ($SD = 21.32$; $M = 194.58$). From fall 2023 to winter 2024, third-grade general education students' reading performance was

altered by their participation in the Lexia Core5 reading competency test. With Cohen's d = -2.24, the magnitude of this change was a large impact size.

Third-grade ELL students enrolled for the 2023–2024 academic year showed a shift in their MAP reading assessment scores following the use of the Lexia Core5 reading proficiency assessment. The two means (BOY 2023 to MOY 2024) differed, according to the paired-samples t-test ($t(98) = -2.48$, $p<.001$). Following completion of the Lexia Core5 reading proficiency assessment, the third-grade general ELL students' mean MAP reading scores ($M = 179.29$, $SD = 17.09$) were lower for BOY 2023 than the MAP reading mean for winter 2024 ($M = 184.34$, $SD = 23.61$). Between fall 2023 and winter 2024, ELL students' reading performance changed as a result of taking the Lexia Core5 reading competency test. With Cohen's $d = -.249$, the magnitude of this change was a large effect size.

The Lexia Core5 grade-level reading growth scores of third-grade general education students enrolled in a school in the Southeast United States for the 2023–2024 academic year changed following the use of the Lexia Core5 reading proficiency assessment. The two means (BOY 2023 to MOY 2024) differed, according to the paired-samples t-test ($t(649) = -4.20$, $p<.001$). After completing the Lexia Core5 reading proficiency assessment, the third-grade general education students' grade-level reading growth mean ($M = -.29$, $SD = 4.10$) was higher for BOY 2023 than the grade-level reading growth mean for MOY 2024 ($M = -.100$, $SD = 1.39$). From fall 2023 to winter 2024, third-grade general education students' grade-level reading growth was altered by their participation in the Lexia Core5 reading competency assessment. With Cohen’s $d = -.17$, the magnitude of this change was a large effect size.

Third-grade ELL students enrolled for the 2023–2024 academic year showed a shift in their Lexia Core5 grade-level reading growth scores following the use of the Lexia Core5 reading proficiency assessment. The two means (BOY 2023 to MOY 2024) differed, according to the paired-samples t-test ($t(101) = -4.20$, $p<.001$). After finishing the Lexia Core5 reading proficiency test, the third-grade ELL students' grade-level reading growth mean ($M = -.39$, $SD = 1.02$) was higher than the grade-level reading growth mean ($M = -.77$, $SD = -.95$). From fall 2023 to winter 2024, third-grade ELL students' grade-level reading growth was altered by their participation in the Lexia Core5 reading competency test. With Cohen's $d = -.29$, the magnitude of this change was a large effect size.

Evidence showed that third-grade students in the general education and ELL populations using the Lexia Core5 reading proficiency assessment increased in their MAP assessment scores for the 2023-2024 school year. The mean change in Rasch Unit (RIT) scores on the MAP reading assessment increased by 9.89 for third-grade general education students and 5.05 for ELL students from fall to winter. The mean change in grade-level growth scores in the Lexia Core5 reading proficiency assessment increased by 7.07 for third-grade general education students and 3.82 for ELL students from fall to winter.

**Findings Related to the Literature**

In this section, the study's findings related to the literature are examined. According to Margolin et al. (2013), student performance in K–5 learning contexts can be considerably enhanced by portable technology interventions. According to Greaves et al.

(2010), using a 1:1 student-computer ratio and effectively implementing educational technology can significantly boost student achievement. Applications of educational technology have a positive impact on elementary school readers' reading outcomes. School administrators were able to break down generational barriers in the classroom, which frequently harm students from low socioeconomic backgrounds.

The success of teaching English literacy depends on providing appropriate evaluations, which enable the evaluation of students' progress as well as the learning process. The assessments should also give pupils the opportunity to consider their own or their peers' work. Furthermore, evaluations support and promote students' learning (Nodoushan, 2014). Literacy levels are impacted by interventions (Damaianti et al., 2020). Lovett et al. (2008) showed that there were no differences between ELLs and their peers who spoke English as a first language in reading intervention outcomes or growth intervention. This finding suggests that systematic and explicit reading interventions are effective for readers regardless of their primary language.

Early childhood reading education now emphasizes more concentrated reading teaching based on the science of brain functioning rather than text recognition. According to a 2013 study by Lonigan et al., students who used CAI programs improved more than control students who did not receive CAI support on tasks involving sound manipulation and rhyming. In terms of phonological awareness, classrooms with CAI help outperform control classes by a large margin. Only underachievers were subject to group disparities.

**Conclusions**

The results of the Lexia Core5 reading proficiency assessment’s effect on students' reading achievement scores on the MAP fall and winter 2023-2024 assessments

are presented in this section, as well as student grade-level growth on fall and winter 2023-2024 assessments as measured by the Lexia Core5 reading proficiency assessment. Implications for action are followed by suggestions for additional study.

### *Implications for Action*

This research can provide school districts with data supporting either the continued use of Lexia Core5 for reading interventions or to begin using the program. The research results showed that Lexia Core5 had a positive impact on student grade-level reading growth and MAP reading achievement in fall 2023 and winter 2024 assessments and program use for both general education and ELL third-grade students.

Many school districts provide extra tutoring programs to raise the academic achievement of low-income students by using federal monies under Title I of the No Child Left Behind Act of 2001. All stakeholders involved in public school districts would benefit from data supporting the use of Lexia Core5 to increase student grade-level reading growth and reading achievement on MAP assessments. Using Lexia Core5 as a reading intervention can help teachers show data and student growth without spending hours analyzing their assessments. Lessons are designed to promote students' understanding of skills when they miss them. Before they are asked to go on, it is dismantled. Instructors will receive email notifications if a certain student requires additional support and interventions in a particular area, and they will also have a prognosis of their year-end performance. Students can also continue independent computer work at home or in after-school programs.

### *Recommendations for Future Research*

Recommendations were provided to increase using Lexia Core5 as a supplemental reading intervention to increase third-grade student reading achievement among ELL and general education populations. Cause and effect cannot be conclusively shown in causal-comparison studies because of the nonrandom assignment of participants to groups. The findings might inspire more research with an experimental design in the future. After examining the data and considering the conclusions, the researcher came up with suggestions for more study. The recommendations for further study are outlined and have to be taken into account by other researchers who want to ascertain whether after-school programs have a major impact on students' academic performance.

One recommendation for further research is to examine the long-term use of Lexia Core5 as a reading intervention program to increase reading achievement on MAP assessments. This could be done as a longitudinal study. While analyzing data in the fall and winter are adequate measures for short-term study, examining data from multiple school years could predict patterns among teacher instructional use and student grade-level and reading achievement growth.

Another recommendation for future researchers is to use two or more public school districts in the southeastern United States. Incorporating students among various socioeconomic statuses and genders could further synthesize the research findings that could provide additional funding for struggling school districts with high poverty populations.

A third recommendation for future research is to examine how third-grade students use Lexia Core5 at home and at school to promote grade-level reading growth. Continued practice of essential skills in a more non-restrictive environment could lead to

additional data supporting the use of Lexia Core5 as independent practice for struggling readers. The longitudinal data could measure the long-term effects of systematic, focused, individualized literacy instruction based on students' current needs.

### *Concluding Remarks*

Using instructional technology to its full potential can greatly improve literacy instruction (Isikwe, 2023). To improve learning results and increase access to education, educational institutions, for example, have started implementing pilot programs that provide tablets to every student (Thieman & Cevallos, 2017). Like any other scientific discipline, reading science is constantly growing and evolving (Duke and Cartwright, 2021).

According to research, instructional technology can help ELLs acquire a second language and increase students' motivation (Lacinda, 2004). With the aid of technology, ELL students can more easily move between phases of language acquisition, find their voice, and produce better writing through images and videos (Brozek & Duckworth, 2011). Preliminary research indicates that digital learning settings can significantly improve the performance parity of ELL students (Lopez, 2010). When technology is used, students' motivation and greater interest in learning topics also impact on learning outcomes (Lopez, 2015).

There are several established strategies for raising student achievement, including intervention, tracking student progress, and using data to inform instructional decisions. All students can benefit from growth if these strategies are part of a supplemental literacy intervention program. According to the study's findings, third-grade general education and ELL students achieved reading achievement growth between the fall and winter

MAP assessments and grade-level growth between the fall and winter Lexia Core5 program use.

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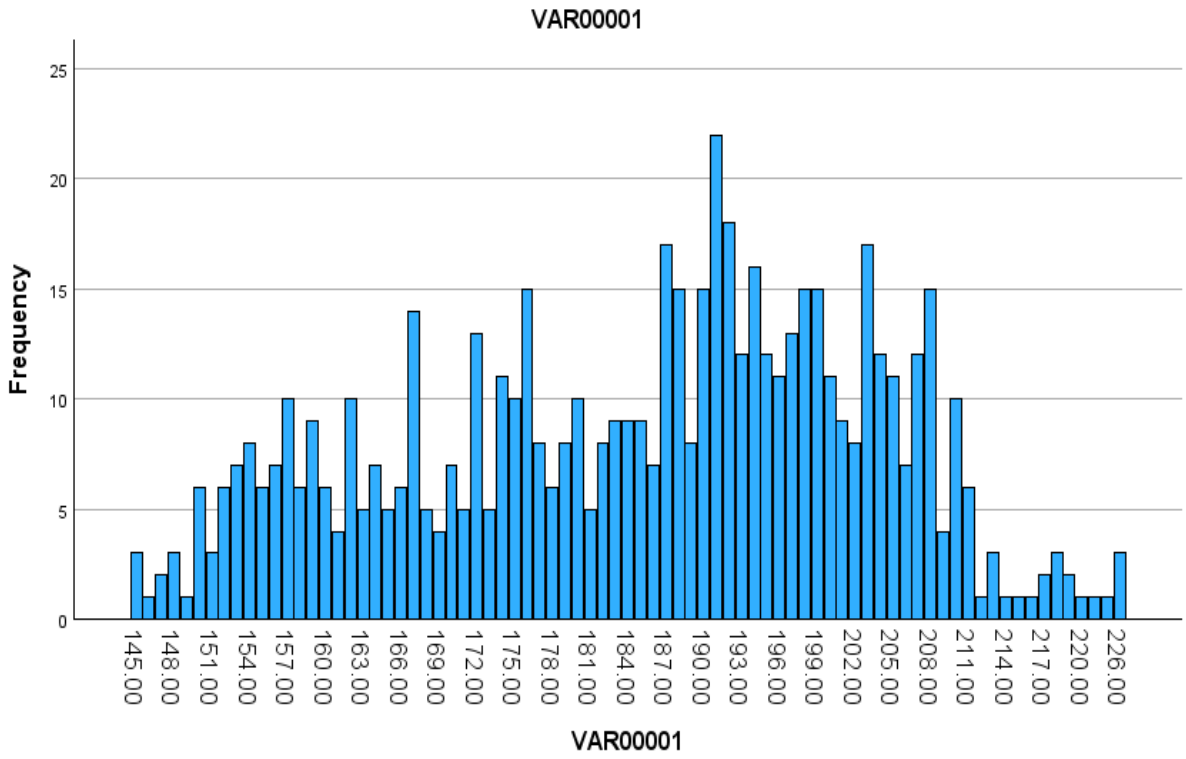
**Figure 1**

NWEA MAP General Education 2023 Assessment Bar Graph

*Third-grade general-education students' frequencies BOY 2023*

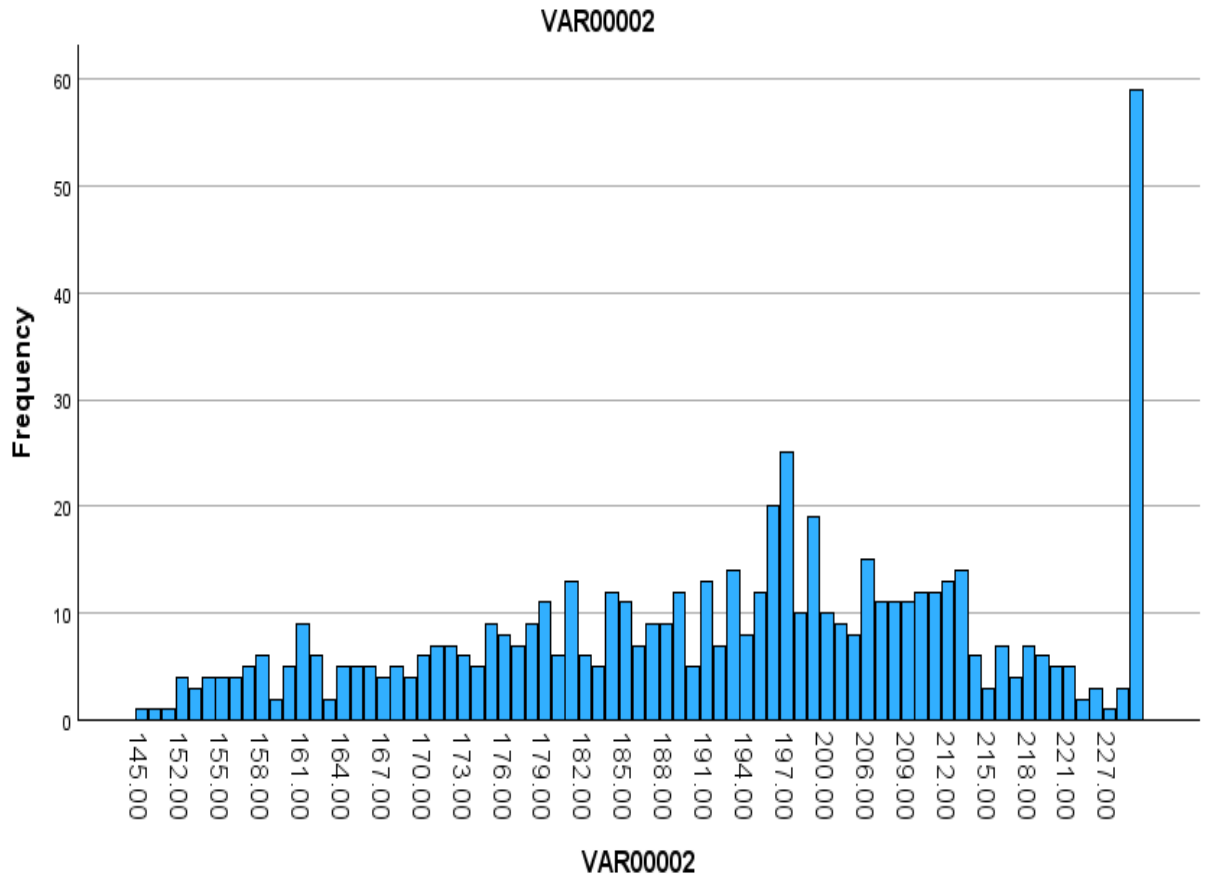



*Note*. VAR00001 indicates MAP test score ranges.

**Figure 2**

NWEA MAP General Education 2024 Assessment Bar Graph

*Third-grade general-education students' frequencies MOY 2024*

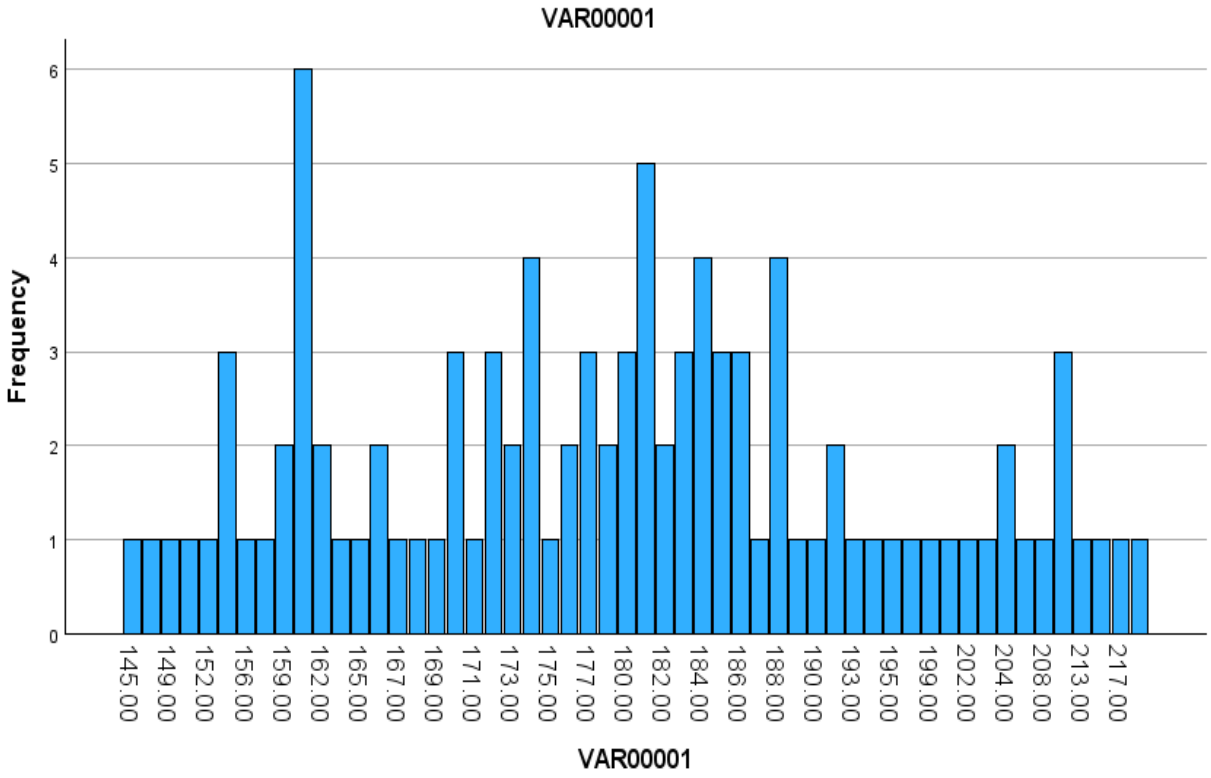



*Note*. VAR00002 indicates MAP test score ranges.

**Figure 3**

NWEA MAP ELL 2023 Assessment Bar Graph

*Third-grade ELL students' frequencies BOY 2023*

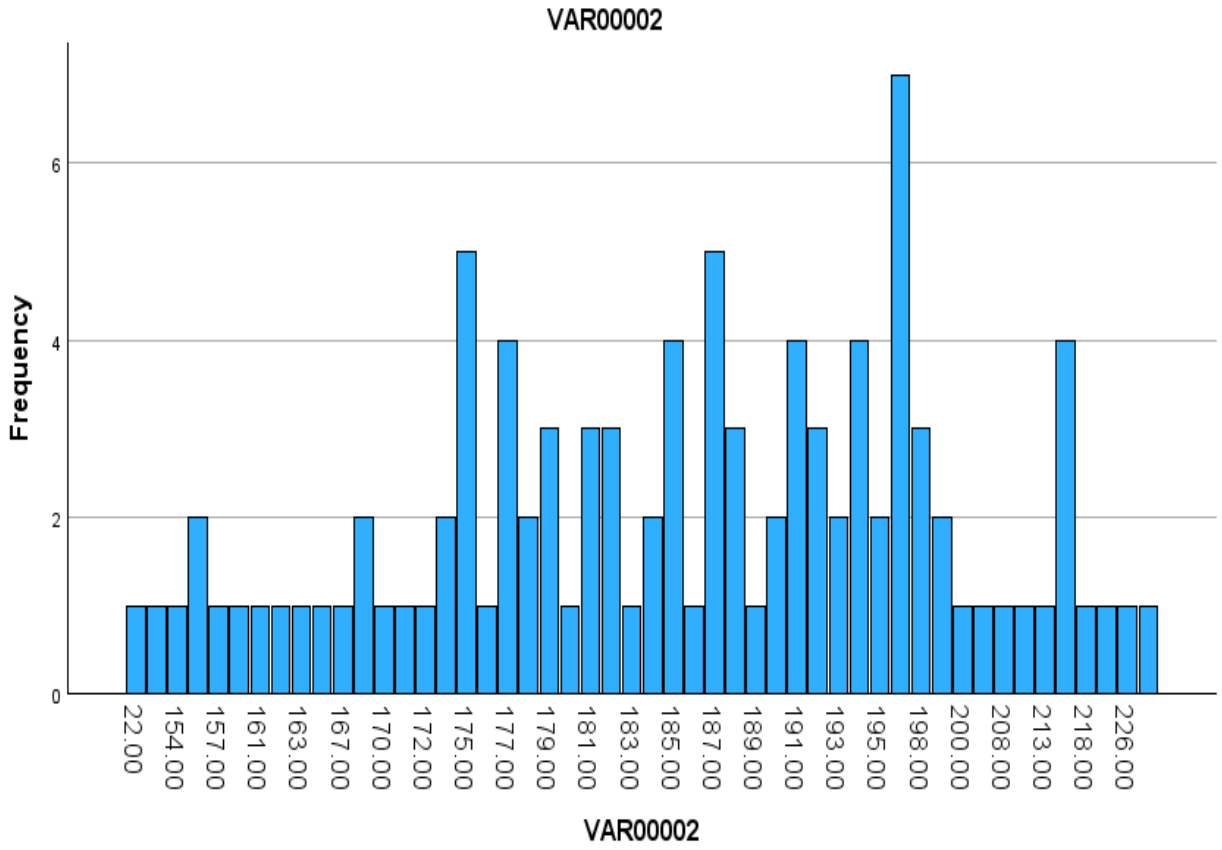



*Note*. VAR00001 indicates MAP test score ranges.

**Figure 4**

NWEA MAP ELL 2024 Assessment Bar Graph

*Third-grade ELL students' frequencies MOY 2024*




*Note*. VAR00002 indicates MAP test score ranges.

# Appendix A: Institutional Review Board

*Baker University Institutional Review Board*

August 23, 2024

Dear Olivia Stroud and Regena Aye,

The Baker University IRB has reviewed your project application and approved this project under Exempt Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.
6. If this project is not completed within a year, you must renew IRB approval.

If you have any questions, please contact me at skimball@bakeru.edu or 785.594.4563.

Sincerely,

*Scott Kimball*, PhD
Chair, Baker University IRB

## Appendix B: Superintendent Approval


September 11, 2024

RE: Approval Letter for Dissertation Research: Olivia Stroud

Ms. Stroud,

Your proposal to conduct dissertation research in the Pulaski County Special School District (PCSSD) has been reviewed. Your study, which includes analysis of archived PCSSD NWEA MAP data is approved. Please feel free to share this communication with Harding University.

Best of luck during your research. If you need anything during the process, please feel free to reach out to Dr. Justin Luttrell, Director of STEM and Blended Learning, for assistance.

Regards,

Dr. Sonya Whitfield
Deputy Superintendent of Learning Services
Pulaski County Special School District

# Appendix C: IRB Submission Form

BAKER UNIVERSITY

**IRB Request**

Date 8/19/24

IRB Protocol Number _____ (IRB use only)

**I. Research Investigator(s)** (students must list faculty sponsor)

Department(s) IDPT

| | Name | Signature | |
|---|---|---|---|
| 1. | Olivia Stroud | | Principal Investigator |
| 2. | Regena Aye | Regena M. Aye | ☑ Check if faculty sponsor |
| 3. | Kyunghwa Cho | Kyunghwa Cho Digitally signed by Kyunghwa Cho Date: 2024.08.20 11:53:51 -05'00' | ☐ Check if faculty sponsor |
| 4. | | | ☐ Check if faculty sponsor |

Principal investigator contact information

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Note: When submitting your finalized, signed form to the IRB, please ensure that you cc all investigators and faculty sponsors using their official Baker University (or respective organization's) email addresses.

Faculty sponsor contact information

Phone 913-344-1243

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**Expected Category of Review**: ☑ Exempt ☐ Expedited ☐ Full ☐ Renewal

**II. Protocol Title**

A Causal-Comparative Study of the Lexia Core5 Computer-Assisted Reading Intervention Program for Showing Reading Achievement Growth of Third-Grade General and ELL Student Populations

III. Summary: The following questions must be answered. Be specific about exactly what participants will experience and about the protections that have been included to safeguard participants from harm.

A. In a sentence or two, please describe the background and purpose of the research.

Computer-assisted instruction (CAI) can potentially provide targeted, individualized student interventions (Mathes, 2020). This study explores the continuing impact CAI has on the literacy achievement of third-grade students identified in the general educational and ELL populations in one urban public school district of 16 elementary schools located in central Arkansas. Lexia Core5 is a reading program for prekindergarten to the fifth grade (Wilkes et al., 2020; Lexia Learning, 2022). The five main components of efficient reading education are covered in Lexia Core5 Reading in a systematic and organized approach: reading comprehension, vocabulary, fluency, phonics, and phonemic awareness (National Reading Panel, 2000). Additionally, structural analysis and morphology are covered in Lexia Core5 Reading. Lexia Core5 Reading has generally produced positive reading outcomes for struggling, at-risk, and general education students.

B. Briefly describe each condition, manipulation, or archival data set to be included within the study.

NWEA MAP BOY and MOY scores of third-grade students from the 2023-2024 school year were requested. Lexia BOY and MOY usage and scores of third-grade students from the 2023-2024 school year were requested. Also included was a percentage of third-grade ELL students among all schools in the district.

IV. Protocol Details

A. What measures or observations will be taken in the study? If any questionnaire or other instruments are used, provide a brief description and attach a copy.

This is a quantitative study. Archival data will be used. No measures or observations will be taken in this study. The Measures of Academic Progress (MAP) was an assessment used in this research study. This assessment is a computerized test that maps a student's academic growth and proficiency in reading. The test is adaptive, meaning the questions' difficulty level changes according to the student's previous answers. The two data sets included MAP Fall and Winter assessments from the Northwest Evaluation Association (NWEA) and the beginning and middle of year Lexia Core5 Reading data from one southeastern school district. All grade levels take the NWEA MAP Fall reading exam as a universal screening test at the start of the academic year. This pretest is given in the first or second week of classes, before instruction. All grade levels take the NWEA MAP Winter reading exam in January as a post-test to show academic progress in reading. The complete data set for this study was the targeted population. A purposive de-identified archival sample of all third-grade students from the school

district was randomized and accessed from the school's database. Archival data from the 2023-2024 school year was used.

B. Will the subjects encounter the risk of psychological, social, physical, or legal risk? If so, please describe the nature of the risk and any measures designed to mitigate that risk.

No student names will be used in the study. Therefore, parental permission will not be needed, and psychological, social, physical, or legal risks will not be encountered.

C. Will any stress to subjects be involved? If so, please describe.

There should not be any stress on the subjects involved as archival test data is the only data being collected and analyzed.

D. Will the subjects be deceived or misled in any way? If so, include an outline or script of the debriefing.

Subjects will not be deceived or misled in any way.

E. Will there be a request for information about which subjects might consider to be personal or sensitive? If so, please include a description.

No student names will be included in the data set or analysis. Only student ID numbers are provided in the data set.

F. Will the subjects be presented with materials which might be considered to be offensive, threatening, or degrading? If so, please describe.

Subjects will not be presented with materials which might be considered to be offensive, threatening, or degrading. The only information collected will be archival test data from two different assessments from the 2023-2024 school year.

G. Approximately how much time will be demanded for each subject?

No time will be demanded for any subject. Only archival test data will be used.

H. Who will be the subjects in this study? How will they be solicited or contacted? Provide an outline or script of the information which will be provided to subjects prior to volunteering to participate. Include a copy of any written solicitation as well as an outline of any oral solicitation.

No subjects will be solicited or contacted. Only archival test data will be used in this study.

I. What steps will be taken to ensure that each subject’s participation is voluntary? What if any inducements will be offered to the subjects for their participation?

No subject participation is needed in this study.

J. How will you ensure that the subjects give their consent prior to participating? Will a written consent form be used? If so, include the form. If not, explain why not.

No written consent form is needed as only archival data will be used for this study.

K. Will any aspect of the data be made a part of any permanent record that can be identified with the subject? If so, please explain the necessity.

No aspect of the data will be made as part of any permanent record that can be identified with the subject.

L. Will the fact that a subject did or did not participate in a specific experiment or study be made part of any permanent record available to a supervisor, teacher, or employer? If so, explain.

No subjects will be participating in this study. Only archival data will be used this study.

M. What steps will be taken to ensure the confidentiality of the data? Where will it be stored? How long will it be stored? What will be done with the data after the study is completed?

The archival test data needed for this study is public knowledge relevant to each school. Archival test data will be destroyed after the successful dissertation defense.

N. If there are any risks involved in the study, are there any offsetting benefits that might accrue to either the subjects or society?

The data analysis and study recommendations can be shared with the participating school districts to help stakeholders make informed future decisions regarding assessment and computer-assisted intervention selections.

O. Will any data from files or archival data be used? If so, please describe.

NWEA MAP BOY and MOY scores of third-grade students from the 2023-2024 school year were requested. Lexia BOY and MOY scores of third-grade students

from the 2023-2024 school year were requested. Also included was a percentage of third-grade ELL students among all schools in the district.