The Impact of i-Ready Instruction on Student Reading Achievement in Kindergarten Through Fifth Grade

Scott A. Sisemore

B.S.E, University of Central Missouri, 2003

M.A., University of Central Missouri, 2007

M.A., George Washington University, 2012

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Doctor of Education in Educational Leadership

Harold B. Frye

Harold B. Frye, EdD
Major Advisor

Susan Rogers

Susan Rogers, PhD

Kenny Rodrequez

Kenny Rodrequez, EdD

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Abstract

Computer-assisted instructional (CAI) programs are not new to education; however, with continued advances in technology and the increased availability of devices, in addition to growing teacher shortages, school districts are increasingly relying on CAI to support student learning and provide interventions to struggling students (Davis & Wright, 2019). This study aimed to assess the impact of i-Ready Instruction on reading achievement growth for kindergarten through fifth-grade students during the 2021-2022 and 2022-2023 school years in the Participant School District. The research objectives were threefold: to compare reading growth between students who engaged in at least 30 minutes of i-Ready Instruction weekly and those who did not; to ascertain if student socioeconomic status (SES) influenced any observed growth difference; and to evaluate the effect of a student's identified Response to Intervention (RTI) Tier on the growth difference. A quantitative quasi-experimental research design was utilized for this study. The dependent variable was student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments in kindergarten through fifth grade. Independent variables included student participation in at least 30 minutes per week of i-Ready Instruction, student SES, and student identified RTI Tier within a given school year. The results of the analysis of three research questions and 36 hypotheses indicated that the use of i-Ready Instruction had little to no impact on student growth achievement. Furthermore, the results indicated that student SES and identified RTI Tier had little to no effect on the difference in student achievement among participants. The results of this study have implications for district leaders and curricular decision-makers.

xx**Dedication**

This work is dedicated to my family, who are the only reason I stand where I stand today. To my grandparents, Lura Jarvis and Frances and Servius Tullius (S.T.) Sims; My Aunt Dede and Uncle Phil; My Cousins, Eric and Lisa Brown (Ditzfeld); and my brother Kevin, along with Tiffany, Grey, and June. To my amazing wife, Annie Sisemore. I could not have found a better partner with whom to share this amazing life. I am so glad I found the school and went to the interview that day. To my boys, Noah, Conner, and Oliver: being your father is the greatest joy of my life and the most important thing I will ever do.

Most importantly, I want to thank my mother, Brenda Michael. The sacrifices you have made and the strength you have demonstrated to ensure your sons did not fall through the cracks are simply awe-inspiring and could never be repaid. In 1979, far from family and support, you loaded two small boys into a broken-down truck that needed a quart of oil every 50 miles and drove countless miles into the unknown to leave an abusive relationship. In doing so, you changed the trajectory of our lives and very likely saved them. I once told you I would ensure your descendants knew this story and how it impacted them. Your grandson may make a Hollywood blockbuster about it someday, but until then, this will have to do.

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Chapter 1

Introduction

School districts nationwide are seeking ways to leverage technology to address gaps in student learning in an environment that is increasingly impacted by teacher shortages and a stressed educational system (Davis & Wright, 2019). The COVID-19 pandemic only exacerbated problems that already existed in many cases. The United States Department of Education Office of Civil Rights (2021) has observed and reported that "emerging evidence shows that the pandemic has negatively affected academic growth, widening pre-existing disparities. In core subjects like math and reading, there are worrisome signs that in some grades students might be falling even further behind pre-pandemic expectations" (p. iii).

Although the COVID-19 pandemic has thrust virtual learning into the spotlight as school districts scrambled to meet the needs of students learning from home, using computers and other technologies to deliver instruction and address learning gaps is not a new phenomenon. Online schools in K-12 education began to take hold in the mid-1990s with the explosion of the Internet revolution (Barbour, 2014). The use of technology to address learning gaps and provide interventions dates back even further, with widespread access to computer-assisted instructional programs to support at-risk students becoming available starting in the mid-1980s (Barley et al. 2002).

Despite being a part of the educational landscape for nearly 40 years, it has only been recently, first with the ubiquity of student devices in the early 2000s, and more recently with the necessity associated with school closings during the pandemic, that computer-assisted instructional programs have become a daily part of the educational

experience for most students in the United States (Auxier & Anderson, 2020). With teachers leaving the profession at alarming rates and vast sums of money being allocated by the federal and state governments to address learning loss caused by the COVID-19 pandemic, this trend towards more technology-based teaching and learning may continue to grow.

A National Education Association poll conducted in 2022 indicated that 55% of teachers planned to leave the profession earlier than they had planned before the COVID-19 pandemic (Kamenetz, 2022). This data point is of particular concern, given that enrollment in teacher preparation programs prior to the pandemic was already declining (Sutcher et al., 2019). When coupled with the vast sums of money being allocated to schools to address the digital divide and learning loss, $190 Billion from the federal government alone, it becomes imperative for school and district leaders to ask important questions about the efficacy of the computer-assisted instructional programs being purchased to confront these issues (Locke, 2022).

Background

The Participant School District is a public school district serving approximately 4,200 students in kindergarten through the 12th grades. The Participant School District's five elementary schools serve students in kindergarten through fifth grades. Two middle schools serve students in Grades 6-8. One high school serves students in Grades 9-12. At the time of this study, The Participant School District had a free and reduced lunch rate of 77.7% (Missouri Department of Elementary and Secondary Education, n.d.). Between 2019 and 2023, the district comprised of a diverse student population. Table 1 provides the district's demographic breakdown as of 2022.

Table 1

Percentage of Participant School District Demographic Data by Race

	2019-2020	2020-2021	2021-2022	2022-2023
Black	51.0	50.5	50.5	47.0
Hispanic	22.0	23.0	24.0	27.5
Multi-Race	6.0	5.0	5.5	6.0
White	20.0	20.0	19.0	18.5
Other	1.0	1.5	1.0	1.0

Note. Adapted from "District Demographic Data," by Missouri Department of Elementary and Secondary Education. *Missouri Comprehensive Data System.* <https://apps.dese.mo.gov/MCDS/Reports/SSRS_Print.aspx?Reportid=6c5b805c-5af7-4c33-be41-dc2b83ded4aa>

The Participant School District has prioritized funding and efforts to address reading deficiencies in kindergarten through eighth grade (Participant School District, 2022). In 2018, 36.1% of Participant School District students scored proficient or advanced on Missouri Assessment Program (MAP) standardized reading assessments, while 63.9% scored in the basic or below basic achievement levels (Missouri Department of Elementary and Secondary Education, n.d.). In 2018, the Participant School District adopted i-Ready Instruction, a product of Curriculum Associates, in an attempt to leverage technology to address student learning gaps in reading and math (Participant School District, 2022).

The Participant School District utilizes i-Ready Diagnostic and Instruction in conjunction with the District's Response to Intervention (RTI) plan (Assistant

Superintendent for Curriculum and Instruction, personal communication, May 9, 2021). i-Ready Diagnostic automatically places students in an appropriate RTI tier upon completion of an assessment. As a result, teachers and building leaders are provided with an automatically generated list of students with similar needs and suggested resources for planned interventions, theoretically streamlining the RTI placement process (Curriculum Associates, n.d.-d). i-Ready Diagnostic and Instruction are products developed by Curriculum Associates.

Founded in 1969 by a group of educators, Curriculum Associates started with the intention to bridge gaps in student achievement through instructional materials and assessment tools (Curriculum Associates, n.d.-a). Based in North Billerica, Massachusetts, Curriculum Associates claims to offer research-based, classroom-tested products that provide personalized learning experiences for students. The company's products are used in over 50% of all U.S. schools, reaching millions of students nationwide. Their products and services cater to diverse academic needs, covering reading, language arts, mathematics, and science (Curriculum Associates, n.d.-a).

In the early 2010s, Curriculum Associates shifted towards technology-based learning resources, developing online, interactive platforms such as i-Ready to meet the changing demands of 21st-century education. This pivot towards digital products has not only allowed the company to stay relevant but also to thrive in the rapidly changing educational technology landscape (Nazerian, 2018). i-Ready, the flagship product of Curriculum Associates, is an adaptive assessment and instruction program designed to provide personalized learning paths for students.

i-Ready Diagnostic assesses student performance in critical areas, and the resulting data is used to personalize i-Ready Instruction, offering tailored lessons to meet each student's unique learning needs (Curriculum Associates, n.d.-b). The company also offers extensive print resources, including the 'Ready' series. This series offers a comprehensive set of student and teacher resources designed to provide targeted instruction and practice in key areas of the curriculum (Curriculum Associates, n.d.-c).

i-Ready Instruction is an online prescriptive learning program that utilizes games and other multimedia resources to personalize student learning. i-Ready Instruction is utilized in conjunction with another Curriculum Associates resource, i-Ready Diagnostic. i-Ready Diagnostic is an adaptive assessment and intervention screener taken three times a year that identifies missing skills and identifies intervention resources on a personal level (Curriculum Associates, n.d.-d). When used in conjunction with i-Ready Instruction, i-Ready Diagnostic automatically creates a prescriptive playlist of lessons for students to utilize in i-Ready Instruction (Curriculum Associates, n.d.-b). All students' growth, regardless of whether they participate in i-Ready Instruction, is measured across the three yearly diagnostic assessments (Curriculum Associates, n.d.-d).

Statement of the Problem

School districts nationwide are increasingly dealing with students falling behind in reading due in part to the COVID-19 pandemic (Goldstein, 2022). As a result, schools are increasingly turning to computer-assisted instructional tools to address those learning gaps (Herold, 2022). With so much at stake financially and in terms of addressing students' learning gaps in a time of great need, it is important for school districts to assess the effectiveness of online intervention tools such as i-Ready Instruction. In addition,

much of the available research pertaining to the effectiveness of i-Ready Instruction comes from studies commissioned by Curriculum Associates. As a result, there is a need for additional independent research on i-Ready Instruction's effectiveness and value to the school districts that utilize it.

Purpose of the Study

The purpose of this study was to determine if the implementation of i-Ready Instruction in the Participant School District had any impact on student achievement in reading among students in kindergarten through fifth grades. The study was conducted to compare student growth, as measured by the difference in scale score between i-Ready fall and spring diagnostic assessments in reading. Data were collected for two groups. The first group, kindergarten through fifth-grade students at five elementary schools in the Participant School District, participated in three yearly i-Ready Diagnostic Assessments in reading and completed an average of at least thirty minutes per week of i-Ready Instruction lessons in reading. The second group, kindergarten through fifth-grade students at five elementary schools in the Participant School District, participated in three yearly i-Ready Diagnostic Assessments in reading and did not complete an average of at least thirty minutes per week of i-Ready Instruction lessons in reading. Data were further divided by subgroup to determine if students from low socioeconomic households were impacted differently based on participation in i-Ready Instruction. In addition, data were further divided by identified RTI tier to determine if students at specific RTI tiers were impacted differently based on participation in i-Ready Instruction.

Significance of the Study

Like many school districts nationwide, the Participant School District is looking closely at the effectiveness of computer-assisted instructional tools in addressing learning gaps caused by the COVID-19 Pandemic. i-Ready Instruction is a costly resource currently utilized by the district in many classrooms. Some teachers and administrators are skeptical of the tool's effectiveness and choose not to utilize it. The results of this study could aid decision-makers in Participant School District and other districts attempting to determine the effectiveness of i-Ready Instruction and similar computer-assisted instructional tools on student achievement in reading. The results of the study could be of particular interest to building and district decision-makers, curriculum directors, and classroom teachers.

Delimitations

Lunenburg and Irby (2008) described delimitations as "self-imposed boundaries set by the researcher on the purpose and scope of the research study" (p. 134). The following delimitations were set for this study:

- The sample for this study was limited to kindergarten through fifth-grade students in the Participant School District.
- The data from i-Ready is the only data used for data analysis in this study.
- Data collected for this study were limited to Reading data collected during the 2021-2022 and 2022-2023 school years.

Assumptions

Lunenburg and Irby (2008) described assumptions as "postulates, premises, and propositions that are accepted as operational for the purposes of the research" (p. 135). The researcher during this study made the following assumptions:

- All teachers utilizing i-Ready Diagnostic and i-Ready Instruction received training and professional development.
- All teachers monitored student participation in i-Ready Instruction lessons with fidelity.
- All students taking i-Ready Diagnostic assessments and completing i-Ready Instruction lessons were engaged and applied full effort.
- The i-Ready Diagnostic assessment is a valid and reliable measure of student achievement and growth in reading.

Research Questions

According to Lunenburg and Irby (2008), "Research questions and hypotheses are critical components of the dissertation or master's thesis. Teamed with a tightly drawn theoretical framework, the research questions or hypotheses become a directional beam for the study" (p. 126). The following research questions guided this study:

RQ1

To what extent is there a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years?

RQ2

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022, and 2022-2023 school years, affected by SES?

RQ3

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years, affected by identified RTI tier?

Definition of Terms

Lunenburg and Irby (2008) suggested that it is crucial to provide definitions for the key terms to ensure mutual comprehension regarding the study. Here are the definitions for the major terms relevant to this research:

Computer-Assisted Instruction (CAI)

For this study, CAI is defined as software and web-based programs that are "individualized or self-paced in order to accommodate differences in student ability or speed" (Bulman & Fairlie, p. 253).

Response to Intervention (RTI)

RTI is a multilayered behavioral and academic support model that emphasizes early identification, regular progress monitoring, and the implementation of evidence-

based instructional strategies tailored to students' individual needs (Fuchs & Fuchs, 2006).

Socioeconomic Status (SES)

Bradley and Corwyn (2002) defined SES as a composite measure that typically incorporates three key dimensions: family income, parental education, and occupational status, serving as an economic and sociological measure of a person's work experience and an individual's or family's economic and social position relative to others. SES is a significant factor influencing a range of life outcomes, including educational attainment and cognitive development.

Organization of the Study

This study is presented in five chapters. Chapter 1 included the background, statement of the problem, the purpose of the study, the significance of the study, the delimitations, assumptions, research questions, the definition of terms, and the organization of the study. Chapter 2 provides historical perspectives on computer-assisted instruction, computer-assisted instruction in reading, foundational reading skills, RTI, Curriculum Associates, i-Ready Diagnostic, and i-Ready Instruction. Chapter 3 includes the research design, selection of participants, measurement, data collection procedures, data analysis and hypothesis testing, and the limitations of the study. The results of the data analysis are presented in Chapter 4. The last chapter includes a study summary, findings related to the literature, and conclusions.

Chapter 2

Review of the Literature

This chapter presents a review of the literature associated with the topic of this study. The literature review includes historical perspectives on the use of computers in education to assist in teaching and learning, as well as specific research on using computers to teach reading and provide reading interventions. In addition, as the core topic of this study is how computer programs like i-Ready Instruction impact students' ability to learn to read, a review of relevant literature on the components of good reading instruction, as well as the impact of socioeconomic factors on learning to read, are also included.

At its heart, i-Ready Instruction is a reading intervention program that utilizes the RTI model. As such, relevant literature on the topic of RTI and its effectiveness is also included in this review. In addition, as both the i-Ready Instruction and i-Ready Diagnostic programs are built around the five reading domains identified as essential for reading instruction by the National Reading Panel (NRP) report released in 2000, relevant research on that report is also included. Finally, as this study focuses squarely on the effectiveness of i-Ready Instruction and its use in conjunction with i-Ready Diagnostic, the relevant literature on i-Ready Instruction is also included.

Historical Perspectives on Computer-Assisted Instruction (CAI)

Major and Francis (2020) pointed out that Computer-Assisted Instruction (CAI) is often used interchangeably with similar terminologies such as personalized learning, computer-assisted learning, computer-aided learning, intelligent tutoring systems, and cognitive tutoring systems, among others. For this study, CAI is defined as software and

web-based programs that are "…individualized or self-paced in order to accommodate differences in student ability or speed" (Bulman & Fairlie, 2016, p. 253).

The emergence of computers in the mid-20th century gave rise to CAI, which has since evolved to play a pivotal role in K-12 education. The first instances of CAI can be traced back to the 1960s, with programs like Programmed Logic for Automated Teaching Operations at the University of Illinois (Bitzer, 1973). Early CAI programs were primarily used for drill and practice, tutorial, or instructional gaming activities, contributing to individualized learning but with limited interactivity and adaptability (Suppes, 1966).

The advent of the internet in the 1990s revolutionized CAI. Web-based learning environments facilitated new modes of instruction, like blended learning and flipped classrooms (Staker & Horn, 2012). Interactive multimedia, including videos, simulations, and virtual reality, were integrated into CAI, providing richer and more immersive learning experiences (Merchant et al., 2014). Online platforms enabled access to a wider array of instructional materials and facilitated collaborative learning opportunities. WebQuest is an example of an internet-based educational framework used by teachers to create inquiry-oriented lessons (Molebash & Dodge, 2003).

In the 21st century, CAI has experienced significant advancements, including the integration of multimedia elements, the implementation of adaptive learning systems, and the utilization of learning analytics. Multimedia elements, such as audio, video, and interactive simulations, have been incorporated into CAI to enhance student engagement and improve learning outcomes (Mayer, 2009). Adaptive learning systems, which tailor instructional content to individual learners' needs, have emerged as a promising approach

to personalize education and optimize learning efficiency (Kulik & Fletcher, 2016). Furthermore, learning analytics, which involves collecting, analyzing, and reporting data about learners and their contexts, have been employed to inform instructional decision-making and support continuous improvement in CAI (Siemens & Long, 2011).

In a review of existing research aimed at educational decision-makers published just months following the closing of schools worldwide due to the COVID-19 pandemic, Major and Francis (2020) identified several key findings on the use of CAI. Among the findings identified include the ability of CAI to personalize learning both inside and outside of the classroom, to adapt to each student's individual pace and proficiency level, and to close educational gaps for disadvantaged and low-performing students. Despite these promising themes found in their review of the research, Major and Francis also stressed the important role of teacher professional development in the effectiveness of CAI implementation. In addition, they cautioned that more research was needed to justify the return on investment for these typically expensive programs (Major & Francis, 2020).

Computer-Assisted Instruction in Reading

CAI has played an increasingly important role in education since its inception in the 1960s. One of the earliest CAI programs, the Stanford Education Program for Gifted Use, used CAI to teach reading skills and showed some promising results (Suppes, 1966). Throughout the 1970s and 1980s, CAI’s development was driven by technological advances, which allowed for more sophisticated and interactive learning environments (Cuban, 1986). During this period, researchers began to explore the effectiveness of CAI in teaching reading and found that it could lead to significant improvements in reading skills (Kulik, 1994).

In the 1990s, the advent of the Internet and the World Wide Web provided new opportunities for CAI in reading instruction. Online platforms allowed for creating collaborative learning environments and facilitated access to a wealth of reading materials (Leu & Kinzer, 2000). In the 2000s, the focus shifted towards evidence-based practices in CAI for reading instruction due to the No Child Left Behind Act, which emphasized research-based instructional practices (Slavin et al., 2009).

In a meta-analysis, Cheung and Slavin (2012) reviewed 85 studies of educational technology applications, including CAI programs, in K-12 reading classrooms. The authors found that technology applications, especially comprehensive models, produced a moderate, positive effect on reading achievement. This study highlights the potential for CAI programs to improve reading achievement but also emphasizes the need for further research to identify the most effective program types.

Savage et al. (2013) examined the role of adaptive learning technology in reading instruction. Savage et al. showed that computer programs could adapt to individual learners' needs, providing a differentiated and personalized learning experience, thereby enhancing reading skills. However, the researchers also stressed the role of extensive teacher professional development for technology resources (Savage et al., 2013).

The use of multimedia in reading programs has shown promise in increasing students' engagement and reading comprehension. The results of a study conducted by Takacs et al. (2015) found that interactive multimedia elements in e-books improved children's story comprehension and vocabulary knowledge. Although the results of their study show the promising potential for technology and CAI to enhance reading instruction, Takacs et al. (2015) emphasized that not all types of multimedia are effective.

In fact, the results of their meta-analysis provided evidence that while adding music, sound effects, and pictures was beneficial, built-in games, dictionaries, and interactive features were deemed to be a distraction and even detrimental (Takacs et al., 2015).

As the above studies indicate, using computer programs to teach reading presents promising potential. However, research results indicate that the effectiveness of these programs is not a given but depends largely on factors such as the quality of the program's design, its implementation, and the degree of teacher involvement. A notable study by Kulik and Fletcher (2016) emphasized these findings. Kulik and Fletcher (2016) found significant variations in the effectiveness of different computer-based reading programs. The researchers concluded that this variation was primarily due to differences in program design and implementation. Specifically, Kulik and Fletcher pointed out that programs well-aligned with curriculum standards offered engaging and relevant content and were implemented consistently and effectively tended to yield better results.

In a similar study, Tamim et al. (2011) found that computer-assisted instruction was most effective when used as a supplement to traditional instruction rather than a replacement. The results of this study indicated that human interaction and personal feedback a teacher provides remain crucial elements of effective reading instruction. Tamim et al. indicated that while computer programs offer significant potential for improving reading instruction, their effectiveness is not automatic.

Foundational Reading Skills

The National Reading Panel (NRP) was established in the United States in 1997, marking a significant milestone in educational reform and literacy studies. The NRP was formed by the Secretary of Education Richard Riley, acting on a congressional mandate,

to examine existing research on how children learn to read and identify the most effective evidence-based methods for teaching reading (National Institute of Child Health and Human Development [NICHD], 2000). To fulfill its mandate, the NRP brought together a diverse group of 14 members, including individuals with expertise in fields such as psychology, education, reading, school administration, and pediatrics. Members were carefully selected to represent a broad range of perspectives on reading instruction and literacy (NICHD, 2000).

For two years, the NRP conducted an exhaustive meta-analysis of the research literature on reading instruction, focusing specifically on five key areas: phonemic awareness, phonics instruction, fluency, vocabulary, and text comprehension strategies (NICHD, 2000). As documented in the NRP report, the panel's conclusions transformed the landscape of reading instruction. For instance, phonemic awareness and systematic phonics instruction were found to significantly improve children's word recognition, spelling, and reading comprehension skills. Furthermore, guided oral reading was highlighted as a strategy to improve reading fluency and overall reading achievement. In contrast, vocabulary instruction and text comprehension strategies were emphasized as necessary components of effective reading instruction (NICHD, 2000).

The impact of the NRP's work cannot be overstated. Their evidence-based findings have informed and shaped local, state, and federal reading instruction policies and programs, most notably the Reading First initiative under the No Child Left Behind Act of 2001. The NRP's influence has also extended beyond U.S. borders, impacting reading instruction practices internationally (Moats, 2007). Nevertheless, the NRP has also faced its share of criticism. Critics have argued that the NRP's criteria for including

studies in their review were overly stringent, thereby excluding potentially valuable research. Moreover, some have voiced concerns that the NRP's emphasis on certain instructional methods might undermine teacher autonomy and creativity in the classroom (Krashen, 2001).

Regardless of the criticism, the results of the above research demonstrate the impact of the NRP's report on reading instruction in the United States and worldwide. The NRP identified five areas it deemed critical for good reading instruction. They include phonemic awareness, phonics instruction, fluency, vocabulary, and comprehension (NICHD, 2000). Not coincidentally, the i-Ready Diagnostic and i-Ready Instruction platforms, which are the topic of this study, are built around these same five skills, which Curriculum Associates (2023) refer to as "domains."

Phonemic Awareness

Phonemic awareness, the ability to identify and manipulate individual sounds (phonemes) in spoken words, is a crucial skill for successful reading (Cunningham, 2001). It is a foundational skill that develops before formal reading instruction and serves as a predictor of reading success (Anthony & Francis, 2005). NICHD (2000) pointed out that "Correlational studies have identified phonemic awareness and letter knowledge as the two best school-entry predictors of how well children will learn to read during their first 2 years" (p. 21). Instruction in phonemic awareness has been shown to improve reading outcomes for young learners, particularly those at risk for reading difficulties (Ehri et al., 2001). Although acknowledging that more research is required, the NRP meta-analysis provided evidence that computers were effective in delivering phonemic

awareness instruction; however, the observed effect size was smaller than was observed through teacher-led instruction (NICHD, 2000).

Phonics

Phonics, the relationship between phonemes and their corresponding written symbols (graphemes), is another essential skill for reading development (Adams, 1994). Systematic phonics instruction has been shown to be more effective than non-systematic or no phonics instruction in improving reading outcomes for students (Cunningham, 2001). Teaching phonics helps students to decode unfamiliar words and promotes reading fluency and comprehension (Ehri, 2005). The authors of the NICHD (2000) report through a meta-analysis of the available research, concluded that "… systemic phonics instruction produces gains in reading and spelling not only in the early grades (kindergarten and 1st grades) but also in the later grades (2nd through 6th grades) and among children having difficulty learning to read" (NICHD, 2000, p. 2-122).

Fluency

Fluency, the ability to read text accurately, quickly, and with expression, is a critical reading skill (Kuhn & Stahl, 2003). Fluent readers can focus on understanding the meaning of the text, as they spend less cognitive effort on decoding individual words (Hudson et al., 2005). Fluency instruction, including guided oral reading and repeated reading, has been shown to improve reading outcomes for students (Cunningham, 2001). The NRP (2000) Report provided evidence that, "Repeated reading and other guided oral reading procedures have clearly been shown to improve fluency and overall reading achievement" (p. 3-28).

Vocabulary

Vocabulary knowledge is crucial for reading comprehension, as it enables readers to understand the meaning of words in context (Perfetti & Stafura, 2014). Verhoeven et al. (2011) found a strong relationship between vocabulary knowledge and reading comprehension. Research on vocabulary development and instruction has led to a consensus on features of effective vocabulary instruction, which include presenting both definitional and contextual information, providing encounters with words in multiple contexts, and engaging students in actively processing word meanings (McKeown, 2019). The results of the NRP meta-analysis provided evidence that computer use for vocabulary instruction showed mixed results when compared to traditional methods (NICHD, 2000).

Comprehension

Reading comprehension, the ability to understand and interpret text, is the ultimate goal of reading. To achieve comprehension, readers must be able to decode words, understand vocabulary, and actively engage with the text to construct meaning (RAND Reading Study Group, 2002). Effective comprehension instruction involves teaching explicit strategies, such as summarizing, questioning, predicting, and visualizing, to help students monitor their understanding and interact with the text (Duke & Pearson, 2002). Regarding the challenges related to teaching reading comprehension in the classroom, NICHD (2000) stated, “The major problem facing the teaching of reading comprehension strategies is that of implementation in the classroom by teachers in a natural reading context with readers of various levels on reading materials in content areas” (p. 4-47).

The Impact of SES on Learning to Read

Learning to read is a critical skill in a child's cognitive and educational development. However, this process is influenced by numerous factors, including SES. Research suggests that SES impacts reading outcomes significantly, demonstrating disparities in reading proficiency based on family income, parental education levels, and overall household resources (Morgan et al., 2009).

SES encompasses three key dimensions: family income, parental education, and occupational status. These factors have a strong correlation with a child's reading achievement. Children from low-SES backgrounds typically face more obstacles in reading acquisition than their higher-SES peers, often resulting in lower reading scores (Evans, 2004). These disparities, evident as early as kindergarten, tend to persist throughout schooling and into adulthood, potentially limiting opportunities for higher education and career success (Bradley & Corwyn, 2002).

The role of family income in reading acquisition is multifaceted. Firstly, children from lower-income families are less likely to access high-quality, literacy-rich environments that facilitate learning to read. They are often exposed to fewer words and complex sentences, leading to a limited vocabulary and poor phonemic awareness (Hart & Risley, 2003). In addition, lower-income families may lack resources to provide supplementary reading materials, further exacerbating this problem (Hart & Risley, 2003).

Evans (2004) noted that "Low-income children are read to relatively infrequently, watch more TV, and have less access to books and computers" (p. 77). Evans (2004) goes on to point out that children from low-income families face disadvantages in nearly every

area of life, from air and water quality to abuse, danger, and social-emotional well-being than their more affluent peers. Taken together, these disadvantages clearly impact low-income students' ability to learn. SES has proven to be a consistent predictor of school attendance and years of school completed (Bradley & Corwyn, 2002).

Higher parental education levels often lead to more sophisticated language use at home, providing a richer language environment for children to learn. Similarly, parents with higher occupational statuses can afford to allocate more time and resources to their children's learning (Duncan & Magnuson, 2012). However, lower-SES families, which often encompass lower education and occupational status, may face difficulty in providing a supportive learning environment due to limited time, resources, and a potential lack of awareness about educational strategies and opportunities (Caro, 2009).

Davis-Kean (2005) conducted a study with 868 students ranging in age from 8 to 12. Davis-Kean (2005) reported that higher parental education levels correlate directly with higher academic performance among children. High levels of parental education often indicate a rich linguistic environment at home, as well as a positive disposition towards education (Davis-Kean, 2005). Duncan et al. (2011) found that parental occupation, in general, has a significant impact on children's reading acquisition. In a random assignment experimental study involving more than 10 thousand children, Duncan et al. (2011) concluded that, in general, every "$1,000 increase in annual income increases young children's achievement by 5% - 6% of a standard deviation," which lead them to proclaim that "…family income has a policy-relevant, positive impact on the eventual school achievement of preschool children" (p. 1263).

Response to Intervention (RTI)

The achievement of reading proficiency is a crucial milestone for students' academic success and overall well-being. However, many students, particularly those from lower socioeconomic backgrounds, struggle with reading and require targeted interventions to bridge the literacy gap (Neuman & Celano, 2001). Timely identification of struggling readers is crucial in providing appropriate support and preventing further reading difficulties. Good et al. (2001) emphasize the importance of using comprehensive assessment tools to identify students with reading difficulties as early as kindergarten. These assessment tools should consider phonological measures, word recognition, and oral reading fluency, as these have been shown to be reliable indicators of reading disabilities (O'Connor & Jenkins, 1999).

Implementing evidence-based interventions is critical in ensuring the effectiveness of reading support. A widely recognized approach for addressing reading difficulties is the RTI framework. RTI emphasizes early identification, regular progress monitoring, and the implementation of evidence-based instructional strategies tailored to students' individual needs (Fuchs & Fuchs, 2006). The RTI framework includes three tiers of intervention.

Tier 1 Intervention

Tier 1 in the RTI framework is the foundation of the multi-tiered system, focusing on high-quality, research-based classroom instruction provided to all students in the general education setting. The goal of Tier 1 is to prevent academic and behavioral difficulties by addressing the needs of all students through effective, differentiated instruction and assessment practices. Teachers monitor student progress through ongoing

formative assessments and make data-driven decisions to adjust instructional strategies accordingly (Fuchs & Fuchs, 2006).

Tomlinson (2000) points out that a critical aspect of Tier 1 is the use of evidence-based instructional practices that are culturally responsive and tailored to meet the diverse needs of students in the classroom. According to Tomlinson (2000), teachers should employ differentiated instruction, which involves adjusting the content, process, and product of learning according to the student's readiness, interests, and learning preferences. Tier 1 instruction should also include universal screening measures to identify students who may be at risk for academic or behavioral difficulties.

These screenings are typically administered three times a year (fall, winter, and spring) and help inform instructional decisions and identify students needing additional support (Fuchs et al., 2012). Successful Tier 1 instruction should meet the needs of approximately 80% of the student population (Fuchs & Fuchs, 2006). If a student struggles despite high-quality Tier 1 instruction, they may be considered for additional support through Tier 2 interventions.

Tier 2 Intervention

Tier 2 in the RTI framework focuses on providing targeted, small-group instruction to students who demonstrate inadequate progress or are at risk of falling behind, despite receiving high-quality Tier 1 instruction. Tier 2 interventions are designed to supplement the core curriculum and provide additional support to help students catch up with their peers (Vaughn et al., 2007). Tier 2 interventions typically involve small-group instruction, where students receive explicit, systematic, and scaffolded instruction in the area of concern, such as reading or math. The instruction is

usually provided by the classroom teacher, a specialized interventionist, or a trained paraprofessional (Fuchs et al., 2008).

Students in Tier 2 are closely monitored using progress monitoring assessments, which are administered more frequently than in Tier 1 (e.g., biweekly or monthly). This ongoing assessment helps teachers track students' progress and adjust the intervention as needed (Stecker et al., 2005). Tier 2 interventions should be evidence-based, meaning they have been proven effective through rigorous research studies.

The duration and intensity of Tier 2 interventions can vary, but they generally last for about 8 to 20 weeks, with sessions occurring multiple times a week for 20 to 40 minutes each (Vaughn et al., 2007). If students demonstrate adequate progress in response to Tier 2 interventions, they may return to Tier 1 instruction. However, if a student continues to struggle, they may be considered for more intensive, individualized support through Tier 3 interventions.

Tier 3 Intervention

Tier 3 in the RTI framework is designed to provide intensive, individualized interventions for students who continue to struggle despite receiving support through Tier 1 and Tier 2 interventions. Tier 3 interventions are tailored to meet the specific needs of individual students and are often provided in a one-on-one setting (Fuchs et al., 2010). Tier 3 interventions typically involve a more in-depth assessment of the student's learning needs to identify specific skill gaps and instructional strategies that may be most effective in addressing those gaps (Fuchs et al., 2012). The instruction in Tier 3 is highly explicit, systematic, and scaffolded, with an increased focus on individualized feedback and error correction (Denton et al., 2006).

The Effectiveness of the RTI Framework

Researchers have demonstrated the effectiveness of RTI in improving reading outcomes for students from diverse backgrounds, including those from lower SES status groups (O'Connor et al., 2005). Vaughn et al. (2009) conducted a study to examine the efficacy of a three-tier RTI model for first-grade students identified as at risk for reading difficulties. Vaughn et al.'s (2009) results revealed that students who received Tier 2 and Tier 3 interventions significantly improved their reading skills compared to students who did not receive the interventions. Vaughn et al.'s (2009) results support the effectiveness of the RTI framework in addressing the needs of struggling readers.

Similarly, O'Connor et al. (2005) investigated the impact of RTI on the reading performance of kindergarten to third-grade students. O'Connor et al. found that students who received Tier 2 interventions made greater progress in their reading skills when compared to students who did not receive any intervention. Furthermore, O'Connor et al. noted that most students who received the intervention no longer required additional support, emphasizing the potential of RTI to prevent long-term reading difficulties.

In another study, Torgesen et al. (2001) explored the effectiveness of an intensive reading intervention for second-and third-grade students identified as learning disabled. Torgesen et al. (2001) found that students who participated in the intervention significantly improved their word identification and reading comprehension skills. In addition, many study participants previously deemed learning disabled, around forty percent, no longer required support outside of the general education classroom within a year of their provided interventions. Torgesen et al. (2001) highlighted the potential of RTI to address the needs of students with diverse reading difficulties. Additionally, the

results of Fuchs et al. (2008) indicated that Implementing RTI leads to improved reading outcomes and reduces the number of students referred to special education services. Fuchs et al. (2008) revealed that schools implementing RTI had significantly lower rates of special education referrals compared to schools that did not implement RTI.

Computer Programs to Support the RTI Framework

RTI has become an integral part of modern education as an approach that helps identify students' learning and behavioral needs. With the advent of technology, computer programs have been increasingly harnessed to support RTI, facilitating tailored interventions and enhancing the learning experience. In the RTI framework, computer programs play a significant role in the three-tiered approach: universal screening, targeted intervention, and intensive intervention. According to Stecker et al. (2005), computer programs have been instrumental in the initial screening process to identify struggling learners.

Within these programs, standardized tests are administered that can efficiently analyze individual student performance, thereby offering an unbiased evaluation and helping educators determine the level of intervention required. Further, computer programs have been useful in administering targeted interventions (Tier 2) and intensive interventions (Tier 3). According to Connor et al. (2009), computerized adaptive learning programs that adjust to a student's learning level can offer tailored instruction and practice opportunities, thus increasing both the effectiveness and efficiency of interventions.

i-Ready Instruction

Curriculum Associates i-Ready Personalized Instruction is a research-based educational program for students in Grades K–8 that creates an individualized lesson plan based on each student's performance on an adaptive diagnostic test (Curriculum Associates, n.d.-b). The program covers five domains in reading and four in mathematics, allowing teachers to modify lesson sequences and add lessons as needed. The platform uses multimedia instruction and regular progress monitoring to provide explicit instruction, practice, and supportive feedback for all learners (Curriculum Associates, n.d.-b).

Curriculum Associates (n.d.-b) recommends students spend 30-49 minutes per subject per week on the platform, passing at least 70% of the lessons throughout the year. Curriculum Associates (n.d.-b) contends that using the program less than this recommended time could be ineffective and that using it more than the recommended time could be detrimental. Although Curriculum Associates recommends that schools utilize i-Ready Instruction in conjunction with i-Ready Diagnostic, it is not required to take advantage of the tools and information provided by i-Ready Diagnostic (Curriculum Associates, n.d.-b).

When used in conjunction with i-Ready Diagnostic, i-Ready Instruction will automatically prescribe lessons tailored to each individual student based on their level of performance on the i-Ready Diagnostic Assessment (Curriculum Associates, n.d.-b). Teachers can monitor students as they complete their prescribed lessons and utilize their professional judgment to make necessary adjustments. When students take an additional

i-Ready Diagnostic assessment, the lessons in i-Ready Instruction will adjust based on the student's most recent performance (Curriculum Associates, n.d.-b).

In a report commissioned by Curriculum Associates, Randel et al. (2020) contended that students who utilized i-Ready "showed significantly greater gains in student achievement" compared to those who did not (p. 1). In addition, Randel et al. found that among subgroup populations such as African-American and Hispanic students, i-Ready use resulted in reading achievement gains that outpaced their peers who did not utilize the program. Although this study was commissioned by Curriculum and Associates and thus should be viewed in that context, there are additional independent studies that support Randel et al.'s claims.

Cook and Ross (2022) examined the impact of i-Ready Instruction on students in Grades 3-8. Cook and Ross found that using i-Ready Instruction resulted in an overall "… statistically significant positive impact on both elementary and middle school students' ELA achievement" (p. 8). Cook and Ross concluded that students who participated in i-Reading Instruction and met the recommended usage guidelines from Curriculum Associates scored on average more than 6 points higher in reading achievement than students who did not.

Similarly, in a study commissioned by the Utah State Board of Education that evaluated software programs for early reading interventions, Durfee et al. (2019) found that i-Ready positively impacted students in Grades K-3. Dufree et al. found that, in comparison to four similar programs for reading intervention, i-Ready had the most significant impact on student growth.

Summary

Chapter 2 provided a review of the literature on the use of computer-assisted instruction in education. The review demonstrated that using computers in education is not a new phenomenon but that the research on its implementation and effectiveness, while showing promise, has produced mixed results. Regarding computer-assisted instruction specifically related to reading instruction, the literature reviewed in this chapter demonstrated that while CAI, including adaptive learning and multimedia technologies, can positively impact reading skills and comprehension, its effectiveness greatly depends on factors like quality program design, implementation, and teacher involvement.

This chapter also reviewed relevant literature on foundational reading skills and highlighted the impact of the National Reading Panel's 2000 report on reading instruction, curriculum, and computer-assisted instructional programs since its release. The Panel's five identified foundational reading skills, phonemic awareness, phonics, fluency, vocabulary, and comprehension are the foundation of the i-Ready Diagnostic and i-Ready Instruction programs. Relevant research was reviewed related to each of the five identified skills. In addition, as this study seeks to find differences in student achievement based on student SES, a review of relevant literature on the impact of family income and education level was also reviewed.

As i-Ready Instruction is, at its core, an intervention tool based on the RTI framework, relevant research related to that framework was also reviewed in this chapter. That review included the framework in general, each of the three framework tiers, research on its effectiveness, and using computers to aid in its implementation. Overall,

the research on the RTI framework reviewed for this study demonstrated the effectiveness of the model. Finally, as this study seeks to determine the effectiveness of the i-Ready Instruction program, this chapter provided a review of the literature on that program.

Chapter 3

Methods

The purpose of this study was to determine if the implementation of i-Ready Instruction, a personalized digital intervention tool for reading, impacted student achievement among students in grades kindergarten through fifth grade. More specifically, the focus of this study was to determine whether i-Ready Instruction impacted participants differently as affected by SES and identified RTI tier. The study's research design, selection of participants, measurement, data collection procedures, data analysis and hypothesis testing, and limitations of the study are described in this chapter.

Research Design

A quantitative quasi-experimental research design was utilized for this study. Random assignment of students to groups was not possible without disrupting the educational setting for the study, thus making a quasi-experimental design more appropriate. The dependent variable was the difference in students' fall and spring scale scores on the i-Ready Diagnostic kindergarten through fifth-grade reading assessment within a given school year. Independent variables included student participation in the i-Ready Instruction program, student SES, and students' identified RTI tier within a given school year.

Selection of Participants

The population of interest was kindergarten through fifth grade students in Missouri. The sample for the study included kindergarten through fifth-grade students from School A, School B, School C, and School D, during the 2021-2022 and 2022-2023 school years. The purposive selection of participants was based on students who were

enrolled in the Participant School District for a full school year and participated in both a fall and spring i-Ready Diagnostic Assessment. At the time of this study, these were schools in the Participant School District located in the Metropolitan Kansas City Area.

Purposive sampling was utilized in this study. Lunenburg and Irby (2008) describe purposive sampling as sampling that includes selecting a sample based on the experience or knowledge the researcher has of the group to be sampled. The sample for this study was based on the researchers' knowledge and experience of kindergarten through fifth-grade students and the kindergarten through fifth-grade curriculum and RTI practices in the Participant School District. A student was included in this study if the following criteria were met:

1. The student was enrolled in kindergarten, first, second, third, fourth, or fifth grade at a Participant School District elementary school; and
2. The student participated in both a fall and spring i-Ready Diagnostic assessments in reading during a school year identified for this study.

Measurement

One instrument was used to collect student performance data for this study. Student scale scores on the fall and spring i-Ready Diagnostic Assessment, disaggregated by SES, RTI tier, and grade level, were utilized. In addition, data on students' average weekly minutes completing lessons in the i-Ready Instruction platform between September and April, disaggregated by SES, RTI tier, and grade level, were utilized. Students completed all i-Ready Diagnostic Assessments and i-Ready Instruction Lessons on computers.

Student SES status was determined by students' National School Lunch Program's Free or Reduced-price Lunch eligibility. Students eligible for free or reduced lunch prices through the program are identified with a "Y" on i-Ready Diagnostic and Instructional reports. Students who are not eligible for free or reduced lunch through the program are identified with an "N" on i-Ready Diagnostic and Instructional reports.

Student RTI tier was determined by performance on fall i-Ready Diagnostic assessments in relation to current grade level on i-Ready Diagnostic reports. Students in Tier 1 have been identified as having performed on or above their current grade level. Students in Tier 2 have been identified as having performed one grade level below their current grade level. Students in Tier 3 have been identified as having performed two or more grade levels below their current grade level.

Curriculum Associates i-Ready Diagnostic Assessment program is a computer-based diagnostic tool that can be utilized with or without other Curriculum Associates and i-Ready programs (Curriculum Associates, n.d.-d). i-Ready Diagnostic is an adaptive assessment system, meaning, as students take an assessment, the system automatically adjusts to their ability based on right or wrong answers. By adjusting the difficulty of questions throughout the assessment based on each student's responses, i-Ready Diagnostic is able to measure a wide range of abilities and provide personalized data to guide instruction (Curriculum Associates, n.d.-d).

The i-Ready Diagnostic in reading is administered three times a year and measures student achievement in phonological awareness, phonics, high-frequency words, vocabulary, and comprehension (Curriculum and Associates, n.d.-d). Upon completion of the assessment, teachers are immediately provided a report for each

student that identifies a scale score that correlates to a grade level. Teachers are provided with details regarding a student's missing skills or knowledge and provide recommended resources for intervention (Curriculum Associates, n.d.-d).

Each i-Ready Diagnostic Assessment contains 54-72 items and typically takes 30 to 60 minutes for students to complete (Curriculum Associates, n.d.-e). i-Ready Diagnostic Reading Assessments measure student performance in 5 established domains. Those domains include phonological awareness, phonics and word recognition, vocabulary, reading comprehension: literature, and reading comprehension: informational text (Curriculum Associates, n.d.-e). If the administered assessment is the second or third assessment of the year, the teacher is also provided with a growth report that identifies the student's growth compared to previous assessments (Curriculum and Associates, n.d.-d).

For this study, growth was determined by the difference between scale scores on the fall and spring assessments. In addition to individual reports, i-Ready Diagnostic provides instructional grouping reports that automatically group students with similar missing skills or knowledge and place them into appropriate RTI tier groups for intervention. Suggested resources for intervention groups are provided for each group (Curriculum Associates, n.d.-d).

The Participant School District requires the i-Ready Diagnostic Assessment in reading for all kindergarten through eighth-grade students. I-Ready Diagnostic Assessments are administered three times a year during testing windows established by the Participant School District. Scale scores from the i-Ready Diagnostic Assessment in

reading were analyzed and served as the dependent variable in this study to measure kindergarten through fifth-grade students' performance in reading.

Participants in this study were administered a fall, winter, and spring diagnostic assessment in reading. Scale scores assigned upon completion of the fall and spring assessments have been utilized to measure student growth across the school year. Although participation in all three assessments was required to qualify for this study, scale scores on the winter assessment were not utilized in a growth calculation. The purpose of this design was to limit the impact of high mobility rates on the study's results and ensure all participants were students in the Participant School District for the full year.

The i-Ready Diagnostic assessment also provides an understanding of student proficiency level and identifies a student's placement in relation to their current grade level. Three proficiency levels are used to categorize student placement: *on or above grade level*, *one grade level below*, and *two or more grade levels below*. These placement levels, in addition to student performance in specific reading domains, determine student placement in tiered intervention groups, in line with the RTI Model with *on or above grade level* equating to Tier 1, *one grade level below* equating to Tier 2, and *two or more grade levels below* equating to Tier 3.

In addition, the i-Ready Diagnostic Assessment provides student placement on an expanded five-tier intervention model. The purpose of the expanded tier model is to provide educators with student intervention groups that further delineate student needs. For this study, the data pertaining to the expanded tier model were excluded because the available literature about the RTI Model centers around a three-tier framework.

Lunenburg and Irby (2008) described content validity as “the degree to which an instrument measures an intended content area.” (p. 181). Validity on the i-Ready Diagnostic assessment is established by demonstrating that the assessment measures what it claims to measure. The i-Ready Diagnostic Assessment utilizes computer-adaptive testing and the Rasch Item Response Theory (IRT) model to ensure inference validity (Curriculum Associates, n.d.-e).

The Rasch model is based on the notion of probabilistic measurement, which holds that the probability of a correct response to a test item is a logistic function of the difference between the person's ability and the item's difficulty (Andrich, 1988). This concept of relating person and item parameters is a distinct feature of the Rasch model, which helps eliminate the inherent subjectivity in test scoring and facilitates a more objective comparison of individual performances (Andrich, 1988). According to Curriculum Associates (n.d.-e), the above underlying theory, coupled with item field tests with more than 2 million students, allows i-Ready Diagnostic to “…make probabilistic inferences about what students know and are likely able to do” (p. 9).

According to Curriculum Associates (n.d.-e), i-Ready Diagnostic adheres to the American Educational Research Association Standards for Educational and Psychological Testing. Multiple linking studies with state and national standardized assessments have been conducted in collaboration with the Educational Research Institute of America (ERIA), which provide evidence of the validity of i-Ready Diagnostic data (Curriculum Associates, n.d.-f). The strong positive correlations shown in Table 2 provide evidence for criterion-related validity.

Table 2

Correlational i-Ready Linking Studies Conducted by ERIA

Measure	Year	*N*	*r*
Colorado Measures of Academic Success	2018	44,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .73 to a high of .85
Indiana Learning Evaluation Assessment Readiness Network	2019	14,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .77 to a high of .81
Mississippi Academic Assessment Program	2019	19,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .78 to a high of .83
Missouri Assessment Program	2018	27,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .81 to a high of .83
Ohio's State Tests	2018	11,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .79 to a high of .81
Partnership for Assessment of Readiness for College and Careers Test	2018	27,000	Results indicate all grade-level assessment correlations were strong, with reading correlations ranging from a low of .78 to a high of .82

Note. Adapted from "Research and Efficacy," by Curriculum Associates.

<https://www.curriculumassociates.com/research-and-efficacy>

In addition, the i-Ready Diagnostic Assessment in reading has been linked to Lexile measures, which serves as a universally respected national literacy measure (Curriculum Associates, n.d.-f). In a study conducted by MetaMetrics with a national

sample of more than 3,000 students at four different grade levels, the correlation between the i-Ready Diagnostic Scale Score and the Lexile measure ranged from .88 to .89. The results of this linking study suggest a strong correlation with the Lexile measure (Curriculum Associates, n.d.-f). The above correlations provide evidence for i-Ready Diagnostic's validity and reliability.

Data Collection Procedures

An Institutional Review Board (IRB) application was submitted to Baker University to establish permission to conduct the study. In addition, a letter was submitted to the Assistant Superintendent for Human Resources at the Participant School District to obtain permission to utilize archival data to conduct the study. Data collection began once Baker University approved the submitted IRB and final approval was granted through the Participant School District. Documents related to the approval process can be found in Appendix B.

The Participant School District required that no identifiable student information be utilized in the study. Student names and student numbers were replaced in the data file with randomly assigned research IDs. Data for all kindergarten through fifth-grade students, including free and reduced lunch status and i-Ready Diagnostic scores for the 2021-2022 and 2022-2023 school years, were provided by the Participant School District Instructional Services Center for use in this study.

Data Analysis and Hypothesis Testing

The study involved the use of quantitative methods for data analysis. IBM SPSS Statistics 28 was utilized to perform data analysis. Each research question with

corresponding hypothesis and the data analysis utilized to test each hypothesis follows. The significance level for all data analyses or hypothesis testing was set at α=.05.

RQ1

To what extent is there a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years?

H1. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year.

The first two-factor analysis of variance (ANOVA) was conducted to test H1 and H13. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and SES (disadvantaged, not disadvantaged) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student socioeconomic status, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H1. The level of

significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H2. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year.

A second ANOVA was conducted to test H2 and H14. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student socioeconomic status, and a two-way interaction effect (Average Weekly Instructional Meetings x SES). The main effect for average weekly instructional minutes was used to test H2. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H3. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year.

A third ANOVA was conducted to test H3 and H15. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student socioeconomic status, and a two-way interaction effect (Average Weekly Instructional Meetings x SES). The main effect for average weekly instructional minutes was used to test H3. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H4. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year.

A fourth ANOVA was conducted to test H4 and H16. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student socioeconomic status (disadvantaged, advantaged) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for

average weekly instructional minutes was used to test H4. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H5. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year.

A fifth ANOVA was conducted to test H5 and H17. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H5. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H6. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year.

A sixth ANOVA was conducted to test H6 and H18. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H6. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H7. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year.

A seventh ANOVA was conducted to test H7 and H19. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average

weekly instructional minutes was used to test H7. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H8. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year.

An eighth ANOVA was conducted to test H8 and H20. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H8. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H9. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year.

A ninth ANOVA was conducted to test H9 and H21. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H9. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H10. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year.

A tenth ANOVA was conducted to test H10 and H22. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly

instructional minutes was used to test H10. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H11. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year.

An eleventh ANOVA was conducted to test H11 and H23. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H11. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H12. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year.

A twelfth ANOVA was conducted to test H12 and H24. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The main effect for average weekly instructional minutes was used to test H12. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

RQ2

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022, and 2022-2023 school years, affected by SES?

H13. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year is affected by student SES.

The first ANOVA was conducted to test H1 and H13. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were

average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H13. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H14. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year is affected by student SES.

The second ANOVA was conducted to test H2 and H14. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly

instructional minutes was used to test H14. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H15. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year is affected by student SES.

The third ANOVA was conducted to test H3 and H15. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H15. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H16. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year is affected by student SES.

The fourth ANOVA was conducted to test H4 and H16. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H16. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H17. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year is affected by student SES.

The fifth ANOVA was conducted to test H5 and H17. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly

instructional minutes by student SES was used to test H17. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H18. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year is affected by student SES.

The sixth ANOVA was conducted to test H6 and H18. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H18. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H19. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year is affected by student SES.

The seventh ANOVA was conducted to test H7 and H19. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H19. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H20. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year is affected by student SES.

The eighth ANOVA was conducted to test H8 and H20. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average

Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H20. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H21. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year is affected by student SES.

The ninth ANOVA was conducted to test H9 and H21. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H21. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H22. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year is affected by student SES.

The 10th ANOVA was conducted to test H10 and H22. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H22. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H23. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year is affected by student SES.

The 11th ANOVA was conducted to test H11 and H23. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly

instructional minutes by student SES was used to test H23. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H24. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year is affected by student SES.

The 12th ANOVA was conducted to test H12 and H24. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student SES (disadvantaged, advantaged) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H24. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

RQ3

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years, affected by identified RTI tier?

H25. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year is affected by identified RTI tier.

A 13th ANOVA was conducted to test H25. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H25. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H26. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year is affected by identified RTI tier.

A 14th ANOVA was conducted to test H26. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3)

of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H26. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H27. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year is affected by identified RTI tier.

A 15th ANOVA was conducted to test H27. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H27. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H28. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year is affected by identified RTI tier.

A 16th ANOVA was conducted to test H28. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H28. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H29. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year is affected by identified RTI tier.

A 17th ANOVA was conducted to test H29. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3)

of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H29. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H30. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year is affected by identified RTI tier.

An 18th ANOVA was conducted to test H30. The two categorical variables used to group the dependent variable, 2021-2022 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H30. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H31. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year is affected by identified RTI tier.

A 19th ANOVA was conducted to test H31. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of kindergarten students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H31. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H32. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year is affected by identified RTI tier.

A 20th ANOVA was conducted to test H32. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3)

of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H32. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H33. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year is affected by identified RTI tier.

A 21st ANOVA was conducted to test H33. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H33. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H34. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year is affected by identified RTI tier.

A 22nd ANOVA was conducted to test H34. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 3 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H34. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H35. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year is affected by identified RTI tier.

A 23rd ANOVA was conducted to test H35. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3)

of Grade 4 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H35. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

H36. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year is affected by identified RTI tier.

A 24th ANOVA was conducted to test H36. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI tier (1-3) of Grade 5 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI tier was used to test H36. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

Limitations

Limitations, which could not be controlled by the researcher, may influence the findings of this study. The researcher was not able to control the environment in which students completed i-Ready Diagnostic Assessments or i-Ready Instruction Lessons. In addition, the researcher was unable to control the importance placed on student effort by the teacher or how the teacher monitored that effort; therefore, student effort could not be controlled. Teacher efficacy regarding the use of both the i-Ready Diagnostic and i-Ready Instructional programs are also factors that potentially provide limitations for this study.

Summary

This chapter included the research design and the selection of participants. In addition, the measurement, data collection procedures, data analysis, and hypothesis testing were described. Finally, the potential limitations of this study were presented.

Chapter 4

Results

The purpose of this study was to determine if the implementation of i-Ready Instruction in the Participant School District had any impact on student achievement in reading among students in kindergarten through fifth grades. The study was conducted to compare student growth, as measured by the difference in scale score between i-Ready fall and spring diagnostic assessments in reading. The results of the 36 hypothesis tests to address the three research questions are explained in this chapter.

Hypothesis Testing

The results of the hypothesis testing to address the three research questions and 36 hypotheses presented in this study are discussed in this section. Each research question is followed by the corresponding hypotheses. Finally, the results of each data analysis are explained.

RQ1

To what extent is there a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years?

H1. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready

Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year.

The results of the first ANOVA indicated a statistically significant difference between the means, $F(1, 192) = 19.382$, $p = .000$, $\eta^2 = .092$. See Table 3 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in kindergarten during the 2021-2022 school year ($M = 71.10$) was higher than the scale score growth mean for students who did not ($M = 52.62$). H1 was supported. The effect size indicated a medium effect.

Table 3

Descriptive Statistics for the Results of the Test for H1

Instruction Time	*M*	*SD*	*N*
30 minutes +	71.10	30.55	101
< 30 minutes	52.62	25.02	95

H2. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year.

The results of the second ANOVA indicated a statistically significant difference between the means, $F(1, 201) = 5.34$, $p = .022$, $\eta^2 = .026$. See Table 4 for the means and

standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 1 during the 2021-2022 school year (M = 61.44) was higher than the scale score growth mean for students who did not (M = 49.29). H2 was supported. The effect size indicated a small effect.

Table 4

Descriptive Statistics for the Results of the Test for H2

Instruction Time	*M*	*SD*	*N*
30 minutes +	61.44	30.74	84
< 30 minutes	49.29	29.73	121

H3. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year.

The results of the third ANOVA indicated there was not a statistically significant difference between the means, $F(1, 216) = 0.325$, $p = .569$. See Table 5 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 2 during the 2021-2022 school year (M = 52.87) was not different than the scale score growth mean for students who did not (M = 49.37). H3 was not supported.

Table 5

Descriptive Statistics for the Results of the Test for H3

Instruction Time	*M*	*SD*	*N*
30 minutes +	52.87	28.50	94
< 30 minutes	49.37	27.72	126

H4. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year.

The results of the fourth ANOVA indicated there was not a statistically significant difference between the means, $F(1, 192) = 1.384$, $p = .241$. See Table 6 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 3 during the 2021-2022 school year ($M = 40.16$) was not different than the scale score growth mean for students who did not ($M = 43.96$). H4 was not supported.

Table 6

Descriptive Statistics for the Results of the Test for H4

Instruction Time	*M*	*SD*	*N*
30 minutes +	40.16	24.01	74
< 30 minutes	43.96	24.01	122

H5. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year.

The results of the fifth ANOVA indicated there was not a statistically significant difference between the means, $F(1, 205) = 2.786$, $p = .097$. See Table 7 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 4 during the 2021-2022 school year ($M = 33.48$) was not different than the scale score growth mean for students who did not ($M = 28.10$). H5 was not supported.

Table 7

Descriptive Statistics for the Results of the Test for H5

Instruction Time	*M*	*SD*	*N*
30 minutes +	33.48	21.00	109
< 30 minutes	28.10	23.81	100

H6. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year.

The results of the sixth ANOVA indicated there was not a statistically significant difference between the means, $F(1, 204) = 3.598$, $p = .059$. See Table 8 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 5 during the 2021-2022 school year ($M = 25.30$) was not different than the scale score growth mean for students who did not ($M = 33.27$). H6 was not supported.

Table 8

Descriptive Statistics for the Results of the Test for H6

Instruction Time	*M*	*SD*	*N*
30 minutes +	25.30	21.52	69
< 30 minutes	33.27	30.40	139

H7. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year.

The results of the seventh ANOVA indicated a statistically significant difference between the means, $F(1, 217) = 4.06$, $p = .045$, $\eta^2 = .018$. See Table 9 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in kindergarten during the 2022-2023 school year ($M = 73.32$) was higher than the scale score growth mean for students who did not ($M = 63.86$). H7 was supported. The effect size indicated a small effect.

Table 9

Descriptive Statistics for the Results of the Test for H7

Instruction Time	*M*	*SD*	*N*
30 minutes +	73.32	32.56	127
< 30 minutes	63.86	33.34	94

H8. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year.

The results of the eighth ANOVA indicated there was not a statistically significant difference between the means, $F(1, 232) = 1.055$, $p = .306$. See Table 10 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in

Grade 1 during the 2022-2023 school year (M = 58.88) was not different than the scale score growth mean for students who did not (M = 58.03). H8 was not supported.

Table 10

Descriptive Statistics for the Results of the Test for H8

Instruction Time	*M*	*SD*	*N*
30 minutes +	58.88	27.08	136
< 30 minutes	58.03	29.45	100

H9. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year.

The results of the ninth ANOVA indicated there was not a statistically significant difference between the means, $F(1, 230) = 2.168$, $p = .142$. See Table 11 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 2 during the 2022-2023 school year (M = 54.13) was not different than the scale score growth mean for students who did not (M = 49.55). H9 was not supported.

Table 11

Descriptive Statistics for the Results of the Test for H9

Instruction Time	*M*	*SD*	*N*
30 minutes +	54.13	28.76	150
< 30 minutes	49.55	34.45	84

H10. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year.

The results of the 10th ANOVA indicated there was not a statistically significant difference between the means, $F(1, 255) = .034$, $p = .853$. See Table 12 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 3 during the 2022-2023 school year ($M = 40.64$) was not different than the scale score growth mean for students who did not ($M = 39.58$). H10 was not supported.

Table 12

Descriptive Statistics for the Results of the Test for H10

Instruction Time	*M*	*SD*	*N*
30 minutes +	40.64	25.71	121
< 30 minutes	39.58	26.42	138

H11. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year.

The results of the 11th ANOVA indicated a statistically significant difference between the means, $F(1, 220) = 5.72$, $p = .018$, $\eta^2 = .025$. See Table 13 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 4 during the 2022-2023 school year ($M = 27.29$) was lower than the scale score growth mean for students who did not ($M = 36.45$). H11 was supported. The effect size indicated a small effect.

Table 13

Descriptive Statistics for the Results of the Test for H11

Instruction Time	*M*	*SD*	*N*
30 minutes +	27.29	20.41	98
< 30 minutes	36.45	33.52	126

H12. There is a statistically significant difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready

Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year.

The results of the 12th ANOVA indicated there was not a statistically significant difference between the means, $F(1, 241) = .006$, $p = .938$. See Table 14 for the means and standard deviations for this analysis. The scale score growth mean for students who completed at least 30 minutes of i-Ready Instruction Lessons a week in Grade 5 during the 2022-2023 school year ($M = 27.92$) was not different than the scale score growth mean for students who did not ($M = 28.22$). H12 was not supported.

Table 14

Descriptive Statistics for the Results of the Test for H12

Instruction Time	*M*	*SD*	*N*
30 minutes +	27.92	22.73	92
< 30 minutes	28.22	27.34	153

RQ2

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022, and 2022-2023 school years, affected by SES?

H13. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those

students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year is affected by student SES.

The results of the first ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 192) = 0.018$, $p = .893$. No post hoc analysis was warranted. See Table 15 for the means and standard deviations for this analysis. H13 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year was not affected by student SES.

Table 15

Descriptive Statistics for the Results of the Test for H13 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	68.51	30.90	43
	Disadvantaged	73.02	30.42	58
<30 minutes	Not Disadvantaged	50.19	24.44	26
	Disadvantaged	53.54	25.34	69

H14. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 1 during the 2021-2022 school year is affected by student SES.

The results of the second ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 201) = 1.490$, $p = .224$. No post hoc analysis was warranted. See Table 16 for the means and standard deviations for this analysis. H14 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year was not affected by student SES.

Table 16

Descriptive Statistics for the Results of the Test for H14 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	57.82	32.94	34
	Disadvantaged	63.90	29.22	50
<30 minutes	Not Disadvantaged	52.88	29.06	34
	Disadvantaged	47.88	30.04	87

H15. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 2 during the 2021-2022 school year is affected by student SES.

The results of the third ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 216) = 2.895$, $p = .090$. No post hoc analysis was warranted. See Table 17 for the means and standard deviations for this analysis. H15 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year was not affected by student SES.

Table 17

Descriptive Statistics for the Results of the Test for H15 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	42.86	24.54	37
	Disadvantaged	59.37	29.21	57
<30 minutes	Not Disadvantaged	47.27	26.62	45
	Disadvantaged	50.53	28.42	81

H16. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 3 during the 2021-2022 school year is affected by student socioeconomic status.

The results of the fourth ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 192) = 1.076$, $p = .301$. No post hoc analysis was warranted. See Table 18 for the means and standard deviations for this analysis. H16 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year was not affected by student socioeconomic status.

Table 18

Descriptive Statistics for the Results of the Test for H16 <SES>

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	38.74	21.98	23
	Disadvantaged	40.80	25.06	51
<30 minutes	Not Disadvantaged	48.93	37.31	41
	Disadvantaged	41.44	28.55	81

H17. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 4 during the 2021-2022 school year is affected by student SES.

The results of the fifth ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 205) = .034$, $p = .854$. No post hoc analysis was warranted. See Table 19 for the means and standard deviations for this analysis. H17 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year was not affected by student SES.

Table 19

Descriptive Statistics for the Results of the Test for H17 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	32.28	21.14	46
	Disadvantaged	34.35	20.26	63
<30 minutes	Not Disadvantaged	27.51	24.02	63
	Disadvantaged	28.40	23.81	100

H18. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 5 during the 2021-2022 school year is affected by student SES.

The results of the sixth ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 204) = .015$, $p = .903$. No post hoc analysis was warranted. See Table 20 for the means and standard deviations for this analysis. H18 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year was not affected by student SES.

Table 20

Descriptive Statistics for the Results of the Test for H18 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	26.93	19.05	29
	Disadvantaged	24.13	23.32	40
<30 minutes	Not Disadvantaged	34.49	31.79	43
	Disadvantaged	32.71	29.90	96

H19. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in kindergarten during the 2022-2023 school year is affected by student SES.

The results of the seventh ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 217) = 0.087$, $p = .769$. No post hoc analysis was warranted. See Table 21 for the means and standard deviations for this analysis. H19 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year was not affected by student SES.

Table 21

Descriptive Statistics for the Results of the Test for H19 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	76.14	32.62	35
	Disadvantaged	72.25	32.66	92
<30 minutes	Not Disadvantaged	64.54	31.37	26
	Disadvantaged	63.60	34.28	68

H20. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 1 during the 2022-2023 school year is affected by student SES.

The eighth ANOVA was conducted to test H8 and H20. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student socioeconomic status (disadvantaged, not disadvantaged) of Grade 1 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student SES, and a two-way interaction effect (Average Weekly Instructional Meetings x Student SES). The interaction effect for average weekly instructional minutes by student SES was used to test H20. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F(1, 232) = 6.159$, $p = .014$, $\eta^2 = .026$. See Table 22 for the means and standard deviations for this analysis. A follow-up post hoc was conducted to determine which pairs of means were different. The Tukey's Honestly Significant Difference (HSD) post hoc was conducted at $\alpha = .05$. One of the differences was significant. The scale score growth mean for not disadvantaged students who completed less than 30 minutes of i-Ready Instruction Lessons a week in Grade 1 during the 2022-2023 school year ($M = 70.71$) was higher than the scale score growth mean for disadvantaged students who completed less than 30 minutes of i-Ready Instruction

Lessons a week in Grade 1 during the 2022-2023 school year (*M* = 54.03). H20 was supported. The effect size indicated a small effect.

Table 22

Descriptive Statistics for the Results of the Test for H20 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	56.10	23.32	41
	Disadvantaged	60.08	28.58	95
<30 minutes	Not Disadvantaged	70.71	33.71	24
	Disadvantaged	54.03	26.99	76

H21. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year is affected by student SES.

The results of the ninth ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 230) = 1.190$, $p = .277$. No post hoc analysis was warranted. See Table 23 for the means and standard deviations for this analysis. H21 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 2 during the 2022-2023 school year was not affected by student SES.

Table 23

Descriptive Statistics for the Results of the Test for H21 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	60.20	35.75	41
	Disadvantaged	51.47	25.34	109
<30 minutes	Not Disadvantaged	49.21	38.73	24
	Disadvantaged	49.68	32.94	60

H22. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year is affected by student SES.

The results of the 10th ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 255) = .024$, $p = .878$. No post hoc analysis was warranted. See Table 24 for the means and standard deviations for this analysis. H22 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 3 during the 2022-2023 school year was not affected by student SES.

Table 24

Descriptive Statistics for the Results of the Test for H22 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	42.66	29.05	35
	Disadvantaged	39.81	24.35	86
<30 minutes	Not Disadvantaged	42.54	27.43	35
	Disadvantaged	38.57	26.13	103

H23. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year is affected by student SES.

The results of the 11th ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 220) = .326$, $p = .569$. No post hoc analysis was warranted. See Table 25 for the means and standard deviations for this analysis. H23 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 4 during the 2022-2023 school year was not affected by student SES.

Table 25

Descriptive Statistics for the Results of the Test for H23 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	25.78	21.06	32
	Disadvantaged	28.02	20.21	66
<30 minutes	Not Disadvantaged	38.45	35.58	31
	Disadvantaged	35.80	32.99	95

H24. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year is affected by student SES.

The results of the 12th ANOVA indicated there was not a statistically significant difference between any two means, $F(1, 241) = .095$, $p = .758$. No post hoc analysis was warranted. See Table 26 for the means and standard deviations for this analysis. H24 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 5 during the 2022-2023 school year was not affected by student SES.

Table 26

Descriptive Statistics for the Results of the Test for H24 < SES >

Minutes	SES	*M*	*SD*	*N*
30 minutes +	Not Disadvantaged	24.81	18.30	32
	Disadvantaged	29.58	24.76	60
<30 minutes	Not Disadvantaged	26.30	20.13	30
	Disadvantaged	28.69	28.87	123

RQ3

To what extent is the difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction lessons a week, and those who did not in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years, affected by identified RTI tier?

H25. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year is affected by identified RTI tier.

The results of the 13th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 190) = .875$, $p = .419$. No post hoc analysis was warranted. See Table 27 for the means and standard deviations for this analysis. H25 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2021-2022 school year was not affected by identified RTI tier.

Table 27

Descriptive Statistics for the Results of the Test for H25 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	71.86	30.24	78
	Tier 2	79.00	26.15	11
	Tier 3	58.92	35.13	12
<30 minutes	Tier 1	54.19	35.58	31
	Tier 2	35.80	32.99	95
	Tier 3	41.67	37.89	6

H26. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week,

and those who did not in Grade 1 during the 2021-2022 school year is affected by identified RTI tier.

The results of the 14th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 199) = .475$, $p = .623$. No post hoc analysis was warranted. See Table 28 for the means and standard deviations for this analysis. H26 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2021-2022 school year was not affected by identified RTI tier.

Table 28

Descriptive Statistics for the Results of the Test for H26 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	64.83	31.88	65
	Tier 2	49.79	27.14	14
	Tier 3	50.00	10.77	5
<30 minutes	Tier 1	51.19	30.27	106
	Tier 2	46.86	24.90	7
	Tier 3	26.25	14.54	8

H27. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those

students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year is affected by identified RTI tier.

The results of the 15th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 214) = .598$, $p = .551$. No post hoc analysis was warranted. See Table 29 for the means and standard deviations for this analysis. H27 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2021-2022 school year was not affected by identified RTI tier.

Table 29

Descriptive Statistics for the Results of the Test for H27 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	55.05	29.13	78
	Tier 2	41.86	27.58	7
	Tier 3	42.56	20.86	9
<30 minutes	Tier 1	51.13	27.12	115
	Tier 2	46.67	45.98	3
	Tier 3	25.00	20.23	8

H28. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year is affected by identified RTI tier.

The results of the 16th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 190) = .545$, $p = .581$. No post hoc analysis was warranted. See Table 30 for the means and standard deviations for this analysis. H28 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2021-2022 school year was not affected by identified RTI tier.

Table 30

Descriptive Statistics for the Results of the Test for H28 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	41.48	27.87	44
	Tier 2	39.63	17.12	8
	Tier 3	37.73	17.50	22
<30 minutes	Tier 1	46.69	33.48	97
	Tier 2	33.75	15.65	4
	Tier 3	33.29	22.97	21

H29. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year is affected by identified RTI tier.

The results of the 17th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 203) = .493$, $p = .612$. No post hoc analysis was warranted. See Table 31 for the means and standard deviations for this analysis. H29 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2021-2022 school year was not affected by identified RTI tier.

Table 31

Descriptive Statistics for the Results of the Test for H29 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	39.92	21.67	49
	Tier 2	29.88	17.16	34
	Tier 3	26.04	21.40	26
<30 minutes	Tier 1	30.71	25.51	55
	Tier 2	25.46	23.20	26
	Tier 3	24.11	19.30	19

H30. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year is affected by identified RTI tier.

The results of the 18th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 202) = 1.254$, $p = .287$. No post hoc analysis was warranted. See Table 32 for the means and standard deviations for this analysis. H30 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2021-2022 school year was not affected by identified RTI tier.

Table 32

Descriptive Statistics for the Results of the Test for H30 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	37.00	22.71	11
	Tier 2	25.89	21.91	44
	Tier 3	14.29	13.84	14
<30 minutes	Tier 1	49.11	40.95	47
	Tier 2	24.99	19.32	71
	Tier 3	25.81	17.92	21

H31. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year is affected by identified RTI tier.

The results of the 19th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 215) = .330$, $p = .719$. No post hoc analysis was warranted. See Table 33 for the means and standard deviations for this analysis. H31 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in kindergarten during the 2022-2023 school year was not affected by identified RTI tier.

Table 33

Descriptive Statistics for the Results of the Test for H31 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	75.04	32.40	102
	Tier 2	70.71	31.13	17
	Tier 3	57.00	36.83	8
<30 minutes	Tier 1	65.88	32.86	80
	Tier 2	50.17	32.55	6
	Tier 3	54.00	38.79	8

H32. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year is affected by identified RTI tier.

The results of the 20th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 230) = 1.214$, $p = .299$. No post hoc analysis was warranted. See Table 34 for the means and standard deviations for this analysis. H32 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 1 during the 2022-2023 school year was not affected by identified RTI tier.

Table 34

Descriptive Statistics for the Results of the Test for H32 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	60.69	27.91	99
	Tier 2	63.78	25.03	23
	Tier 3	38.07	12.24	14
<30 minutes	Tier 1	60.49	30.18	85
	Tier 2	46.11	23.97	9
	Tier 3	41.00	15.40	6

H33. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 2 during the 2022-2023 school year is affected by identified RTI tier.

A 21st ANOVA was conducted to test H33. The two categorical variables used to group the dependent variable, 2022-2023 scale score growth, were average weekly instructional minutes (at least 30 minutes, less than 30 minutes) and student RTI Tier (1-3) of Grade 2 students. The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for average weekly instructional minutes, a main effect for student RTI tier, and a two-way interaction effect (Average Weekly Instructional Meetings x Student RTI Tier). The interaction effect for average weekly instructional minutes by student RTI Tier

was used to test H33. The level of significance was set at .05. When appropriate, an effect size, as measured by eta squared, is reported.

The 21st ANOVA planned to test H33 was not conducted because of a sample size issue in one of the ANOVA cells. See Table 35.

Table 35

Descriptive Statistics for the Results of the Test for H33 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	57.75	29.30	122
	Tier 2	35.64	19.54	14
	Tier 3	41.07	20.87	14
<30 minutes	Tier 1	51.96	35.60	75
	Tier 2	28.00		1
	Tier 3	29.63	9.65	8

H34. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year is affected by identified RTI tier.

The results of the 22nd ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 253) = .323$, $p = .724$. No post hoc analysis was warranted. See Table 36 for the means and standard deviations for this analysis. H34 was

not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 3 during the 2022-2023 school year was not affected by identified RTI tier.

Table 36

Descriptive Statistics for the Results of the Test for H34 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	46.95	28.72	62
	Tier 2	39.91	23.56	22
	Tier 3	30.49	17.53	37
<30 minutes	Tier 1	43.71	28.61	90
	Tier 2	32.71	19.23	17
	Tier 3	30.88	18.72	68

H35. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year is affected by identified RTI tier.

The results of the 23rd ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 218) = .624$, $p = .537$. No post hoc analysis was

warranted. See Table 37 for the means and standard deviations for this analysis. H35 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 4 during the 2022-2023 school year was not affected by identified RTI tier.

Table 37

Descriptive Statistics for the Results of the Test for H35 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	36.43	22.14	35
	Tier 2	26.32	16.73	31
	Tier 3	18.22	17.73	32
<30 minutes	Tier 1	43.68	38.12	77
	Tier 2	24.16	18.69	25
	Tier 3	26.08	22.11	24

H36. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year is affected by identified RTI tier.

The results of the 24th ANOVA indicated there was not a statistically significant difference between any two means, $F(2, 239) = 1.836$, $p = .162$. No post hoc analysis was warranted. See Table 38 for the means and standard deviations for this analysis. H36 was not supported. The difference in student achievement, as measured by scale score growth between the i-Ready Diagnostic fall and spring reading assessments, between those students who completed at least thirty minutes of i-Ready Instruction Lessons a week, and those who did not in Grade 5 during the 2022-2023 school year was not affected by identified RTI tier.

Table 38

Descriptive Statistics for the Results of the Test for H36 <Identified RTI Tier>

Minutes	RTI	*M*	*SD*	*N*
30 minutes +	Tier 1	35.24	29.26	21
	Tier 2	27.92	20.74	50
	Tier 3	20.62	18.11	21
<30 minutes	Tier 1	44.62	37.66	45
	Tier 2	23.48	18.08	81
	Tier 3	15.11	15.78	27

Summary

Chapter 4 included the data analysis and the hypothesis testing results for the research questions related to the current study of the impact of i-Ready Instruction on student growth in reading in Grades K-5 during the 2021-2022 and 2022-2023 school

years. The results of 24 ANOVAs were presented. Chapter 5 includes a summary of the study, findings related to the literature, and the conclusions.

Chapter 5

Interpretation and Recommendations

The focus of this study was to determine if the implementation of i-Ready Instruction in the Participant School District impacted student achievement in reading among students in kindergarten through fifth grade during the 2021-2022 and 2022-2023 school years. Additionally, the focus of this study sought to determine whether i-Ready Instruction impacted participants differently as affected by student SES and identified RTI Tier. Chapter 5 is divided into three main sections: study summary, findings related to the literature, and the conclusions.

Study Summary

A summary of this study, which examined if the implementation of i-Ready Instruction in the Participant School District had any impact on student achievement in reading among students in kindergarten through fifth grades, is presented in this section. Included in the study summary is an overview of the problem, followed by the purpose statement and research questions. The study summary concludes with a review of the methodology and a presentation of the major findings.

Overview of the Problem

As schools and school districts continue to grapple with teacher shortages and the rise in popularity of flexible online learning options, the lure of CAI as an instructional and intervention tool could continue to grow. Chapter 2 of this study provided evidence that the effectiveness of CAI as a tool to teach students to read and support students who fall behind in reading is not clear. Kulik and Fletcher (2016) concluded that much of the variation that exists in studies on the effectiveness of CAI is largely due to the design and

implementation of the individual applications. As such, it is important that schools and school districts do not take the claims of educational software companies at face value and exercise due diligence in examining the effectiveness of the tools they purchase so that informed decisions can be made regarding the use of taxpayer funds.

The Participant School District, like many districts around the country, adopted Curriculum Associates' CAI solution, i-Ready Instruction, as a tool to address gaps in reading achievement at the elementary level. Although studies on the effectiveness of i-Ready Instruction in reading exist, as shown in Chapter 2 of this study, the vast majority of those studies were commissioned by Curriculum Associates and are, thus, not independent. To fully understand the effectiveness of i-Ready Instruction following a completed implementation in a school or school district, independent studies are needed.

Purpose Statement and Research Questions

Three purposes were the basis for this research study. The first purpose was to determine if the implementation of i-Ready Instruction had any impact on student achievement in reading among students in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years. The second purpose was to determine if the differences in students' achievement in reading among students in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years were affected by student SES. The third purpose was to determine if the differences in students' achievement in reading among students in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years were affected by students' identified RTI Tier. To address the three purposes of this study, three research questions were posed, and 36 hypotheses were tested.

Review of the Methodology

A quantitative quasi-experimental research design was utilized in this study to compare the reading achievement growth of students who participated in an average of 30 minutes a week of i-Ready Instruction lessons and those who did not. This study was conducted using archival data provided by the Participant School District. Participants included students enrolled in the Participant School District in Kindergarten through fifth grade during the 2021-2022 and 2022-2023 school years. The independent variables included the average time students participated in the i-Ready Instruction Program per week, student SES, and student-identified RTI tier. The dependent variable included scale score growth between the i-Ready Diagnostic fall and spring reading assessments for students in Grades K-5 during the 2021-2022 and 2022-2023 school years. To test the 36 hypotheses, 24 two-factor ANOVAs were conducted.

Major Findings

The data analysis for the current study produced mixed findings. The researcher examined the effect of i-Ready Instruction on reading achievement among kindergarten to fifth grade students during the 2021-2022 and 2022-2023 school years. Consistent with the hypothesis, a statistically significant difference in reading growth was observed between students who engaged in at least 30 minutes of i-Ready Instruction weekly and those who did not, specifically in kindergarten and first grade during the 2021-2022 school year and only in kindergarten for the 2022-2023 school year.

The hypotheses were not supported for second through fifth grades in the 2021-2022 school year or for first, second, third, and fifth grades in the 2022-2023 school year, as there was no statistically significant difference in reading growth between the two

groups. For fourth grade during the 2022-2023 school year, the hypothesis was not supported. Here, students who engaged in at least 30 minutes of i-Ready instruction weekly showed a statistically significant adverse effect in their reading growth compared to their peers who engaged in less than 30 minutes weekly. The results of the first research question indicate that students who participate in at least 30 minutes of i-Ready Instruction per week at the kindergarten level outperform their classmates in reading achievement growth; however, at all other levels included in this study, i-Ready Instruction appears to have little to no impact, and in one case an adverse impact, on student reading achievement.

Additionally, the researcher examined the effects of student SES on reading achievement growth from fall to spring during kindergarten through fifth grade during the 2021-2022 and 2022-2023 school years. As hypothesized, data analysis results revealed that the difference in reading achievement growth between students who engaged in at least 30 minutes of i-Ready Instruction per week and those who did not was influenced by student SES in the first grade during the 2022-2023 school year. However, the hypotheses were not supported for kindergarten through fifth grades during the 2021-2022 school year or for kindergarten, second, third, fourth, and fifth during the 2022-2023 school year, as no statistically significant impact of student SES was observed between the two groups.

Additionally, the researcher examined the effects of students' identified RTI tier on reading achievement growth from kindergarten to fifth grade during the 2021-2022 and 2022-2023 school years. Data analysis results indicated that a student's identified RTI tier did not significantly influence achievement growth when using i-Ready

Instruction in the 2021-2022 school year and kindergarten, first, third, fourth, and fifth grades during the 2022-2023 school year. An impact could not be determined for second grade during the 2022-2023 school year due to sample size constraints, which prevented hypothesis testing.

Findings Related to the Literature

The findings of the current study related to the literature on the impact of i-Ready Instruction on student achievement in reading among kindergarten through fifth-grade students during the 2021-2022 and 2022-2023 school years are presented in this section. Additionally, the current study focused on the effects of student SES and identified RTI Tier on the differences in reading achievement growth among kindergarten through fifth-grade students who completed at least thirty minutes of i-Ready Instruction Lessons a week and those who did not during the 2021-2022 and 2022-2023 school years. The results of the current study in relation to the literature in those areas are also presented.

Kulik (1994) found that utilizing CAI tools to teach reading could lead to significant improvements in reading. However, as Major and Francis (2020) stressed, although CAI programs have shown some promise in personalizing learning and addressing learning gaps for low-performing students, their effectiveness still required additional research. The results of the current study seem to support that conclusion and the conclusion of others, such as Cheung and Slavin (2012), who made clear that not all CAI programs are created equal and should be evaluated independently.

Regarding the first research question, the findings from the current study at the kindergarten and first-grade level support the findings of Durfee et al. (2019), who found a positive impact of i-Ready in early grade levels. Although the current study's findings

support Durfee et al. (2019) at the kindergarten level and first grade during the 2021-2022 school year, in the first, second, third, and fifth grades during the 2022-2023 school year, and second, third, fourth and fifth grades during 2021-2022 school year, the current study's results contrast with Durfee et al.'s findings of positive impact. The findings of the current study contrast with Cook and Ross (2022), who found positive impacts for students utilizing i-Ready Instruction in Grades 3-8. The adverse effect among fourth-grade students utilizing i-Ready Instruction identified in the current study contrasts with Cook and Ross (2022) and Durfee et al. (2019). No significant adverse impacts were observed by Cook and Ross (2022), Durfee et al. (2019), or in any related research reviewed for the current study.

The findings of the current study indicated no significant relationship between student SES and student achievement growth in reading in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years, apart from first grade during the 2022-2023 school year. In addition, the current study's results indicated no significant relationship between a student's identified RTI Tier and student achievement growth in reading in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years. Neuman and Celano (2001) stressed the importance of targeted interventions to bridge learning gaps in struggling readers, many of whom come from lower SES backgrounds. Curriculum Associates (n.d.-b) professes that i-Ready Instruction serves this purpose. The results of the current study indicate, at least in the case of the Participant School District, that the tool is falling short of bridging gaps in reading achievement between disadvantaged students and their peers who are not disadvantaged.

Savage et al. (2013) found that computer programs that adapt to the individual needs of learners and provide a personalized learning experience, such as i-Ready Diagnostic and i-Ready Instruction, could enhance student reading skills. The results of the current study, with few exceptions, contrast with these findings. However, Savage et al. also stressed the importance of extensive teacher professional development when utilizing these tools.

Similarly, Kulik and Fletcher (2016) found that implementation played a major role in the significant variations the researchers found in the effectiveness of CAI programs. Professional development is not the only implementation factor that can impact effectiveness. Kulik and Fletcher (2016) also pointed out that programs that were well-aligned with curriculum standards and in a consistent manner yielded better results. In addition, Tamim et al. (2011) found that CAI programs were most impactful when used in a supplemental way as opposed to a replacement for traditional instruction or intervention activities. The fact that the above implementation factors, such as professional development and curriculum alignment, were not controlled for this study cannot be discounted in interrupting its results or the relation of those results to the reviewed literature.

Conclusions

Conclusions drawn from the current study regarding the impact of i-Ready Instruction on student achievement in reading in kindergarten through fifth grades during the 2021-2022 and 2022-2023 school years are presented in this section. In addition, conclusions regarding the effects of student SES and identified RTI Tier on the differences in student achievement growth in reading in kindergarten through fifth grades

during the 2021-2022 and 2022-2023 school years are presented in this section. Implications for action, recommendations for future research, and the researchers concluding remarks follow.

Implications for Action

Based on the findings of this study, the Participant School District is provided with data and findings to evaluate the effectiveness of i-Ready Instruction as a tool to support reading instruction and interventions in kindergarten through fifth grades following the district's implementation of the program. The Participant School District should evaluate the full implementation of i-Ready, including teacher professional development and alignment to the district’s curriculum and standards, in addition to the data and findings provided in this study, before making decisions on its continued use. In addition, the Participant School District should evaluate its testing and RTI protocols and consider any potential relationship between those findings and the findings of this study.

Recommendations for Future Research

The current study provided information regarding the impact of i-Ready Instruction on student growth achievement in reading for students enrolled in kindergarten through fifth grades. Additional research could be valuable in expanding on the findings of the current study. Five additional studies that could prove valuable are listed below.

- An additional study could be conducted to examine how i-Ready instruction impacts student achievement growth in reading compared to other RTI intervention strategies employed by the Participant School District.

- As Curriculum Associates (n.d.-b) does not recommend that students utilize i-Ready Instruction more than 45 minutes per week, an additional study could be conducted to examine the impact of i-Ready Instruction on students who exceed that amount.
- An additional study could be conducted that includes a measure of student efficacy in the completion of i-Ready Instruction Lessons.
- A qualitative study could be conducted to gain insight into teacher self-efficacy regarding the use of i-Ready Instruction and the RTI Model.
- A longitudinal study following a cohort of students through multiple years of i-Ready Instruction use could prove beneficial in determining any long term impact.

Concluding Remarks

As school districts continue to work towards filling gaps in reading achievement, CAI programs like i-Ready Instruction should be considered but examined carefully to ensure alignment with the district's priorities. In addition, when examining the effectiveness of CAI programs, it is important to look closely at the district's implementation, including professional development and curriculum alignment, as well as protocols for use, just as closely as student achievement growth to best determine the causes of any shortcomings in the program's effectiveness. Doing so will ensure that leaders can make informed decisions in the best interest of students and taxpaying citizens.

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Appendices

Appendix A: IRB Approval Letter

BAKER UNIVERSITY
Own Confidence

Baker University Institutional Review Board

July 25, 2023

Dear Scott Sisemore and Harold Frye,

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 A. Kimball

Scott Kimball, PhD
Chair, Baker University IRB

Baker University IRB Committee
Jiji Osiobe, PhD
Tim Buzzell, PhD
Susan Rogers, PhD

Appendix B: District Email Approval for Research

Re: Data Request Form Doctoral Research

1 message

[redacted] Thu, Jun 22, 2023 at 6:12 PM

To: Scott Sisemore <ssisemore@bsd124.org>

[redacted]

Hi Scott,

Your proposal has been approved. I have copied Dr. LeMay in this email, as she will work with her staff to gather the data for you.

Good luck on your study, I wish you well!

[redacted]