EXAMINING THE EFFECT OF UTILIZING 1:1 IPAD TECHNOLOGY ON THIRD GRADE READING ACHIEVEMENT: A CAUSAL-COMPARATIVE ANALYSIS

by

Sharla Edwina Edwards

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University

2023

EXAMINING THE EFFECT OF UTILIZING 1:1 IPAD TECHNOLOGY ON THIRD GRADE READING ACHIEVEMENT: A CAUSAL-COMPARATIVE ANALYSIS

by Sharla Edwina Edwards

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Liberty University, Lynchburg, VA

2023

APPROVED BY:

Jeffrey S. Savage, Ed.D., Committee Chair

Barry Dotson, Ed.D., Committee Chair

ABSTRACT

This quantitative causal-comparative study examined the effects of one-to-one (1:1) iPad instruction versus traditional instruction on urban third-grade students' English Language Arts (ELA) achievement. The research is significant given the rising use of technology, like the 1:1 iPad initiative, to combat declining reading proficiency. It highlights the pivotal role of third-grade reading proficiency in future success, aligning with education policies and catering to modern learners. This study provides valuable insights for educators, administrators, and education stakeholders by elucidating the impact of technology on reading achievement. As one-to-one instruction gains prominence, understanding its influence on students' reading performance is crucial due to its potential for improving achievement. The study encompassed 293 third-grade students from elementary schools in North Carolina's Central Piedmont region, with 170 in non-iPad classrooms and 123 in iPad-equipped classrooms. The North Carolina End-of-Grade Reading Test (EOG RT) assessed reading achievement, with pre-and post-test scores derived from archival student data. Data analysis employed analysis of covariance (ANCOVA). The findings indicate no significant difference in reading achievement between third-grade students using 1:1 iPad technology and those in traditional classrooms. Future research recommendations encompass longitudinal testing, broader geographical sampling, exploration of various subjects, examination of diverse student groups, and investigation into reading instruction methods, iPad usage time, and teacher-student attitudes. These avenues can deepen our comprehension of technology's impact on student achievement.

Keywords: authentic application, end-of-grade testing, beginning-of-grade testing, one-to-one (1:1) iPad technology, pedagogy, standardized testing, student performance

Dedication

Thank you to everyone for your encouragement and support during this significant transition in my life. I could not have completed this journey without the guidance and strength provided by my Lord and Savior, Jesus Christ. The scripture I kept close to my heart comes from 2 Corinthians 5:7: “For we live by faith, not by sight.” When challenges, weariness, and frustrations occurred, I was ready to throw in the towel, but God reminded me not to be blinded by situations but to keep my eyes on him. This degree is a testimony to keeping my eyes on him.

Next, I must thank the people I am blessed with, especially during this process. My mother, Mae, instilled in me the principles of having integrity and working hard for your goals. In my upbringing, quitting was never an option; I needed that to persevere through the doctoral process. In my youth, she told me I could be anything I wanted, and I believed that with all my heart. I used that simple phrase to get through a process that has only been completed by 2% of the population. My sister Victoria is my silent supporter. She has always ensured I had everything I needed to excel in all my endeavors. She does not say much but shares my happiness in all my accomplishments. Last is my brother Victor, who offers encouragement in various ways, usually by applauding my achievements as a nod to him being the older brother. I am blessed to have a strong support system for encouragement and motivation.

Acknowledgments

I sincerely want to thank my dissertation chair, Dr. Jeffrey Savage. I am eternally grateful that you were assigned as my chair. Your appointment came at a time when I believed my journey was ending. You assisted me in maneuvering through the process and completing the journey: Your prayers, calming demeanor, words of encouragement, and explicit discussion of the manuscript and processes. I also greatly appreciate my committee member, Dr. Barry Dotson, for coming on board, ready to assist me.

I must sincerely thank Dr. Debra Dean, who assisted me through the whole journey from start to finish. Thank you for guiding me when I became frustrated and overwhelmed with the process. I will forever be grateful for the role you played in this accomplishment.

I truly need to thank everyone again from the bottom of my heart for being a blessing to me.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

Analysis of Covariance (ANCOVA)

Academically-Intellectually Gifted (AIG)

Beginning of Grade (BOG)

Elementary and Secondary Education Act (ESEA)

English Language Arts (ELA)

English Language Learners (ELL)

End of Grade (EOG)

Every Student Succeeds Act (ESSA)

Exceptional Child (EC)

Individuals with Disabilities Education Act (IDEA)

Institutional Review Board (IRB)

National Assessment of Educational Progress (NAEP)

National Center for Education Statistics (NCES)

National Defense of Education Act (NDEA)

No Child Left Behind Act (NCLB)

North Carolina Beginning of Grade 3 pre-test (BOG3)

North Carolina Standard Course of Study (NCSCOS)

North Carolina Department of Public Instruction (NCDPI)

One-to-One iPads (1:1)

Socioeconomic Status (SES)

Special Education (SPED)

Zone of Proximal Development (ZPD)

CHAPTER ONE: INTRODUCTION

Overview

The focus of this quantitative, causal-comparative study is to provide data analysis on the impact of using 1:1 iPad technology in the classroom. This chapter will present the historical context, social context, and theoretical framework as part of the study's background and context. Moreover, this first chapter will identify the problem statement, purpose statement, significance of the study, and the research question that will guide the current research: analyzing the 1:1 iPad technology impact on the achievement of third-grade students during reading instruction.

Background

The Soviet Union's 1957 launching of Sputnik, the first artificial satellite from Earth to reach space, significantly impacted America's educational system (Addison & McGee, 2015; Cha, 2015). This launch supported the belief that America had presumably lost the space race. Losing the space race had critics re-examining the instructional standards, especially for math and science. As a result, the National Defense of Education Act became legislation to re-vamp the educational system in 1958. In addition, the NDEA legislation started the movement of accountability of student learning, hence national testing to track students' achievement with standardized testing (Cha, 2015).

The 21st-century learner has emerged in recent years, and the emphasis is on technological advancements as the frontrunner. The challenge is the need to ensure every American student has access to a 1:1 technological device in their hands (Harper & Milman, 2016). School districts providing students with a 1:1 technological device attempt to increase student performance for standardized testing to enhance the 21st-century classroom (Ditzler et al., 2016). Legislation has created the opportunity to provide additional resources and funding to

increase technology usage in all classrooms nationwide. However, this is not occurring promptly or in all districts, especially those representing low socio-economic and rural areas (Harper & Milman, 2016). Therefore, administrators must realize the benefit of using a 1:1 technological device in the classroom.

Historical Overview

2002, President George W. Bush signed the No Child Left Behind Act (NCLB) (U.S. Department of Education, 2002). The legislation increased the federal government's role in the day-to-day operations of schools by holding them accountable for student achievement. The law mainly focused on specific groups of students to close the gap between their peers. These students consist of the special education population (SPED), English Language Learners (ELL), low socioeconomics, and minority children (U.S. Department of Education, 2002). States felt compelled to comply with the mandates or risk consequences of losing "Title I" funding supplied by federal governments. The NCLB law contributes to the year-end grade testing in the third through eighth grades. The justification described the end-of-grade testing as a tool to ensure students demonstrated the proper growth in each grade level. The federal government requires students to demonstrate proficiency in end-of-year standardized testing (U.S. Department of Education, 2002).

Part D of the NCLB legislation, titled "Enhancing Education through Technology," cites eight purposes and three goals in establishing technology usage within the K-12 classroom (U.S. Department of Education, 2002). These purposes and goals highlight the need for funding to promote the successful implementation of technology to enhance student achievement in elementary and secondary schools (U.S. Department of Education, 2002). Technology implementation needs the appropriate funding to support schools, especially those in high-need

areas. The U.S. Department of Education proposes promoting technology implementation by ensuring localities and state organizations support the technology and continued access to the infrastructure. The U.S. Department of Education has the burden of offering numerous routes for all the schools to receive funds for implementing technology in the classroom to benefit the students (Spears, 2012).

Implementing technology into the educational setting requires the preparation of teachers, principals, and district administrators by creating and providing professional development to promote effective teaching and learning methods. The 1:1 technology presents unlimited support from all the stakeholders to integrate initiatives to advance the curricula based on the community's needs (Spears, 2012). These methods assist with providing academic courses through distance learning, especially in isolated areas.

The legislation covered three precise goals to ensure the promotion of student performance. These, as presented in the law, are as follows: The U.S. Department of Education's primary focus was to safeguard and promote increasing the student achievements of elementary and secondary students by implementing technology in the classroom (U.S. Department of Education, 2002). The U.S. Department of Education encourages the various state departments of education and the local boards of education to ensure that technology integration into the curricula effectively promotes student achievement. These agencies are responsible for offering training to teachers that complements the standards and objectives addressed within curriculum development (U.S. Department of Education, 2002).

Society-at-Large

In today's society, technology represents a daily occurrence. Schools obtain resources to provide classrooms with interactive whiteboards, projectors, document cameras, and desktop

computers to enhance student learning (Harper & Milman, 2016). Schools across the country are adopting 1:1 technological devices in the classroom. Technological devices are making their way into hands across the globe in the form of cell phones, tablets, computers, game systems, and other accessories. Unfortunately, schools are also still operating using traditional methods of instruction because 1:1 devices are unavailable.

The information age is rapidly changing the world and the daily operations of businesses and organizations (Stone, 2017). Implementing 1:1 iPad technology in the classroom assists students in meeting the community's demands. The iPad technology provides students with skills and experiences relevant to the needs of stakeholders. Technology in the classroom enhances skills for use later in life. The skills and knowledge obtained from implementing 1:1 iPad programs strengthen the communities through jobs, job training, and college readiness. Students participating in 1:1 technology demonstrate significant growth in critical thinking and problem-solving skills (Stone, 2017). The relationship between schools and communities is substantial when the local government and school boards create curricula and programs to accommodate the skills and knowledge needed for growth (Clausen & Greenhaigh, 2017). Unfortunately, the technology in a large number of schools is not comparable. Some students have limited access to these technological opportunities; therefore, some students, schools, communities, and other stakeholders are experiencing a disadvantage in the workforce and the preparation of college students (Stone, 2017). Students not utilizing 1:1 iPad programs demonstrate a gap of being less prepared regarding stakeholders' needed skills and experiences. Technological devices provide students with unlimited resources in all subject areas, whereas those without may experience a deficiency in the resources afforded (Clausen & Greenhaigh, 2017).

Theoretical Background

Research suggests various theories support the implementation of 1:1 iPads in the classroom and the impact on instruction, assessment, and intervention to increase student achievement in reading (Pasini, 2018). This study will focus on the three theoretical viewpoints that support constructivism and Jerome Bruner. The supported theories describe the need for positive interactions during instruction to impact student achievement. Studies conclude that students' interactive and hands-on approaches are consistent with constructive theories (Moon et al., 2021). The integration of 1:1 iPads provides a rich learning environment for students. The iPads allow students to interact with lessons and activities. One significant component of the traditional delivery methods in the classroom is teachers lecturing while presenting students with limited visuals and audio. The only interaction between teachers and students typically includes students answering questions and completing activities based on the lesson. Research reports that digital learning environments outperform traditional classrooms (McKnight et al., 2016).

The study examined Bruner's theory of instruction, scaffolding, and discovery learning within his education processes. Bruner rationalized that learners developed their coding system to deepen their understanding of their knowledge by organizing and categorizing to promote exploration instead of depending solely on the teacher (Metsämuuronen & Räsänen, 2017). In discovery learning, children can participate actively in lessons through play, social interactions, and manipulating the content. Bruner's theory of scaffolding allowed teachers to use the 1:1 iPad devices to apply modeling to instruction. Students could receive one-on-one assistance from teachers or guided instruction through instructional applications. Bruner's theory of instruction partially focuses on the motivations that engage students in instruction (Pasini, 2018). The research will convey how Bruner's theories will equip students to take control of their learning

as proposed by the 21st-century learner framework. Research supports constructivist pedagogies centered on inquiry-based learning (Taylor et al., 2020).

In summary, the mandates created by the NCLB and ESSA Act to ensure that students have access to technological devices to utilize in the classroom have led to the surge of school districts nationwide joining the 1:1 iPad initiative. The iPad initiative ensures every child can access an iPad device to increase student achievement, especially in reading. Literacy is rapidly moving in different directions as the gap is widening. The focus must be on evolving theories and instructional practices (Taylor et al., 2020). The theories of Jerome Bruner will assist in creating a positive learning environment by ensuring that children are learning with technology by building knowledge instead of by technology because instruction is still an important component.

Problem Statement

The study examined a gap in the literature concerning the reading achievement differences among third-grade students. The National Assessment of Educational Progress (NAEP) (2019) reports that 35% of students will achieve reading proficiency nationally by the third grade. Reading proficiency demonstrates a disadvantage for students from low socioeconomic families, English language learners, students with disabilities, and students of color (Fien et al., 2021). Research highlights significant gaps in reading proficiency based on race and ethnicity; there is a significant difference between African-American and Caucasian students but only a slight difference between Caucasian and Hispanic students (Fien et al., 2021). Technology is currently at the forefront of changing classroom dynamics by adding 1:1 technology (Ditzler et al., 2016). There is limited research on the impact of 1:1 iPad on instruction and how it benefits students from disadvantaged groups. (Thieman & Cevallos,

2017). However, there is some evidence that student achievement increases when 1:1 iPad devices are used as an essential part of the curriculum (Thieman & Cevallos, 2017). Still, if there is only supplemental usage, student learning has no impact (Thieman & Cevallos, 2017). One of the critical challenges to implementing the 1:1 iPad into the classroom is providing adequate resources and funding to disadvantaged students (Crompton et al., 2022). The U.S. Department of Education Office of Educational Technology (2017) concludes that one of the results of technology integration must demonstrate increased student achievement (U.S. Department of Education Office of Educational Technology, 2017). One of the most persistent claims of the last 50 years has been that outcome differences in student achievement, especially across racial and ethnic groups, exist because of unequal funding 'resources (Gay, 2018; Hammond, 2015; Jensen, 2022; Pew Research Center, 2013), one would expect an almost excess of research on 1:1 technology integration. Such is not the case. The problem is that research is still needed to ascertain the effectiveness of 1:1 iPad technology integration, especially its role in possibly closing the achievement gaps among historically underrepresented groups, a gap in the literature researchers have called to be filled (Harper & Milman, 2016; Parks & Tortorelli, 2021).

Purpose Statement

This quantitative, causal-comparative study explored the end-of-grade testing performance of third-grade students who utilize 1:1 iPad technology during reading instruction compared to those who do not utilize 1:1 iPad technology. Third-grade students are faced with the beginning of high-stakes testing to measure their success in the classroom. The sample will comprise archival data of 293 third-grade students from four Title I elementary schools in North Carolina. The schools chosen for the study have comparable demographics, populations, and school culture, except for using 1:1 iPad technology during reading instruction. The researcher

will conduct the study using data collected from the two school districts that are actively participating in the study. The data will include the 2018-2019 third-grade North Carolina Beginning-of-Grade 3 (BOG3) English Language Arts/Reading Test scores and the End-of-Grade (EOG) test scores. The BOG3 test is administered to third-grade students at the beginning of the school year. The EOG test is administered at the end. The first school district representing schools A and B has implemented 1:1 iPad technology in kindergarten through fifth grades. The second school district serving schools C & D receives instruction through traditional delivery methods. The independent variable is the instructional delivery method based on whether we learn through traditional or 1:1 iPad instruction. The dependent variable for the study is the North Carolina EOG post-test assessment administered at the end of the third-grade year. The study will use the BOG3 assessment as the covariate to control for prior achievement (Field, 2018; Gall et al., 2007).

Significance of the Study

In the last decade, schools increasingly have made technology accessible to all students. Technology in schools has transformed from 1 to 2 computers in a room or a computer lab to implementing the 1:1 iPad technological device in schools where each student can access a device. Schools nationwide are following the iPad initiative to promote increased student achievement. Researchers suggest that student learning is increasing because technological devices create an environment for students to become more engaged in lessons (Ackley, 2017). Increased engagement makes students more interested in the content because teachers can integrate various digital tools into reading lessons.

Teachers across the country have witnessed a decline in reading proficiency for students over the last several years. Students are struggling to maintain the appropriate grade levels. The

National Assessment of Educational Progress (2019) reports that two-thirds of United States students read on grade level. Research details the decline in reading achievement nationwide and effective ways to improve reading, especially in pre-kindergarten through third grades (Demiroz, 2018). Students must leave third grade-proficient in reading. Weyer and Casares (2019) discuss the importance of third grade as the final grade in reading is taught because students are reading to learn after third grade. Research shows that 88% of students who dropped out of high school or failed to finish high school were struggling readers (Weyer & Casares, 2019). In support of NCLB and the ESSA acts, while improving reading proficiency, technology is needed in the classroom to support the 21st-century learner effectively (Adler-Greene, 2019).

The research is intended for utilization by educators, administrators, and stakeholders within the education sector. The research will provide insight to those wanting to implement the 1:1 iPads in the classroom. The research will address the current research on the various demographic populations by race, ethnicity, socioeconomic status, and any other education classification and how they impact reading achievement and integrating 1:1 iPad devices into instruction. This study aims to give insight into the processes of integrating technology into the classroom as a tool to enhance instruction for all students.

Research Question

RQ1: Is there a difference in the End-of-Grade testing performance between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology while controlling for prior achievement?

Hypothesis

$H_0$1: There is no significant difference in End-of-Grade reading achievement between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology during reading instruction while controlling for prior achievement.

Definitions

1. *Authentic Application:* A pedagogical approach that situates learning tasks in the context of future use (Spector et al., 2014).
2. *Beginning-of-Grade Testing:* The North Carolina Beginning-of-Grade Tests measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study (NC Department of Public Instruction, 2018)
3. *End-of-Grade Testing:* The North Carolina End-of-Grade Tests measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study (NC Department of Public Instruction, 2018)
4. *One-to-one Technology:* The act of equipping classrooms/schools with initiatives consisting of the utilization of provided technology to all students (Bebell & O'Dwyer, 2010)
5. *Pedagogy*: Refers to the actions undertaken by a classroom teacher to ensure that learning takes place. Pedagogy can encompass strategies, selecting a curriculum and resources, and assessment or evaluation methods (Spears, 2012)
6. *Standardized Testing:* High-quality assessment results in actionable, objective information about student knowledge and skills (U.S. Department of Education, 2002).

7. *Student Performance:* Students demonstrate their knowledge and skills of the content with the grade level. Teachers' instruction, resources, and other factors play a significant role in student achievement (Harper & Milman, 2016)

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter of the dissertation will examine the constructivism framework based on the philosophical ideas and contributions of Jerome Bruner. The researcher will also utilize the works of Jean Piaget, Lev Vygotsky, and John Dewey as collaborators. The literature review will examine Jerome Bruner's emphasis on cognitive practices that detail the instructional designs for teachers and students. Bruner's methods utilized components of contributions highlighted by Piaget, Vygotsky, and Dewey. The practices discussed in this study will examine discovery learning, the theory of scaffolding, and the cognitive theory of instruction. The second section will discuss related literature corresponding to the other constructs and barriers present to ensure an understanding of 1:1 iPad instruction for the reading achievement of third-grade students. The related literature examined will explain reading achievement, 21st-century learning, the 1:1 iPad initiative, and technology integration. The study will highlight the barriers present in all the schools in the study and anticipated by the researcher. Ultimately, this literature review is designed to help the reader understand the metamorphosis of classrooms from the 20th to the 21st century to enable students to become digitally literate. In particular, the literature review will emphasize the role of technology as it frames the warrant for the present research. It will examine two classrooms that maintain traditional teaching methods and two that utilize iPad technology.

Theoretical Framework

Constructivism

This study examined constructivist beliefs by introducing 1:1 iPad technology into reading instruction in the classroom. The research acknowledges that utilizing digital tools in the

classroom is essential to students learning technology skills when needed (Hamilton, 2018). Technology benefits students in becoming self-motivated in their learning (Hamilton, 2018).

In the constructivism theory, the roles of the teacher and students are clear and precise (Hamilton, 2018). Educators aim to create an environment where students can construct and gain experiences. The teacher must provide the structure to encourage opportunities for student-centered learning by promoting active and social participation (Hamilton, 2018). Constructivism supports students using old information and experiences to process new information while committing the information to memory (Aldoobie, 2015). The constructivism theory ensures that the learning process is by students actively participating in instruction. The constructivist theorist views children as creators who construct and build, effectively arriving at their understanding and conclusion when presented with a concept (Gordon Biddle et al., 2014). Children utilize their instincts to determine the tools needed to construct their learning patterns (Gordon Biddle et al., 2014).

In imploring the constructivism theory, teachers are facilitators of the classroom, teaching students to formulate their conclusions to the presented information. Teachers must expand themselves past the lecture method of teaching. Lecturing is responsible for students not acquiring the proper understanding of skills by listening or hearing information repeatedly without application (Gordon Biddle et al., 2014). The construction theory expresses that learning occurs when children construct their understanding and knowledge based on their experiences and environment. Constructivism was birthed out by educational philosophers dismissing the act of children learning through play and interactions. Piaget, the founder of constructivism, dismissed these philosophers' findings and introduced the stage theory of cognitive development.

The constructive theory in this study will focus on the work of Jerome Bruner, a prominent contributor to the field of education. Bruner's discovery learning theory is significant to implementing the 1:1 iPad into instruction because it describes children utilizing various environments to discover new concepts by discovering information for themselves (Clark, 2018; Stapleton & Stefaniak, 2019). Children are given the tools to encourage these discoveries. However, they are not guided to conclusions (Bruner, 1966). Bruner noted that the relationship between educators and students would consist of cooperation. Children are not mandated to listen to educators to take cues or demonstrations of scaffolding (Bruner, 1966). Bruner's work conveys the same reasoning the constructivist theory expresses (Gordon Biddle et al., 2014). Bruner focused on mathematics and science while explicitly developing students' thought processes in science, technology, engineering, mathematics, or STEM (Gordon Biddle et al., 2014). Bruner's explicit and clear structure can transfer into reading and reading comprehension during instruction. Bruner emphasizes the need for students of all ages to learn through discovery. Students need concrete manipulatives that promote one-to-one correspondence for students to explore (Gordon Biddle et al., 2014). These occurrences will assist students in arriving at natural responses based on their knowledge, experiences, and inquiries. Bruner described educational aids that students needed to enhance teaching effectiveness and learning within the classroom (Bruner, 1977). The educational aids Bruner discussed playing a significant role in learning were sound recordings, books, videos, laboratories, various blocks, and models represented through charts and animations in the educational setting; these aids will benefit the different learning styles of students (Bruner, 1977). The iPad encompasses all of the machines that Bruner mentioned into one device. Bruner noted that the device could not take the teacher's place providing instruction. Bruner realized educational aids would take some of the load off the

teacher's shoulders. The exciting concept was that Bruner that machines could offer immediate correction or feedback while the students are learning (Bruner, 1966).

The implementation of 1:1 iPad technology further advances Bruner's ideas of allowing students to have numerous resources by encouraging them to discover authentic relationships (Clark, 2018). Students would have an unlimited library of books and media resources (Stone, 2017). An iPad can enable students to read text online and complete activities based on individual reading levels. Current websites have the resources to connect students to interactive blocks and models to manipulate hands-only (Bruner, 1977). The 1:1 iPad technology allows students and teachers to utilize the practices described by constructivists. Implementing 1:1 iPads in the classroom supports constructivism theory. The constructivism theory uses three principles to engage students in learning: discovery learning, social activism, and child development (Aldoobie, 2015). The study examined this theory's relevance when paired with technology while enhancing student learning.

Discovery of Learning

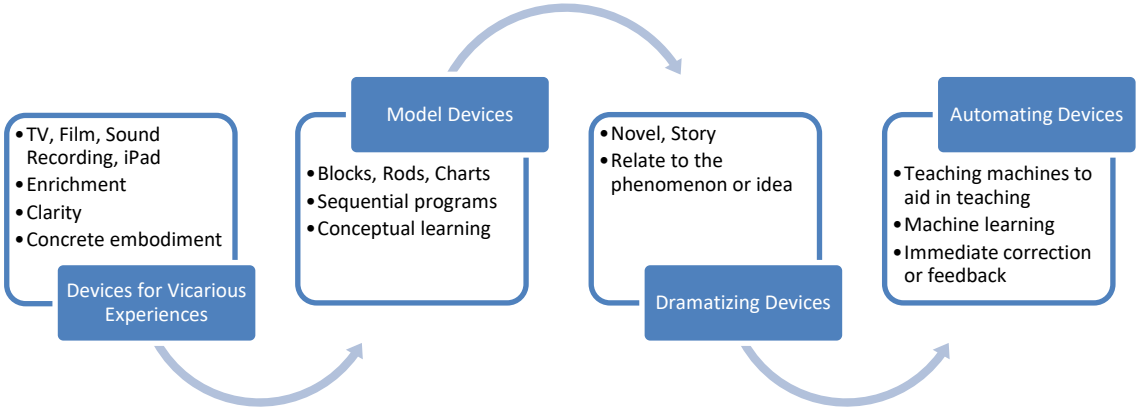
Bruner's discovery of learning complements the ideas emphasized by Piaget's works (Stapleton & Stefaniak, 2019). The ideas suggested by Piaget conclude that children acquire knowledge by becoming active and motivated learners within their environment (Ormrod, 2011). Children can construct and manipulate their learning instead of receiving a lecture from an educator during instruction. Piaget mentions various components that assist students in developing the skills and motivation to learn by utilizing their cognitive skills (Follari, 2019). The multiple environments of children represent schemes, thoughts, or actions that children are responsible for maneuvering. Piaget highlighted the component of social interaction for children in diverse settings because physical and social interactions encourage cognitive development

(Follari, 2019). Bruner emphasized that discovery learning provides explicit instruction and planning for students to receive a structured experience (Johnson, 2017). Children will experiment with concepts and hands-on applications in physical interactions to effectively develop critical thinking skills upon completing tasks (Follari, 2019).

The last components detailed by Piaget are assimilation and accommodation to create and discover new schemes within the learning process (Follari, 2019). These concepts assist children in interacting, interpreting, and responding to new schemes while enhancing their knowledge. Using Bruner's discovery learning theory, children are encouraged to use their senses to manipulate their content by choosing, transforming, storing, and applying their new experiences to acquire knowledge (Wen, 2018). Using scientific methods, children can formulate hypotheses and separate and control variables (Follari, 2019). Piaget's perspective makes a clear connection to other academic subjects. However, all the capabilities and skills obtained can transfer to reading and reading comprehension skills.

Figure 1

Models of Devices



Theory of Scaffolding

In Bruner's theory of scaffolding, he follows the influences of Lev Vygotsky and his zone of proximal development (ZPD). Bruner believed scaffolding allows teachers and students to collaboratively acquire knowledge based on a specific goal (Eun, 2019). Vygotsky's perspective includes the reasoning that children find little benefit in the tasks they can complete successfully independently (Johnson et al., 2003). In this case, Vygotsky explained that cognitive development only occurs when a child can complete tasks with minimal assistance or support, identified as the Zone of Proximal Development (Johnson et al., 2003). The zone of proximal development covers the distance between the proper understanding and the more advanced development of the subject matter through social interaction (Clark, 2018). Vygotsky looked at the ZPD as an area of progression where students advance through understanding with the support of more knowledgeable others (Clark, 2018). One significant contribution of scaffolding is recognizing and identifying a child's strengths and weaknesses to effectively meet their needs (Colter & Ulatowski, 2017).

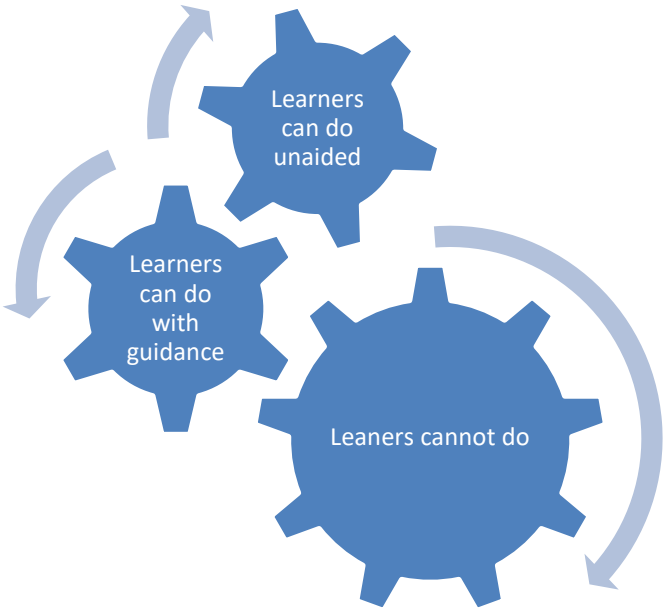
Vygotsky believes scaffolding and supporting others at the appropriate time and level will lead to successful progression through the ZPD (Clark, 2018). Children learn reading strategies through scaffolding from the teachers within the classroom during instruction (Johnson et al., 2003). The goal of scaffolding within reading instruction is to assist students in becoming independent within the content (Colter & Ulatowski, 2017). In younger grades, tracking print, letter sounds, sight words, and chunking words are essential in kindergarten and first grades. The children are exposed to simple comprehension questions to gauge their understanding of the text. The questions consisted of the characters, setting, and the time a story takes place. In the second grade, children are introduced to decoding words, segmenting, and the meaning of words and

phrases. The children learn the comprehension concepts of themes and main topics and compare and contrast two texts. In assisting children in completing these tasks, the students must endure the appropriate instruction to demonstrate how to complete the task (Johnson et al., 2003).

Vygotsky's ZPD is significant to the study because children will receive education via traditional and 1:1 iPad teaching methods. The students will complete tasks utilizing the taught strategies and concepts guided by the teacher, whether using technology or not (Clark, 2018). This theory has a significant relationship with education because it promotes the support children need to succeed throughout their academic years and lives (Clark, 2018).

Figure 2

Vygotsky's Zone of Proximal Development



Theory of Instruction

Jerome Bruner made significant contributions to the field of cognitive psychology. An idea that Bruner demonstrated a considerable influence on was the area of instructional theory (Stapleton & Stefaniak, 2019). Bruner's rationalization is that students are curious. Therefore,

they will willingly expose themselves to learning new concepts while invoking problem-solving ability (Bruner, 1977). Bruner's instructional theory development follows the works of John Dewey and his cognitive learning theory. Bruner's instructional theory consisted of 4 components: predisposition, the structure of knowledge, optimal sequencing of material, and reinforcement. In addition, Bruner and Dewey emphasized connecting children's experiences to their learning process (Gordon Biddle et al., 2014).

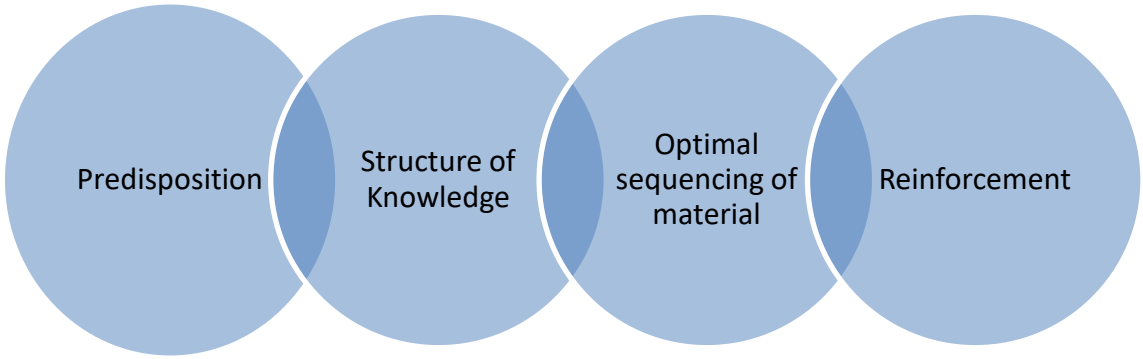
The cognitive learning theory ensures that the 1:1 iPad devices will assist with changing the mindset of passive students to active learners (Almasseri & AlHojailan, 2019). Students are kept engaged in lessons in the predisposition stage to prove that they can solve ill-structured situations and problems to navigate the problem by utilizing multiple solutions (Stapleton & Stefaniak, 2019). Bruner's thoughts on the structure of the knowledge stage are based on the cognitive awareness of the students (Xu, 2019). The teacher is responsible for simplifying the material until students can successfully develop their cognitive skills through enactive, ironic, and symbolic learning (Stapleton & Stefaniak, 2019). Bruner's optimal sequencing of materials ensures that content is presented sequentially to assist with the mastery of the content (Xu, 2019). Bruner reiterates that knowledge must be transformed and organized to benefit problem-solving (Xu, 2019). Dewey (1915) believed educators needed to focus on social interactions. Lessons are presented to allow rich and poor students to interact and learn from each other's experiences (Gordon Biddle et al., 2014). Teaching through social interactions promotes equal educational opportunities for all children, regardless of circumstances. Bruner agreed that social interactions were the best way for learners to retain information (Xu, 2019). Dewey suggests that the classroom in schools is comparable to democratic societies. Dewey's work indicated his belief that children possessed specific impulses. Educators needed to encourage students to use

those impulses to conduct observations and formulate questions to awaken their consciousness and acquire thought-provoking decision-making (Dewey, 1915). Bruner suggested that the notions of children could be satisfied with reinforcements (Stapleton & Stefaniak, 2019). Therefore, students were introduced to extrinsic rewards immediately after completing a task. The goal was for the students to progress to the intrinsic stage in which they were satisfied with completing the task and receiving the appropriate feedback (Stapleton & Stefaniak, 2019).

The implementation of 1:1 iPad technology allows students to guide students to their conclusions based on experiences and cognitive instincts. Technology can expand teaching to include numerous beneficial resources that are otherwise unavailable. Using 1:1 iPads in the classroom allows students to create a space unique to their learning.

Figure 3

A Cognitive Theory of Instruction



Related Literature

Federal Laws: NCLB and ESSA Acts

The No Child Left Behind Act (2001) was one of the federal laws that addressed the widening educational gap (U.S. Department of Education, 2002). The NCLB Act promised significant financial allotments for technology implementation to support school districts

nationwide. The funding was allotted for repairing, maintaining, and upgrading the systems' current technology. In addition, the allotments increased the integration of technology within the curriculum. Educators were to receive intensive and comprehensive professional development to increase the effectiveness of utilizing technology in the classroom (Harper & Milman, 2016). Unfortunately, the allotments promised by NCLB never fully came to fruition. Districts across the nation were left underfunded, and the technology was never fully implemented, especially in low socio-economic areas or Title I schools classified as impoverished. In 2015, the legislature was signed to replace NCLB, and the Every Student Success Act (ESSA) became the new active federal education law. ESSA was the legislation passed by the federal government, states, districts, and schools to have the ability to meet the needs of all students in K-12 (U.S. Department of Education, 2017). The ESSA Act is primarily responsible for closing the education gap throughout the country and rejuvenating the teaching and learning occurring in schools by implementing technology and technological devices in the classroom (Cook-Harvey et al., 2016).

The ESSA act represents historically underserved students in the existing education system (U.S. Department of Education, 2017). Educators boost the creation of the 21st-century learner, but if these students are not adequately equipped to meet the students' demands, they will not progress. ESSA contains mandates that ensure students of color, low socioeconomics, ELL, students with disabilities, foster care, and people experiencing homelessness (U.S. Department of Education, 2017). The act follows Bloom's Taxonomy Framework by ensuring the learning opportunities demonstrate higher-order and critical thinking to the subject matter. The ESSA Act also uses multiple assessments that promote equity (U.S. Department of Education, 2017). The act supplied federal funds to combat the lack of resources for schools, especially those

representing low-socioeconomic areas (U.S. Department of Education, 2017). One of the significant challenges associated with ESSA is the equity within the resources outlined by the law. Cook-Harvey et al. (2016) discuss the inequalities for students who live in poverty, which contribute to half of the student population in the United States. However, the same districts and schools that provide education to these students can receive less funding than their counterparts from middle and upper socioeconomic areas (Ujifusa, 2016). Burnette (2019) explained that states are not demonstrating equitable spending among school districts. Research has concluded that adequate funding, up-to-date curriculum material, and the ability to keep up with the fast-paced advancements in technology will provide the structure to improve student achievement and close the gap.

There are 115 school districts in North Carolina, including the two districts where the study is conducted. The school districts are not comparable in size, but the population of students is similar. The per pupil expenditure is also comparable between the two districts. The following table will show the funding allotments for each student in NC (National Education Association, 2022). The state is currently ranked forty-seventh in the country, with an average allotment of $10,301.00.

Table 1

NC Per Pupil Expenditure

School Districts	State PPE	State Rank	Federal PPE	Federal Rank	Local PPE	Local Rank	Total Expenditure
1	6573.72	78th	697.05	52nd	1405.83	42nd	$9414.59 Rank 71st
2	7040.54	53rd	734.98	42nd	2486.74	26th	$10,262,28 Rank 42nd

Reading Achievement Gap

To examine the impact of the 1:1 iPad devices on reading achievement, we must discuss the reading achievement gap nationwide. Some common factors in the decline of reading are socioeconomic status, ethnicity, and students with disabilities. This study is significant because it will determine if integrating the 1:1 iPads within reading instruction will positively impact students, increasing student achievement.

The achievement gap is rapidly growing mainly because of the income inequalities directly correlating to families' socioeconomic status. Therefore, educators must understand the adversities that students living in impoverished areas will face in their learning that do not exist for their counterparts living in homes with a higher income (Hanushek et al., 2019).

The NCLB and ESSA Act contained provisions for schools and districts in these areas. However, it has not solved the problem, and the gap is widening. The provisions on both federal and state levels provided the resources for students to receive additional support in the classroom by utilizing interventions, tutors, and summer programs to combat the summer loss of materials learned throughout the year. Research shows that students in lower SES can lose two to three months of reading over the summer because of summer loss (Allington & McGill-Franzen, 2021). It was also found that middle and higher SES household students still make gains during the summer because of their book accessibility (Allington & McGill-Franzen, 2021). Students with a disability is another area

Research shows that effectively implementing 1:1 iPads within reading instruction impacts student achievement regardless of SES (Harper & Milman, 2016). Teachers must add 1:1 iPad devices to their instruction to promote student engagement and motivation. Implementing 1:1 devices in the classroom involves more than handing students a device and

having them work independently. Teachers must model the objectives, standards, and concepts in which students must achieve proficiency in the subject matter. Teachers have to utilize a variety of instructional approaches to assist the different learning styles of students. The iPad devices provide additional support by providing lessons and activities that can be completed on the student's individualized learning levels (Harper & Milman, 2016). The devices will provide meaningful opportunities for practice at their level to promote proficiency in literacy skills. The iPads and applications will allow students to make valuable mistakes and provide the opportunity to correct those mistakes based on the automatic feedback provided (Goos, 2020).

The iPad device can be used in a variety of ways that will assist in decreasing the achievement gap for all students. Studies conclude that a significant contribution to children not achieving proficiency in reading is that children spend less time reading in and out of school (Allington & McGill-Franzen, 2021). One factor that may have contributed to this is that in low SES areas, students may not have access to children's books (Allington & McGill-Franzen, 2021). The integration of 1:1 iPad devices could combat the need for students to have access to physical books; 1:1 iPads allow students to access e-books online to read through digital databases (Wall, 2017). The E-books give students the power to choose the books they are interested in reading. E-books will promote the desire to read for enjoyment. In addition, the teacher can upload different reading materials to engage students (Goos, 2020). The devices are equipped with features that will assist all students in increasing their reading proficiency. For example, the students can access picture books for beginning readers to tell a story through pictures, activate the read-aloud feature for vocabulary development, change the size of the text, and listen in different languages if applicable (Wall, 2017).

Studies show that students with disabilities benefit from lessons and activities created through iPad integration into the classroom. The iPad devices can provide literacy skills through multi-sensory applications, which impact learning (Goos, 2020). Students with difficulties with communication disorders and autism spectrum disorders, such as speaking and nonverbal, can utilize iPads to assist them in communicating with teachers, parents, and other students (Gilmour et al., 2019). Text-to-speech can allow students to ask questions, convey messages, and interact with the class to promote a positive learning environment (Alqahtani, 2021). Using iPad technology and multi-sensory applications can support children with attention deficit hyperactivity disorder by enhancing literacy skills, helping students stay focused on the content, and allowing them extended time when reading literature (Chambers et al., 2018). Although students with disabilities are still responsible for taking all the end-of-the-year tests, iPad devices can assist in providing students with their accommodations (Chambers et al., 2018). Research concludes that 60% of fourth-grade students without disabilities perform below grade level (Gilmour et al., 2019).

English Language Learners (ELL) can utilize iPad devices to assist with translating books and literacy activities into a different language for students. The translation feature will assist the student with communicating with the teacher or vice versa. Utilizing the language features will allow students to acclimate to the class. In addition, the language applications will create familiarity, allowing students to build their confidence while being introduced to a new language (Allington & McGill-Franzen, 2021).

Supporting literacy programs in the early years assists educators in closing the achievement gap, especially with reading proficiency. One program, Head Start, was developed to allow children 3 and 4 years of age to participate in early learning (Hanushek et al., 2019).

These programs are needed based on the research regarding the disadvantages of students living in low SES areas. Younger children need printed material and tests to raise their levels of achievement. The 1:1 iPad technology will support students in practicing phonological awareness and reading skills (Hagans & Good, 2013).

Educational agencies and mandates are recording the statistics showing the decline in reading proficiency nationwide, especially for our third-grade students. The reading achievement gap is steadily rising, and the data must be analyzed to assist in finding a solution.

The importance of increasing student achievement in reading is based on the statistics that 23% of students below grade level fail to finish high school, compared to 9% of primary-scoring readers and 4% of readers scoring proficient (National Assessment of Educational Progress, 2019). This study examined the third-grade proficiency levels because there is a possibility for students to be retained and not progress to the next grade. The United States's national and state reading scores are steadily plummeting. The research shows that 2 out of 3 children are currently not meeting the standards for reading proficiency set by the National Assessment of Educational Progress (2019). The NAEP reports a drastic decline in reading scores across the United States (Rebarber, 2020). The NAEP accredits the establishment of Common Core standards in the education system (Rebarber, 2020). The decline is significant among the students already categorized in the at-risk category (Rebarber, 2020). This information guides the students detailed in the reading sub-categories of this study. The decline in the national reading average provides a purpose for examining students' reading achievement, especially those in the third grade.

The national average in reading is not detailed by third grade but rather by the fourth-grade proficiency levels. The reading proficiency level for fourth grade nationally is 34.5%

(National Assessment of Educational Progress, 2019). The 2018-2019 third-grade proficiency levels in NC are currently at 56.8%, a decline from the previous two years of 58% (NC Department of Public Instruction, 2019). Third grade also marks the first year of high-stakes testing for students in reading. Students can be retained in the third grade based on their reading levels. The students can have a second chance on the assessment by participating in the reading camp at the close of the school year (NC Department of Public Instruction, 2019). Students can proceed to the fourth grade in NC depending on the reasonable cause exemptions. Students are offered the opportunity to complete an alternative assessment approved by the state board of education, Scholastic Reading Inventory, STAR Reading, Northwest Evaluation System (NWEA) Measures of Academic Progress, and Iowa Test of Basic Skills (NC Department of Public Instruction, 2019). The students will also complete reading portfolios throughout the school year by completing a reading passage and comprehension assessment each week after instruction (NC Department of Public Instruction, 2019). The students have exceptional circumstances depending upon the demographics of the students represented in the schools (NC Department of Public Instruction, 2019). Students identified with limited English proficiency with less than two years of instruction in the English Language Learners (ELL) (NC Department of Public Instruction, 2018). Students with disabilities with an Individual Education Plan (IEP) will take the NCEXTEND alternative assessment. North Carolina has also set exemptions for retaining students who receive reading interventions and have been previously included in kindergarten-third grades (NC Department of Public Instruction, 2019)

21st Century Learning

The construct of 21st-century learning is the foundational framework of the curriculum, assessments, instruction, and professional development to bring K12 students into a global

society (Kereluik et al., 2013). In 21st-century learning, there is agreement within the research that the four Cs encompass the significance and meaning within schools, organizations, and partnerships. The four Cs consist of collaboration, communication, creative problem-solving, and critical thinking to understand better the presented knowledge (Kereluik et al., 2013; Varier et al., 2017). When promoting 21st-century learning, a shift has to occur within the classroom by allowing teachers to become facilitators while activating a more prevalent role in adding technology to instruction (Seward & Nguyen, 2019). Teachers must also encourage students to play a more direct role in their learning. Traditional education explains that students sit and listen to a teacher provide instruction through lectures, typically with a textbook or other handouts (Kassinger, 2019). Students are surrounded by all the technological devices and advantages to enhance instruction. Studies have demonstrated that 1:1 iPad devices effectively improve student achievement, motivation, and engagement when integrated into the curriculum (Varier et al., 2017).

The 21st-century framework consists of three foundational subcategories to guide students within the learning process: core content, digital literacy, and cross-disciplinary. The 21st-century subcategories represent the knowledge to become 21st-century learners (Kereluik et al., 2013). The core content knowledge denotes the natural way to reason and solve problems based on applied learning. Educators can use technology in classroom practices to support students' critical thinking, problem-solving, and communication skills (Saavedra & Opfer, 2012). Educators must provide a student-centered environment for students to connect through active playing, collaboration, and exploration by integrating technology within planned activities (Varier et al., 2017). The factors in the student-centered climate will support the constructivism

theories of allowing students to become active participants in their learning and the knowledge gained.

Integrating 1:1 iPad technology into the classroom promotes an extension of learning within the regular classroom while bringing a global experience into the classroom (Varier et al., 2017). Technology plays a vital role in differentiating instruction for teachers and students. Teachers can utilize technology applications that will allow students to complete self-directed tasks while collecting the data to identify their strengths and weaknesses to help them learn the material. Utilizing technological applications, teachers can assign tasks that meet students' individual needs, whether students are represented in exceptional groups such as special education, ELL, gifted, or multiple ethnicities (Kassinger, 2019).

Studies have found that 1:1 iPad devices improve student achievement, motivation, and engagement when integrated successfully (Varier et al., 2017). Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, as informed by the learning sciences (Hamilton, 2018). Students can build skills using the technology tools available to help them create and solve problems (Miller, 2017).
The benefits allow iPads to integrate technology into their learning and create opportunities to demonstrate proficiency in the competency areas. Students build networks and customize their learning environments to support the learning process (Hamilton, 2018). Students will be able to receive immediate feedback electronically by completing computerized assessments. These assessments will assist students in creating the appropriate indicators (Kassinger, 2019).

Students can build skills by using various technology tools to help them create and solve problems. Using technological devices, students can use digital research more quickly with unlimited access than searching without technology (Hamilton, 2018). Technology for the

computational thinker is unnecessary, although it will take longer, and students may become frustrated without digital tools. Using digital learning tools gives students better visuals and helps their minds think and reason in coming up with a solution (Hamilton, 2018). Using digital tools will allow students to access information around the world. Also, students can talk to and make friends globally (Hamilton, 2018). Students can learn more about the different cultures and issues of countries firsthand. They can see cities and countries digitally that they will never visit. Students learn more about local and global issues due to digital technology (Hamilton, 2018). Talking and collaborating with different cultures worldwide also helps students learn teamwork. Television and websites show happenings worldwide, especially over the events and how people are united to solve racial and non-racial issues (hunger, women's rights, pandemic). Zoom and Google Classroom represent ways digital tools help students appear face-to-face with someone in New Zealand, China, France, or anywhere else. Teachers can also have a network of supporters within reach of technology (Hamilton, 2018). Videos, text, and pictures are part of creative communication. The teacher uses creative communicators to allow students to express themselves. Some students cannot express their feelings, so using innovative communication tools helps them communicate. According to the reading, communication projects may be the backbone of educational technology utilization. Students will express their feelings adequately with simulations, models, and visualizations. This technology method can help students form ideas by pulling them on their screens. For students with disabilities, this is a must for use in the classroom.

Digital literacy is a must when advancing the technology skills of the 21st-century learner. Digital literacy is students' ability to use 1:1 iPads or other technological devices to process information (Milman et al., 2014). Students from the last two decades are growing in the

technology age. They need additional preparation to acquire basic technological skills to keep up with competing in a global society (Varier et al., 2017). Digital literacy is students' ability to use 1:1 iPads or other technological devices to process information (Milman et al., 2014). Technological devices have emerged in our everyday lives, and education differs from the implication of technological advances changing daily (Kassinger, 2019). Schools in the United States actively participate in preparation for the workforce (Milman et al., 2014). The component of digital literacy supports standards to embrace global competencies to effectively promote the shift in education (Milman et al., 2014). Technological devices in the classroom allow educators to create an environment that ensures the curriculum is relevant to students' lives. Students will develop a deeper understanding of the context by connecting positively with students about the curriculum. The researchers conveyed that teachers use other technological devices for student learning, such as iPads, allowing students to reach higher-order thinking skills (Crompton et al., 2022).

Students from the last two decades are growing up in the technology age they need. This advancement places the responsibility on districts and teachers to provide instruction that includes technological devices, applications, and software (Kassinger, 2019). Using technology correctly for research using digital literacy skills gives students the necessary tools and knowledge for all life situations (Hamilton, 2018). Students are provided guidelines on the privacy rights of others, dangers, and precautions needed when utilizing technological devices at school or home. Teachers must also teach students due to distractions when researching the computer (Hamilton, 2018).

Technology and 1:1 Integration

The Elementary and Secondary Education Act (2001) mandates integrating technology into the classroom for increased student achievement in grades K-12 for all subjects, especially reading instruction (U.S. Department of Education, 2002 or 2015). The legislature's goals were to improve student achievement as measured by the state's standardized testing. The second goal was to promote technologically literate students for society (Davies & West, 2014).

To comply with the mandate, integrating technology in the classroom became essential. The integration of technology and 1:1 iPad devices in the school is similar, but there is an extreme difference. Technology integration allows and supports teachers in utilizing technological tools to deliver instruction. Although this provides technology for the classroom, it will not satisfy the requirements for integrating mobile devices.

Holen et al. (2017) discuss the importance of integrating technology by the U.S. standards within schools to promote confidence, security, and advancing economics. The most significant goal of implementing technology within the classroom is to resolve the inequality of students who do not have access to the internet, technological tools, or devices. The accessibility difference occurs more often in low socioeconomic areas, a significant challenge to fulfilling the technological needs to promote 21st-century learning (Holen et al., 2017). The path to technology integration is a cohesive partnership between schools, educators, and students (Hamilton, 2018). Schools are effectively working to implement technology in the classrooms. One component for effective implementation is building up educators' understanding of utilizing technology as an instructional method. Educators must understand that digital tools provide the opportunity to enhance instruction for student learning activities (Davies & West, 2014).

The application is applied to solve the problem presented with teaching and learning. Educational technology utilizes curriculum and instructional planning to combat specific issues (Earle, 2002; Miller, 2017). Technology integration also emphasizes access to new and developing digital learning technologies (Crompton, 2018; U.S. Department of Education, Office of Educational Technology, 2017). Studies show that effectively incorporating technology has demonstrated increased motivation and engagement, which provides the opportunity for students to enjoy the lessons or activities that they are completing (Retalis et al., 2018)

Integrating technology in the classroom answers the calls to increase student achievement; schools are increasingly implementing 1:1 programs. Various technological devices are utilized during the 1:1 initiative, such as laptops, mobile devices, and tablets (Cohen, 2012). This study will focus on integrating 1:1 iPad devices in the classroom. The initial introduction of the iPad began in 2010 (Fenton, 2017). The iPad is a technological device containing an interface equivalent to the iPod and iPhones previously released by Apple, Inc. (Murray & Ocelese, 2011). An iPad is a tablet with matching capabilities to a laptop or desktop computer. The iPad is smaller in size; therefore, iPad portability is ideal for students in the K-12 environment. The iPad devices offer a more cost-effective tool to integrate with advanced flexibility and capabilities than the older generation of desk and laptop computers (Varier et al., 2017). They also provide a higher level of mobility, which allows students to create various spaces within the classroom while efficiently providing the opportunity to transport the devices between home and school (Varier et al., 2017).

The common purpose of using 1:1 iPads is to create opportunities for teachers and students to engage with technology and devices for instructional purposes to increase student achievement (Fenton, 2017). Schools must be willing to accept the changes accompanying

integrating the 1:1 iPad devices in the classroom. This integration will allow schools to make significant changes supporting a new direction, impacting student learning (Retalis et al., 2018). The purpose of supporting integration within schools is to engage students by offering them a plethora of learning experiences to deepen their understanding of their subject matter (Retalis et al., 2018). Schools are experiencing growing pains in transitioning from computer labs and technology instruction in isolation to organizing learning environments that are fully digitalized with 1:1 iPad devices and technological tools for teachers and students (Holen et al., 2017).

In the classroom, iPads have become a powerful learning tool in which teachers and students collaborate within the learning environment (Pittman & Gaines, 2015). Research reiterates the positive impact 1:1 iPads have on increasing student achievements (Pittman & Gaines, 2015). Students can participate in student-centered learning groups to manipulate the concepts. Utilizing the iPad allows students to interact with various applications that serve as software and programs to address a specific subject matter (Fenton, 2017). The technological applications, software, and programs allow students to receive personalized lessons based on their individualized levels of learning (Aitken, 2017). The applications are available with the capabilities for explorations of manipulations in their decisions to gain extensive knowledge of a topic for a more in-depth understanding of the classroom environment (Corey, 2019). Digital learning will allow students to complete the assignments in a self-directed manner, have the chance to complete computerized tasks, and reevaluate their work based on feedback (Stone, 2017).

Crompton et al. (2022) discussed in their research how the 1:1 iPad devices assist students with their learning based on their levels of engagement. Crompton et al. (2022) utilized Bloom's Taxonomy Framework of six updated cognitive processes: remember, understand,

apply, analyze, evaluate, and create to describe the activities and tasks that students could complete to increase their level of achievement. Educators must come to terms with introducing and utilizing digital tools in the classroom, taking more time for instruction than lectures, and completing worksheets and discussions (Hamilton, 2018). However, digital tools promote increased student engagement and an in-depth learning method. Educators may find tremendous success by starting with smaller groups of students with simple innovation strategies, allowing teachers to experience trials and errors at their own rate (Hamilton, 2018). The educators and students can work together to overcome their anxieties and comfort levels while experiencing the implementation of technology in the classroom (Davies & West, 2014). Utilizing Bloom's Taxonomy and 1:1 iPad devices allows students to create tasks and activities that promote creativity, critical thinking, and problem-solving skills (Retalis et al., 2018). Technology integration will encourage students to engage more with lessons because they can actively interact with lessons and all related activities. Using 1:1 iPads in the classroom enables students to demonstrate graphics, interactive charts, and other apps to complete the areas within Bloom's cognitive process framework (Felvegi & Matthew, 2012). The integration of high-quality instruction daily will promote an increase in student achievement because of an increase in engagement (Fenton, 2017). Crompton et al. (2022) research concluded that elementary students in the study were engaged in the learning activities based on Bloom's Framework describing the six cognitive processes: remembering 11.3%, understanding 29.6%, applying 15.5%, analyzing 8.5%, evaluating 4.2%, and creating 33.3% of the time (Crompton et al., 2022). The researcher's study analysis revealed that 40% of students still work in the lower levels of Bloom's taxonomy under remembering and understanding (Crompton et al., 2022). The results for the students still working in the remembering and understanding realms represent the challenges of residing in

low socioeconomic areas, having teachers that have not received the appropriate professional development, or belonging to another disadvantaged group (Powers et al., 2020).

Another challenge that affects the impact of utilizing 1:1 iPads is educators receiving the appropriate professional development. Studies show that with the integration of 1:1 iPad devices, educators are voicing the support needed to become effective. This support includes additional professional developments incorporating technological devices, tools, and applications within instructional delivery, tasks, and activities (Fenton, 2017). In addition, educators must acquire the appropriate skills for the positive usage of applications during teacher-created lessons (Fenton, 2017).

Educators have reported needing more prep time to complete their lessons and collaborating with colleagues while ensuring effective technological practices are integrated into lessons (Fenton, 2017). Varier et al. (2017) conclude that positive classroom environments are jeopardized unless educators provide professional development to meet their needs. Professional development can change the readiness and beliefs of educators based on the support received (Holen et al., 2017). Educators without the appropriate can quickly become overwhelmed, unprepared, and out of their comfort zones, especially veteran teachers who are not as familiar with technology (Fenton, 2017). Educators are also demonstrating concerns regarding insufficient technological support to assist with troubleshooting and having availability to answer questions to make teachers technologically savvy to promote a higher level of learning (Fenton, 2017; Holen et al., 2017).

Digital Divide

Schools have obstacles and challenges when integrating technology into the education environment to enhance instruction. The digital divide provides numerous challenges in

integrating 1:1 iPad devices within the schools to promote a positive experience while increasing student achievement. School leaders must understand the need for students to acquire the skills for using digital tools online in a socially positive environment; this includes ensuring students use their technological devices safely, ethically, and legally (Crompton, 2018; U.S. Department of Education, Office of Technology Education, 2017). Studies show that the digital divide is complex because the challenges are consistent with geographic locations, ethnicities, and socioeconomic status (SES).

The digital divide comprises more than the ability to purchase devices for use in classrooms. Schools must have adequate access to equip classrooms with the appropriate technological tools, including devices, bandwidth, and internet connectivity (Dolan, 2016; Hohlfeld et al., 2017). When examining the geographical locations, there is a noticed pattern in rural areas. Rural communities are typically located in isolated areas. They have limited access to technology and the internet, offering more complex solutions to fix the problems in the districts (Powers et al., 2020). The limited access to internet connectivity offers a significant drawback to the utilization of 1:1 iPad instruction in these areas at school and home (Dolan, 2016). The current statistics show that 85% of suburban and urban locations have the appropriate access to technological tools and internet within the school, compared to 75% of rural locations having the same access (Pew Research Center, 2013). Rural communities have the burden of replacing aging technology because of the frequent technological upgrades while trying to provide enough devices, software, and other technological tools to impact instructional practices. Rural communities also have the challenges of providing teachers with professional development to train on the usage of utilizing the 1:1 iPads to provide engaging lessons to promote student achievement, positive attitudes, and increased knowledge from teachers regarding the integration

of 1:1 iPad technology into the classroom (Powers et al., 2020). In supporting teachers' knowledge, technology integration will positively impact students in the classroom environment. The research confirms teachers' comfort with technology and determines the number of lessons and technological practices utilized in the classroom. Teachers already know about the pedagogy; however, the challenge may be integrating technology into the curriculum (Hew & Brush, 2007). Schools have to ensure that educators have support throughout the process.

Ethnicities play a significant role in determining who benefits from technology in the home. Studies show that households with African American and Hispanic families present a disadvantage with the ownership of technological devices within the home compared to Caucasian families (Dolan, 2016). Currently, the Asian American community represents the highest percentage of technology usage at home, at 85% (Dolan, 2016). The level of education is another indicator of the availability of technological tools in the home. The lowest amount of technological usage occurred when the head of the household did not graduate from high school or only had a high school diploma (Powers et al., 2020). Income is another factor when making the comparison between different groups. The National Telecommunications and Information Administration reported that 49 % of households with an average salary below $25,000 a year have technology available for use in the home, compared to 96% for households with an income range over $100,000 a year.

The digital divide has many challenges, but one of the most significant is the socioeconomic status of students attending a particular school. The research suggests that in 2020, 86% of classrooms had technology readily available with the appropriate support; however, these statistics changed with the onset of the Coronavirus pandemic (Powers et al., 2020). As a result, schools vamped up their technology to meet the needs of their students. In

2021, the statistics for technology readily available increased to 94% (U.S. Department of Education, National Center for Education Statistics, 2021). There is a significant difference in schools based on students' socioeconomics. The schools classified as low socioeconomics have more challenges than other schools. The NCES reports the ratio of computers to students in the classroom based on their socioeconomic status. On average, it is 1:5.3; for students with a low SES, it is 1:5.9, and it is 1:4.7 for schools with a higher SES. In this study, two schools entirely emerged in the 1:1 iPad integration (U.S. Department of Education, National Center for Education Statistics, 2021).

The other schools may concur with the average SES, even though they are all classified as low socioeconomic. Research demonstrates that integrating technology into lower socioeconomic schools shows a difference in the instruction students receive based on their SES. The utilization of technological tools by teachers influences the impact of the skills that students are obtaining; however, students are not utilizing the technology to their full potential (Dolan, 2016). One reason is that teachers from low SES schools are not receiving the appropriate training or professional development on technological tools, and the lack of software availability impacts student learning. (Dolan, 2016; McLoone et al., 2015). Teachers' knowledge and skills significantly impact the decisions made within the classroom. The teachers' knowledge will determine whether or not these decisions have a positive or negative impact on the students. The basis of the differences in the schools based on SES is how students are instructed in the low SES schools and those attending schools with higher SES. Software programs in lower SES schools are consistently used for drills, practice, and free time.

In contrast, schools in higher SES use their software programs to provide lessons that will stimulate their high-order thinking. This results in various experiences, such as virtual

experiences, problem-solving software, or activities that provide opportunities to create projects, presentations, and other thought-provoking activities to promote student learning (Brawner & Allen, 2006; Hohlfeld et al., 2017). Therefore, teachers must create and implement innovative and creative ways to explore and expand the usage of various digital tools within the classroom (Crompton, 2018).

Hohlfeld et al. (2017) discuss three levels that dictate the successful integration of technology. In this theory, Level one examines the school's infrastructure that details the access to the hardware, software, internet connectivity, and technicians that can support troubleshooting. The technology is not guaranteed to operate smoothly, hence the need for technical support. Teachers, staff, and students must have reliable support for technological devices to troubleshoot any challenges or issues occurring, as time is of the essence (Hew & Brush, 2007). The focus of level one is to ensure that students and teachers are provided with the most recent hardware and software to achieve the next level of design to create an even playing field for all students.

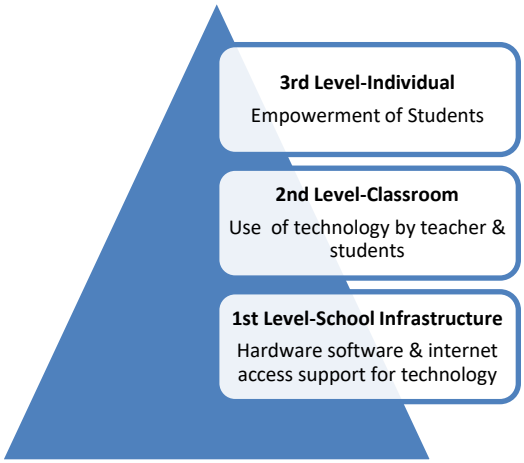
As one progresses through the theory, level two encompasses the classroom and integrating the 1:1 iPad devices, technological tools, and practices utilizing various devices and hardware in the classroom, such as computer-based assessments and adaptive software to support special needs students (Hohlfeld et al., 2017). Teachers can incorporate technological tools beyond the 1:1 devices into the classroom. The dynamics of the 21st-century classroom have changed in the last decade, and it is now equipped with electronic whiteboards, projects, and document cameras to deliver instruction. Students are being introduced to technology applications and classroom response systems or clickers that enable students to use electronic keypads to answer questions in multiple formats. However, challenges can present themselves

with the response systems because they lack flexibility by not allowing students to respond to problem-solving questions without critical thinking (McLoone et al., 2015). This level is instrumental in assisting students with acquiring digital tool skills as it applies them to their learning. Educators must guarantee that the students' diverse learning, cultural, and socio-emotional needs in their school building are met while implementing standards for students and teachers (Crompton, 2018).

In Level three, the goal is to achieve success by ensuring that students are empowered by receiving quality instruction through integrated technology within the classroom (Hohlfeld et al., 2017). Leaders must collaborate with their faculty, community partnerships, students, parents, and other key stakeholders to ensure the strategic plans and visions developed by the school improvement team are the driving force behind the decision-making occurring for the advancement of learning goals and objections (Crompton, 2018; Office of Educational Technology, 2017). The students are charged with acquiring the knowledge to demonstrate mastery in digital learning. At this level, we can intertwine the ideas Bruner and the other collaborating philosophers presented regarding instruction. Teachers must ensure that technology and technology devices are included in all student assignments and instruction (Carver, 2016). The students' technological savviness can be attributed to the 21st-century mastery of technology (Retalis et al., 2018).

Figure 4

Levels of the Digital Divide in Schools



Summary

Chapter 2 examined the history and transformation of constructivism theory based on the contributions of Jerome Bruner. In recognizing and highlighting the works of Bruner, the study presented Piaget, Vygotsky, and Dewey as collaborators to ensure a deeper understanding of the different philosophies and theories that were included to compare their thoughts with the implementation of 1:1 iPads in the classroom. Chapter 2 highlighted Bruner and Piaget and their ideas discussed in discovery learning to ensure that learners can develop their knowledge levels. Bruner agreed with Vygotsky regarding scaffolding and ensuring the appropriate support for their learning. The ideas of Bruner and Dewey's theory of instruction presented an understanding of how to assist students in developing their line of thinking to support learning. The related literature section in the study highlights additional readings that will describe factors that impact the implementation of 1:1 iPads in the classroom. Reading achievement is the basis of the research. First, however, the section will explain the current state of third-grade students in reading instruction and how the integration of 1:1 iPads will impact instruction. This section explains 21st-century learning and the expectations for students and teachers by describing how

technology is a significant component in becoming a 21st-century learner through integrating technological devices in the classroom.

CHAPTER THREE: METHODS

Overview

The purpose of the study was to explore the effects of 1:1 iPad technology on student performance based on third-grade students in a technologically enhanced classroom setting. The methodology chapter supported a quantitative, causal-comparative research design and warrant analysis of covariance (ANCOVA) as the appropriate data analysis method. The chapter described the variables, participants, setting, instruments, and study procedures. This section defined the utilization of methods to compile and analyze the data.

Design

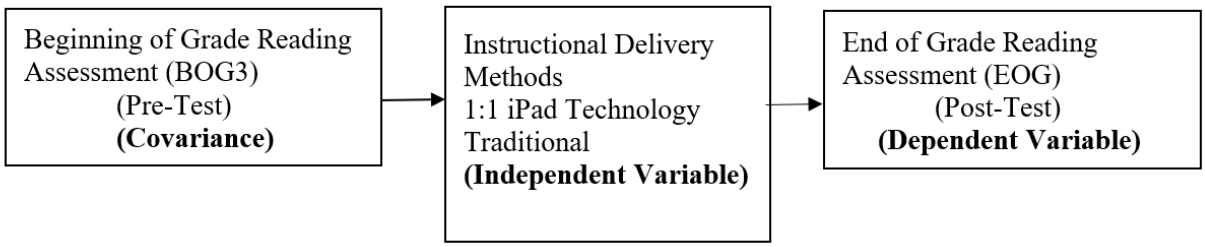
A non-experimental, causal-comparative research design explored the differences between end-of-grade (EOG) test scores from third-grade students who used iPad technology and those who did not (Rovai et al., 2013). According to Gall et al. (2007), the rationale behind utilizing the causal-comparative research method is that two or more groups are predefined and not developed. Moreover, the analyzed data has already occurred, thus causal-comparative research's ex post facto nature (Miller, 2017). The causal-comparative design does not show a cause-and-effect relationship but alludes to it (Gall et al., 2007). Brown (2021) concluded that utilizing the causal-comparative design is significant when analyzing archival data, mainly because the independent variable cannot be manipulated. The independent variable was the instructional delivery method used for third-grade students. The independent variable consisted of two levels demonstrated by the instructional practices of iPad 1:1 technology or traditional classroom teaching. The 1:1 iPad instruction equips classrooms and schools with initiatives to provide technology to all students (Retalis et al., 2018). Furthermore, the dependent variable was the Reading EOG test scores, a measure used by North Carolina to evaluate student performance

on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study (NCSCOS) (NC Department of Public Instruction, 2018).

This research identified the covariate as a pre-test (BOG3) and established a baseline for where students start (Siew & Ambo, 2020). The BOG3 is a measure used by North Carolina to evaluate student performance on the goals, objectives, and grade-level competencies specified in the NCSCOS (NC Department of Public Instruction, 2019). The covariate's purpose allowed for examining two groups utilizing the pre-test and post-test design while controlling for the individual's prior achievement. The covariate enabled the researcher to explore the two groups' growth by statistically removing the influence of individual differences based on each student's starting points. In addition, the covariate accounted for the differences among the groups based on the pre-test. Finally, the causal-comparative research design supports examining the differences between the groups in the study depending on technology utilization (Gall et al., 2007; Rovai et al., 2013).

Figure 5

Variable Relationships for the Research Model



Research Question

RQ1: Is there a difference in the End-of-Grade testing performance between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology while controlling for prior achievement?

Hypothesis

The null hypothesis for this study is:

$H_0$1: There is no significant difference in End-of-Grade reading achievement between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology during reading instruction, controlling for prior achievement.

Participants and Setting

The participants for the study came from a convenience sample of 293 third-grade elementary students located in Central Piedmont, NC, during the 2018-2019 school year. The schools in the study represented two different neighboring school districts. The first district consists of schools two elementary, and the second district consisted of data from three schools. All five schools in the study were classified as low socio-economic settings.

Population

The North Carolina report card data showed that the study's populations are demographically and geographically similar (NCDPI, 2019). The study consisted of a sample extracted from the archival dataset of four different datasets of 293 third-grade students from five elementary schools in Central Piedmont, North Carolina. The schools involved in the study are classified as Title I because 100% of the students in all the schools receive free breakfast and lunch. The meals are provided through an initiative by the U.S. Department of Education to bridge the gap between low-income students and others (U.S. Department of Education, 2002).

The schools were allocated additional funds because of the Title I classification. The iPad classrooms are in the same district, in which significant funds were allocated to advance technological resources available in all classrooms. The fund allotment allowed this district to provide all students except pre-kindergarten with an iPad. The third-grade students can take the

iPads off the school campus for usage in settings other than school. The non-iPad classrooms were comparable in size to schools in the iPad classrooms; however, the school district does not allocate any funding for implementing or purchasing 1:1 technological devices for the whole district. The schools had accessed technological resources such as interactive whiteboards, document cameras, and response clickers to promote technological advancements in the classroom; however, iPads are unavailable. The classes represented a diverse population based on gender, race, and ethnicity. The researcher determined the technology usage by the number and percentage of students in each school. The researcher acquired the school environment's demographics based on the 2018-2019 testing data. The researcher utilized convenience sampling because of its simplicity in collecting data and matching the study's objectives (Gall et al., 2007; Smith, 2018). Students' comparison groups occurred naturally based on enrollment in schools that utilize 1:1 iPad technology and those that do not.

Participants

The samples in this study were extracted from the archival data from five different datasets. The number of participants sampled equaled 293, exceeded the required minimum when assuming a medium effect size for this study. According to Gall et al. (2007), 65 is the required minimum for a one-way ANCOVA with two groups when assuming a medium effect size with a statistical power of .7 at the .05 alpha level. The sample came from five different elementary schools within two school districts located in Central Piedmont, North Carolina. The two school districts supplied the case data by following the researcher's directions. For the study, the researcher identified the schools as iPad and non-iPad classrooms. The schools are located approximately 30 miles from each other in different counties. The case data for students were grouped depending on the school they attended. The students attending the iPad classrooms

received instruction utilizing the 1:1 iPad. All the students had access to personal iPads issued by the school district for daily usage. The cases for the student data compiled from the non-iPad classrooms do not have access to 1:1 iPad technology daily or their own technological devices in the classroom. The integration of 1:1 iPads or other devices had not occurred. Next, the researcher extracted the demographic information for the 293 third-grade students. The demographic information included a gender sample of 146 females and 147 males from third-grade literacy instruction. Gender will be represented by a breakdown of 61 females and 62 males from the iPad classroom. There were also 85 females and 85 males from the non-iPad classrooms. The researcher requested the student's ethnicity and racial classifications be included in the data collected, along with the tests from both the BOG3 and EOG tests.

Setting

The schools identified in the study represented the elementary (K-6) setting. The researcher instructed the district testing administrator to randomly chose student cases from each school, extracting 2018-2019 BOG3 and EOG scores. The samples represented the population of third-grade students from each school. The researcher gave explicit instructions for extracting the cases to ensure no interference from the categorical and demographic characteristics such as their race, and gender of the students for data analysis. Cases represented an uneven division, with 123 data cases from students utilizing 1:1 iPads and 170 data cases with students not using 1:1 iPad technology as an instruction method. The researcher chose third grade because it is the starting point for standardized testing mandated by state and federal education departments. The researcher examined the data to ensure all students have test scores for BOG3 and the EOG. The cases with missing variables, either the criterion or covariate variables, were deleted from the researcher's dataset and were utilized in the study.

Instrumentation

This study utilized archival data from the third-grade BOG3 and EOG test scores. The BOG3 and EOG standardized assessments tested the students and provided beginning and end-of-year test scores. The purpose of the assessments was to measure student proficiency in reading during the school year.

North Carolina Ready BOG3 and EOG English Language Arts/ Reading Test

The North Carolina Ready BOG3, English Language Arts/Reading Test, was administered during the beginning of the year testing window, starting on the 11th day and continuing until the 15th day of school (NC Department of Public Instruction, 2019). The purpose of the BOG3 instruments for the assessment was to establish a beginning baseline for third-grade students in reading. The assessment served as a growth tool for teachers to determine the ones most suited to teach reading remediation and summer institutes to improve reading achievement (NC Department of Public Instruction, 2019). The BOG3 item development began in 2011-2012, and the first BOG3 assessment was administered during the 2013-2014 school year (NC Department of Public Instruction, 2019).

The NC End of Grade Test was administered during the last ten days of the school year. The students were allotted 180 minutes to complete the test on the designated day (NC Department of Public Instruction, 2019). The EOG assessment aimed to measure the student's performance on grade-level competencies demonstrated by goals and objectives displayed in the NC Standard Course of Study (NCSCOS) (NC Department of Public Instruction, 2019). EOGs began in NC with the assessments mandated by the No Child Left Behind Act. In 2017, the state adopted new NCSCOS objectives; therefore, the assessments were revamped to demonstrate the new curriculum for English language arts (NC Department of Public Instruction, 2018). In 2017-

2018, further test questions were created to compensate for the latest standards and objectives (NC Department of Public Instruction, 2018). In the 2018-2019 school year, the test was administered for the first time with embedded field questions (NC Department of Public Instruction, 2019). Numerous studies used the instruments (e.g., Kaniuka, 2017; Kim et al., 2016; Smith et al., 2020).

The researcher examined the assessment test data to document the validity of the scores assigned to the proficiency levels (NC Department of Public Instruction, 2018). The recorded testing data identified the concepts and formats representing the questions presented within the test development. The North Carolina Department of Instruction identified four areas to measure the validity of the English Language Arts EOG and the NC Ready BOG3 assessments taken during the third-grade year. The content validity area measures the test's content to align with the North Carolina Standard Course of study. In the creation of the assessment phase, state officials allowed third-grade teachers to examine test samples and verify the standards' correct representation. The BOG3 consisted of 40 multiple-choice questions utilizing the NC Standard Course of Study (NCSCOS). The strands and the percentage of their occurrence are as follows: reading for literature represents 32 -37%, reading for informational text 41–47%, and language 20-24% creates 100% of the test. The other strands in the curriculum, such as reading foundation skills, writing, speaking, and listening, are not utilized for testing purposes (NC Department of Public Instruction, 2019). The EOG assessment for English Language Arts (ELA) consisted of 50 multiple-choice questions that assessed the strands of reading for literature 38-42%, reading for informational text 46-50%, and language 13-15% to fulfill the requirements of the assessment (NC Department of Public Instruction, 2019).

The BOG3 was created as a parallel to the EOG to assist in school and teacher accountability to ensure student growth during the third-grade year of a student's academic journey (North Carolina Department of Public Instruction, 2019). The BOG3 and the EOG both contain the exact test specifications for measuring reading growth between tests (North Carolina Department of Public Instruction, 2019). The study utilized the cases which are represented by the following scale score testing data for both of the ELA reading assessments: levels I and II (< 431 Not Proficient), Level III (439-441), Level IV (442-451), and Level V (> 452) (NC Department of Public Instruction, 2019). The test re-test reliability discussed the EOG assessment at the end of the school year to determine their third-grade proficiency. Students scoring Level I or II are not proficient and must re-take the assessment after intensive intervention sessions. The re-take testing conditions mirror the format of the first testing day (NC Department of Public Instruction, 2019). The assessments were standardized tests that fulfilled testing mandates for both the state and federal education departments. The assessments in reading were given to all third-grade students, starting at the beginning of the third-grade year. The BOG3 was administered during the first 15 days of the school year, while the EOG was taken in the last days (NC Department of Public Instruction, 2019). The BOG3 test was allotted 90 minutes to complete. However, students could be given an additional 90 minutes for 180 minutes. The EOG test were allotted 120 minutes for students, with a maximum of 180 minutes or 3 hours. This time limit does not include the time needed for students who qualified for accommodations for exceptional needs (NC Department of Public Instruction, 2019).

The evaluation's reliability provided a stable, standardized test for all test takers (NC Department of Public Instruction, 2019). Educators created the content questions, and the BOG3 assessment validity is strengthened by questions provided by the educators (NC Department of

Public Instruction, 2019). The assessments were written to maintain consistency and dependability to promote fairness for all students represented by subcategories (NC Department of Public Instruction, 2018). The results of the assessment categories of the alpha estimates must reach .70 or above to demonstrate whether the BOG3 and EOG assessments are reliable. In examining the reliability of the data points given for the revision in 2017-2018, the ratings are significantly above the appropriate ranges (NC Department of Public Instruction, 2018). The researcher examined the released documents for the EOG assessments to ensure students' educational needs were met by evaluating the reliability and validity of the North Carolina standardized test. In addition, the released documents assisted in measuring the effects of the test on students, teachers, and the educational system to promote accountability (NC Department of Public Instruction, 2019). This research consisted of archival data based on the standardized tests of the 2018-2019 school year; therefore, the researcher did not have to administer or score either assessment. The scoring of the assessments is the responsibility of the testing administrators from each school. The tests are electronically scored immediately after the testing administrators had collected all the testing materials for the day.

Gall et al. (2007) described test reliability as the consistency and stability of a test and students' scores to measure achievement. The test and test scores were distinguished by observing the measurement to ensure measurement error exists. The size of the measurement of errors determined whether the scores acquired for the BOG3 and EOG are reliable. The reliability of the assessments were measured by utilizing the coefficients. The coefficients dictate that .00 demonstrates the absence of reliability, and 1.0 indicates perfection. The North Carolina BOG3 and EOG assessment yielded a score of .90, proving the examination revealed internal consistency, therefore meeting the requirements to demonstrate reliability (NC Department of

Public Instruction, 2019). The NC Department of Public Instruction made the assessments, resources, materials, and information regarding the instrument accessible to the public by providing links on its official website. Therefore, the researcher did not have to seek approval.

Procedures

The researcher chose five elementary schools in two North Carolina school districts. The selected schools demonstrated Title I classification and similarities in population and demographics. The researcher chose the schools that participated in the study based on similar demographics and how instruction was delivered.

The study started with the researcher completing and submitting the application to the Institutional Review Board (IRB). The IRB approval permitted the researcher to begin the school districts' data collection. Next, the researcher contacted the assistant superintendent to discuss the IRB's decision and requested the third-grade BOG3 and EOG scale score test data for the 2018-2019 school year. The schools' request indicated the need for random samples regardless of the teacher assigned to the students. The discussion included setting up face-to-face and written correspondence to discuss the study, permission requests, and data collection after approval from the Institutional Review Board (IRB).

The researcher submitted an application through the IRB at Liberty University and was granted approval (See Appendix A). The appendix consists of the letters and emails from the school district that granted the retrieval and usage of the archived data (See Appendix B). The researcher created a letter to request permission to complete the research in the districts. However, one of the districts had a research request form that needed completing, too (See Appendix C). The NC Department of Education website provides the public with information on

the BOG and EOG. This testing information included samples of the instrument, test specifications, policy legation, and assessment briefs (See Appendix D).

The case datasets included test score information for 123 students from schools that utilized the 1:1 iPad and 170 from the non-iPad classrooms. The first school system in the study was identified as the iPad classrooms, which have access to the 1:1 iPad technology within both schools. The non-iPad classrooms represented the second school system in the study; these schools received instruction through traditional delivery methods. After receiving the archival data, the researcher coded the data to keep the identity of districts, schools, and student's participation in the study confidential. The information coding occurred within a Microsoft Excel document, because it was most compatible with the system the district's used to recorded their documentation. The codes consisted of the following information and identified the study's critical components while ensuring identity protection for the participants. The compiled data received coding based on the following demographic characteristics: gender, race/ethnicity, and the BOG3 and EOG test scores. Table 2 shows how the researcher had the school district test administrators compiled the data from the testing datasets.

Table 2

Representations for Coding Data Sets

Student #	Gender	Race/Ethnicity	BOG3 Raw Score	BOG3 Score Level	EOG Raw Score	EOG Score Level

Data Analysis

Analysis of covariance (ANCOVA) was used to analyze the data collected for this study, which assessed if a difference exists in EOG scores based on technology use while controlling for prior achievement. ANCOVA is the appropriate statistical test to use when controlling for the

possible effects of a pre-test on outcome differences (Field, 2018; Green & Salkind, 2011; Warner, 2013). The researcher completed the data analysis for the study using the IBM SPSS Statistical Analysis Software version 28 for Windows.

Data Screening and Assumptions

The data screening included box and whisker plots for each variable to detect extreme outliers (Field, 2018; Green & Salkind, 2011; Warner, 2013). The researcher completed the data screening by sorting the data and examining the collected scores for inconsistencies and inaccuracies. Assumption testing included examining the assumption of normality to ensure the data collected is appropriate for conducting a statistical test. The researcher conducted a Kolmogorov-Smirnov (KS) because the sample size is greater than > 50 (Green & Salkind, 2011). The assumption of linearity was tested with a series of scatter plots between each group's pre-test and post-test variables. The researcher utilized the same scatterplots created in the assumption of linearity to examine and find the "cigar shape" as classified in the assumption of bivariate normal distribution (Green & Salkind, 2011). The assumption of homogeneity of slopes allowed the researcher to examine the scatterplots to determine whether a significant interaction was present or not (Warner, 2013; Green & Salkind, 2011; Smith, 2018). The assumption of equal variances required utilizing Levene's Test for Equality of Variance of Error Variance to test the null hypothesis across the groups identified as the criterion variables (Green & Salkind, 2011; Warner, 2013).

Data Analysis

The examination of the tests of between-subjects effects determined whether a significant difference is present using the .05 alpha level. A post hoc pairwise comparison (Tukey) indicated which groups were different if there was a statistically significant difference. Finally, partial Eta

Squared measured any group differences' practical significance—or effect size—with Cohen's guidelines for interpretation (0.2 – small effect, 0.5 – moderate effect, 0.8 – large effect) (Cohen, 1988).

CHAPTER FOUR: FINDINGS

Overview

This quantitative, causal-comparative study aimed to determine the difference between third-grade students utilizing 1:1 iPad technology during reading instruction compared to those who did not utilize 1:1 iPad technology. The researcher utilized the North Carolina beginning and end-of-year test scores. The researcher used archival data from the 2018-2019 school year from two Central Piedmont, NC, districts. This chapter includes the research question, null hypothesis, and descriptive statistics and presents a narrative with visual results of the one-way analysis of covariance (ANCOVA).

Research Question

RQ: Is there a difference in the End-of-Grade testing performance between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology while controlling for prior achievement?

Null Hypothesis

H_0: There is no significant difference in End-of-Grade reading achievement between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology during reading instruction while controlling for prior achievement.

Descriptive Statistics

Descriptive statistics provided an overview of the population used for this study. There were two separate groups investigated. The first was a non-iPad classroom, and the second was a classroom that used iPads. As shown in Table 3, 85 female third graders and 85 male third graders were in the non-iPad classroom. There were 61 females and 62 males in the iPad classroom. The students represented six different ethnicities. The data from the non-iPad

classroom included 39% Hispanic, 31% Black, and 20% White. The iPad classroom included 53.66% Hispanic, 13.82% Black, and 28.46% White. The non-iPad classroom included 170 students; meanwhile, the iPad classroom consisted of 123 students.

Table 3

Descriptive Statistics: i-Pad Use

	Non-iPad Classroom		*iPad Classroom*	
	N	%	*n*	%
Gender				
Female	85	50.00	61	49.59
Male	85	50.00	62	50.41
Ethnicity				
Asian	3	2.00	1	0.81
Black	52	31.00	17	13.82
Hispanic	67	39.00	66	53.66
American Indian	0	0.00	1	0.81
Multiracial	14	8.00	3	2.44
White	34	20.00	35	28.46

There were two measures of data for reading achievement. The first was the reading level. The second was the raw reading score. As shown in Table 4, at the beginning of the school year, 66.47% of the third-grade students in the non-iPad classroom were at reading level 1, and 21.76% of the students were at reading level 2. Similar to the non-iPad room, most students started the school year with reading level 1. At the beginning of the school year, 66.67% of the third-grade students in the iPad classroom were at reading level 1. There were 19.51% of the students at reading level 2.

Table 4

Descriptive Statistics: Reading Levels per Classroom

	Beginning of Grade		End of Grade		Reading Level Changes	
Reading Levels	*n*	%	*n*	%	*n*	%
Non-iPad Classroom						
1	*113*	66.47	60	35.29	-53	-31.18
2	37	21.76	46	27.06	9	5.3
3	4	2.35	18	10.59	14	8.24
4	14	8.24	33	19.41	19	11.17
5	2	1.18	13	7.65	11	6.47
iPad Classroom						
1	82	66.67	46	37.40	-36	-29.27
2	24	19.51	29	23.58	5	4.07
3	4	3.25	10	8.13	6	4.88
4	10	8.13	33	26.83	23	18.7
5	3	2.44	55	4.07	52	1.63

When the students in the non-iPad classroom completed their end-of-year testing, the majority of the scores improved overall. Table 4 shows that more students were reading at higher levels at the end of the year than at the beginning. Similarly, in the non-iPad room, when the students in the iPad classroom completed their end-of-year testing, the scores improved overall. However, there were two students from the non-iPad classroom whose reading level decreased from level 2 at the beginning of the year to level 1 at the end of the year. There were 79 students who had a reading level that stayed the same. In total, there were 89 students who had an increase in their reading level. In the iPad classroom, there were also two students whose reading level decreased from level 2 at the beginning of the year to level 1 at the end of the year. There were 63 students who had a reading level that stayed the same. In total, there were 58 students who had an increase in their reading level. The beginning-of-grade reading scores for the non-iPad classrooms ranged from 407 – 462. The average was 428. The end-of-grade reading scores

ranged from 410 – 461. The median was 435. The beginning-of-grade reading scores for the iPad classrooms ranged from 413 – 458. The average was 428. The end-of-grade reading scores ranged from 412 – 461. The median was 435. Table 5 details the raw reading scores for both classrooms.

Table 5

Descriptive Statistics: Raw Reading Scores per Classroom

	Non-iPad Classroom			iPad Classroom		
Raw Reading Scores	*BOG* *n*	*EOG* *N*	*Diff*	*BOG* *n*	*EOG* *n*	*Diff*
400-410	1	1	0	0	0	0
411-420	43	18	-25	30	15	-15
421-430	63	36	-27	48	28	-20
431-440	47	64	17	32	39	7
441-450	14	35	21	10	30	20
451-460	1	15	14	3	10	7
461-470	1	1	0	0	1	1

Results

Data Screening

Data screening began by combining the two datasets collected from the two school districts in the Central Piedmont area of North Carolina. Once combined, dummy variables were assigned to data columns containing alpha characters such as ethnicity and gender. To differentiate between iPad and non-iPad classrooms dummy variables were also assigned. The researchers sorted the data on each variable and scanned for inconsistencies. No data errors or inconsistencies were identified. Once the data was imported from Excel into SPSS, the variable view was updated to change the measure to ordinal for all categorical variables and scale for the beginning-of-year and end-of-year scale scores.

Outliers can be problematic in any dataset. Outliers are unusual values found within the data. Multiple tests were used to identify the outliers in this study, including the box-and-whisker-plots and histograms. Gignac (2016) explained that outlier detection is a topic where different scholars have various preferred methods for analysis. The method used in SPSS, according to Gignac, is based on the interquartile range rule multiplier; however, Hoaglin and Iglewicz (1987) contend that this range rule multiplier of 1.5 is inaccurate. The recommended multiplier is 3 instead of 1.5. Those outliers will appear with an asterisk instead of a small circle.

Box and whiskers plots were produced using the descriptive statistics explore function in SPSS. No extreme outliers were identified for the test score levels; however, outliers were identified at data points 37, 197, 225, and 237 and were denoted with a little circle detailing the identification number of the cases found on the box and whisker plot. As noted above, observing a small circle can be accepted; however, observing an asterisk denotes a true outlier. Furthermore, the researcher converted the data point to a z-score, which fell within +3 and -3 standard deviations of the sample mean (Warner, 2013, p. 153). See Figure 6 for the box and whisker plot of the reading level differences and Figure 7 for the box and whisker plot of the reading score differences.

Figure 6

Box and Whisker Plot for Level Difference

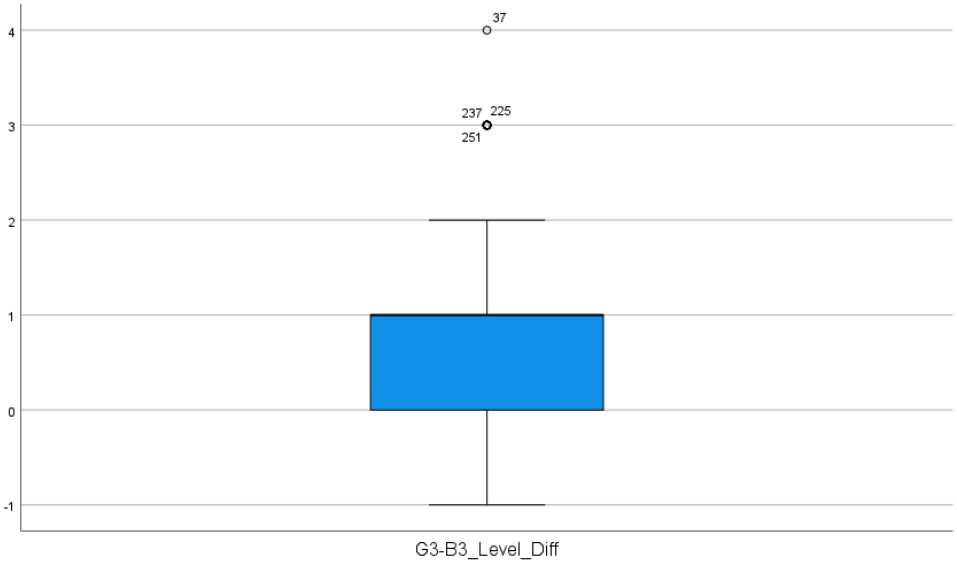
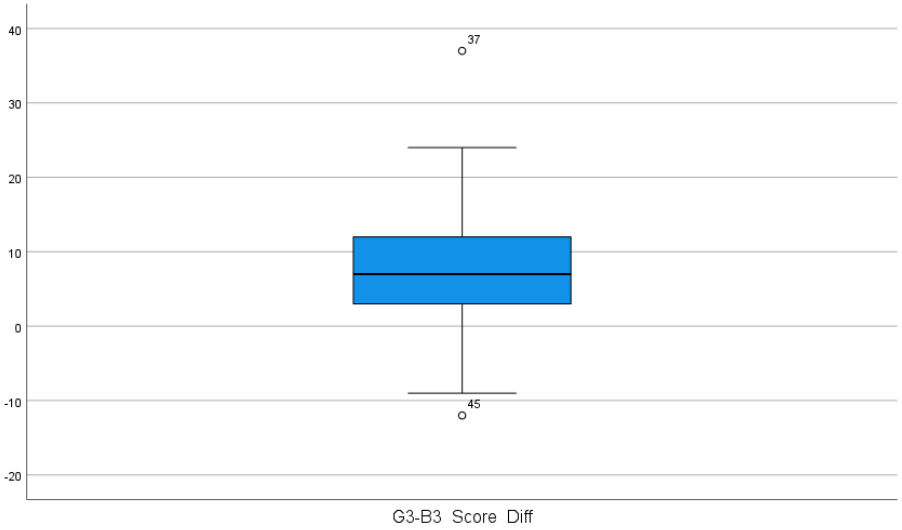


Figure 7

Box and Whisker Plot for Raw Score Difference



Furthermore, a histogram was produced for each dataset using the descriptive statistics frequency function in SPSS. Pallant (2005) notes that histograms will show an outlier when data points sit on their own. When looking at the histograms in Figure 8 and Figure 9, they appear to

be normally distributed and follow the shape of a normal curve. Therefore, there is no concern with outliers at this time.

Figure 8

Histogram for Reading Level Difference

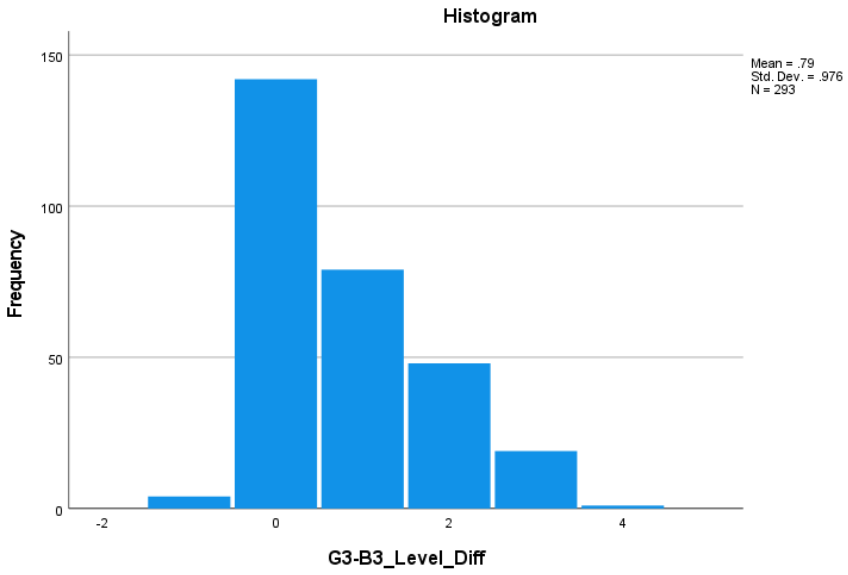
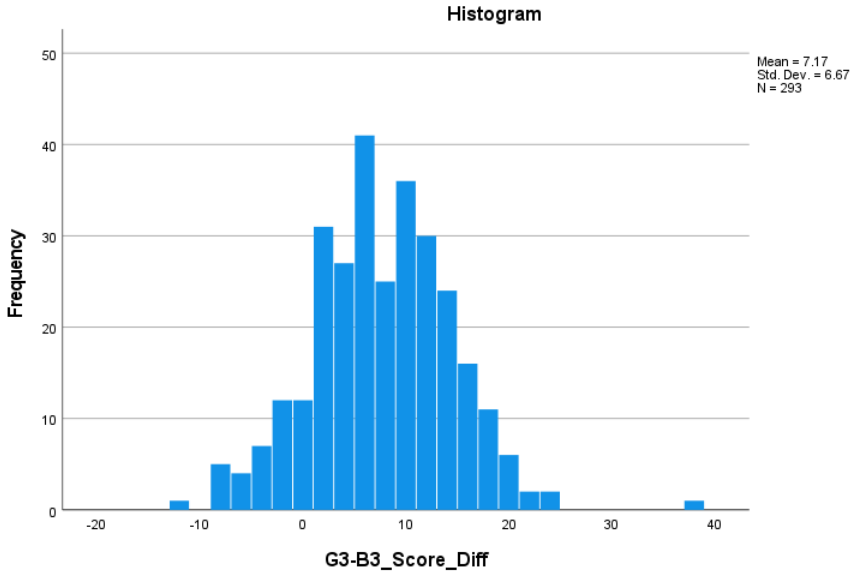


Figure 9

Histogram for Raw Score Difference



Assumptions

An Analysis of Covariance (ANCOVA) was used to test the null hypothesis. The ANCOVA requires assumptions of normality, linearity and bivariate normal distribution, homogeneity of slopes, and the homogeneity of variance. The assumption of no significant outliers was addressed in the data screening section. Finally, four additional assumptions frequently demanded of ANCOVA are methodological design considerations—and met in this analysis (see Chapter Three Data Analysis section): (a) one dependent variable; (b) one independent variable; (c) one covariate variable; and (d) independence of observations. The Shapiro-Wilk test for normality uses an unspecified mean and variance.

Meanwhile, the Kolmogorov-Smirnov test requires the researcher to specify the mean and variance. Both tests have been used to test normality; however, the Kolmogorov-Smirnov test is more general but less powerful. Additionally, the Shapiro-Wilk test is more appropriate for smaller sample sizes of 50 participants or less, whereas the Kolmogorov-Smirnov test is used for samples of 50 or more. Both tests are presented in Table 6. When the Sig. value is more than 0.05 the data is considered normally distributed. In this case, the Kolmogorov-Smirnov test for the raw score difference is the only test that appears to have a normal distribution. Pallant further recommends a review of the histogram and Q-Q Plots as she notes a Sig. value of less than 0.05 is “quite common in larger samples” (p. 57).

Table 6

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*Df*	Sig.	Statistic	*df*	Sig.
Reading Level Difference	.290	293	<.001	.818	293	<.001
Raw Score Difference	.049	293	.081	.989	293	.023

Note: Lilliefors Significance Correction

Andy Field (2018) criticizes the tests-alone approach, advocating for visual confirmation of statistical results. Since three of the four tests in Table 6 show that the assumption of normality has been violated, the visual approach will be used for further assessment. The assumption of linearity and bivariate normal distribution were tested using scatter plots for each group. Linearity was met, and bivariate normal distributions were tenable as the shapes of the distributions were not extreme. Figure 10, Figure 11, Figure 12, Figure 13, and Figure 14 include the scatter plot for each reading level. It is important to note that although there are five reading levels, no student in this dataset leapfrogged five levels in one year of school.

Figure 10

Scatter Plot for G3 Level-1

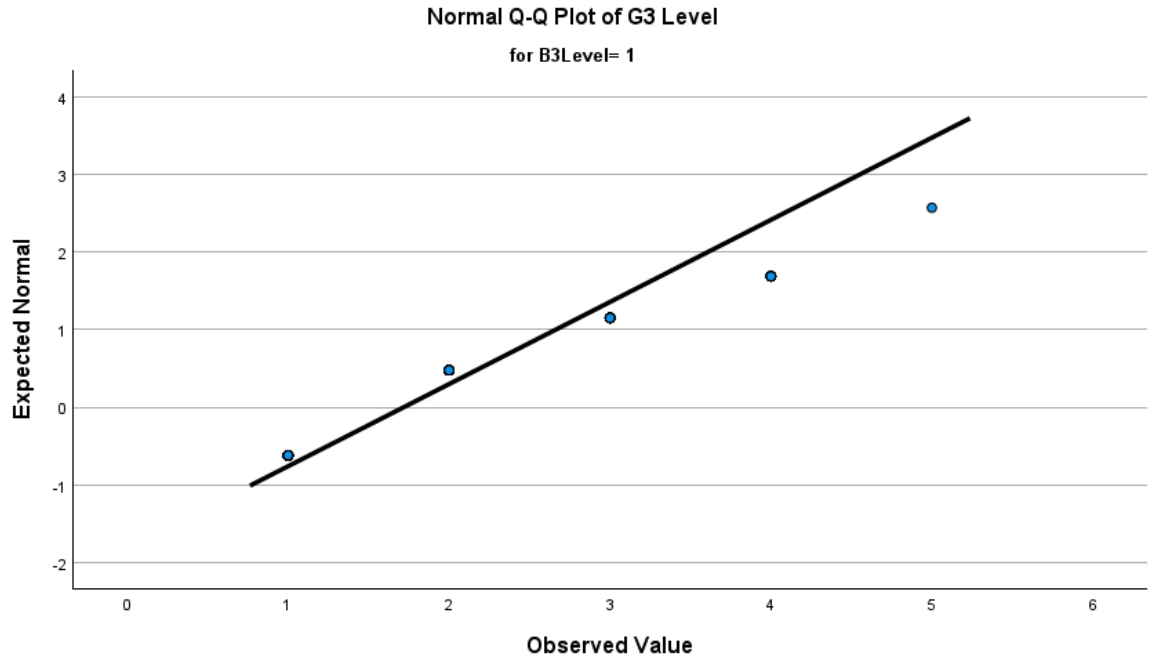


Figure 11

Scatter Plot for G3 Level-2

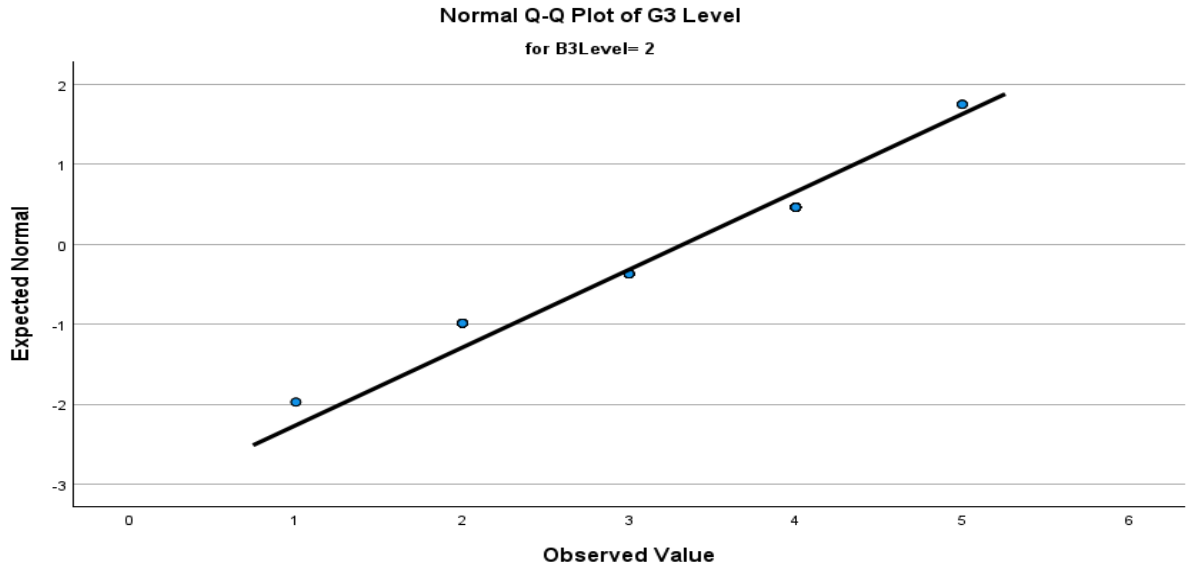


Figure 12

Scatter Plot for G3 Level-3

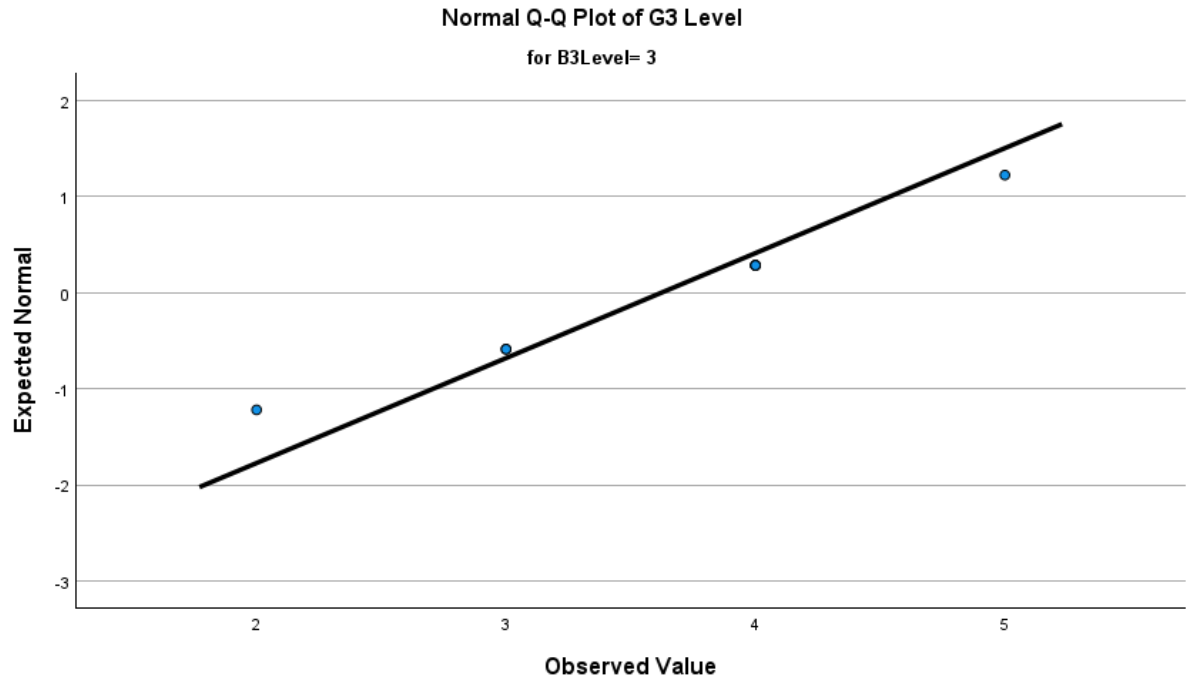


Figure 13

Scatter Plot for G3 Level-4

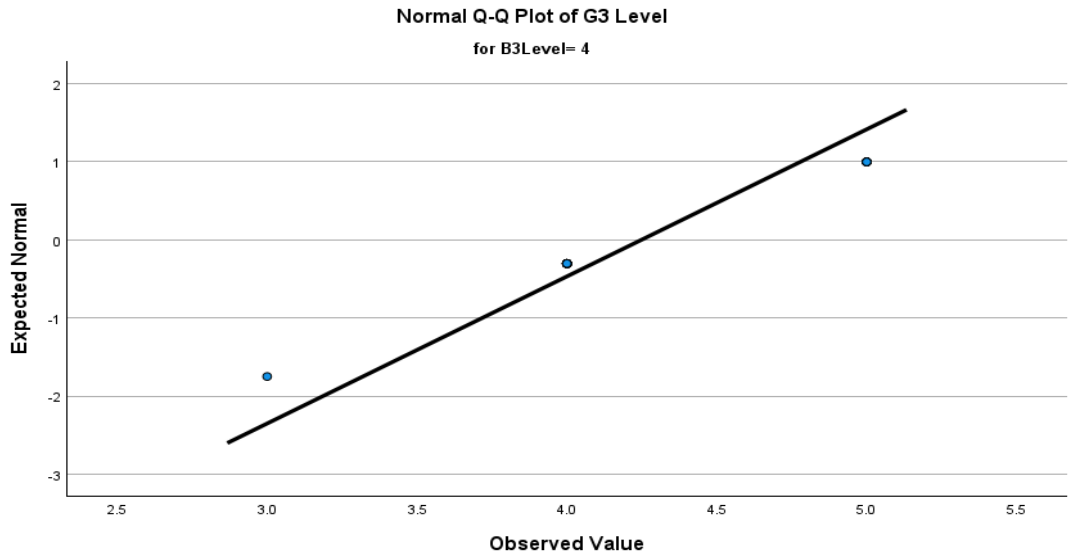
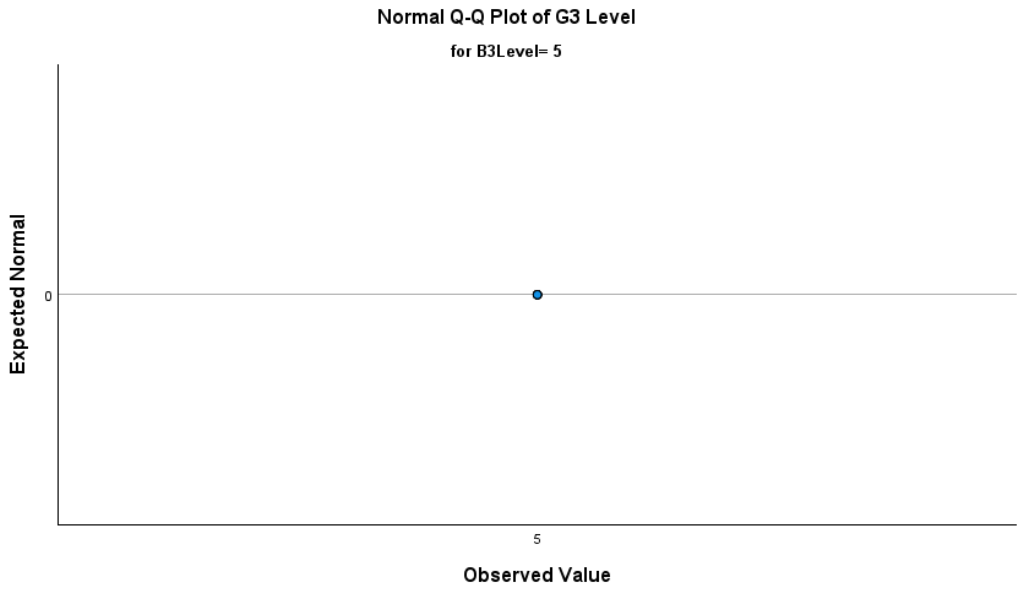


Figure 14

Scatter Plot for G3 Level-5

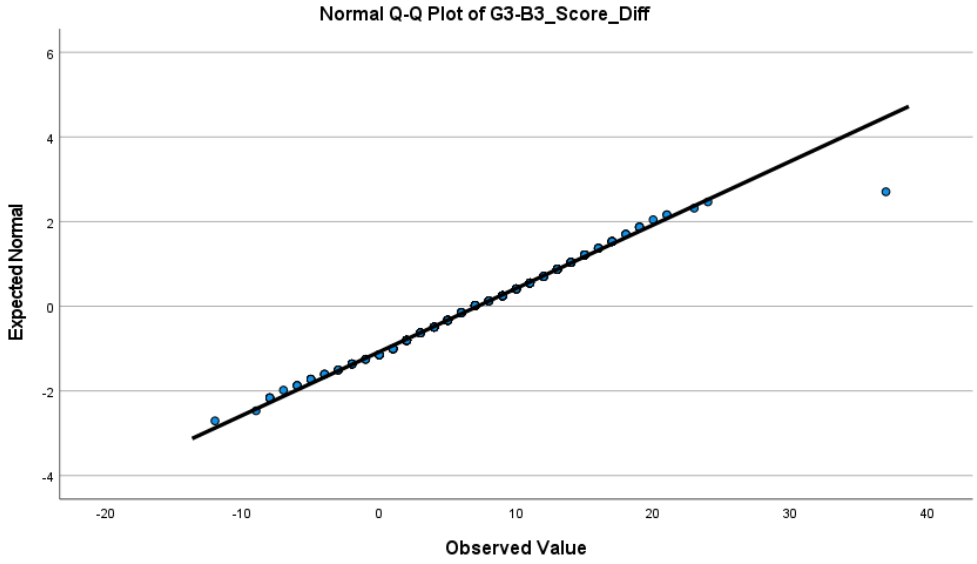


Note: While there were five reading levels, no students leapfrogged five levels in one year of school.

While the above five Q-Q plots provide the ordinal properties of data for the reading levels, the following Q-Q plot provides the visual test of normality for the raw reading scores. Figure 15 shows a visual confirmation of normality with the possible exception of one outlier. However, referring back to Figure 7, the outlier is not extreme since the asterisk is not present, and the item can be retained (Pallant, 2005).

Figure 15

Scatter Plot for Raw Reading Scores



The assumption of homogeneity of slopes was tested for two interaction models based on the dependent variable of the difference between the beginning and end of grade level. The first was with the interaction of iPad/non-iPad classroom and ethnicity. The second model was with the iPad/non-iPad classroom interaction and gender. No interaction was found as $p = .659$ and $p = .061$, respectively. Since the p-values were above .05, the assumption of homogeneity of the slope was met.

Table 7

Tests of Between-Subjects Effect for BOG and EOG Level Difference

Source	Type III SS	*Df*	MS	*F*	Sig.
iPad Classroom	.985	1	.985	1.032	.311
Gender	.008	1	.008	.009	.927
Ethnicity	1.020	1	1.020	1.069	.302
iPad*Ethnicity	.186	1	.186	.195	.659
iPad*Gender	3.378	1	3.378	3.540	.061

A similar test was performed to examine the interaction models based on the dependent variable of the difference between the beginning-of-grade and end-of-grade raw scores. The first was with the interaction of iPad/non-iPad classroom and ethnicity. The second model was with the iPad/non-iPad classroom interaction and gender. No interaction was found as $p = .822$ and $p = .480$, respectively. Since the p-values were above .05, the assumption of homogeneity of the slope was not violated.

Table 8

Tests of Between-Subjects Effect for BOG and EOG Raw Score Difference

Source	Type III SS	*Df*	MS	*F*	Sig.
iPad Classroom	4.988	1	4.988	.111	.739
Gender	23.012	1	23.012	.512	.475
Ethnicity	24.486	1	24.486	.545	.461
iPad*Ethnicity	2.282	1	2.282	.051	.822
iPad*Gender	22.429	1	22.429	.499	.480

Results for Null Hypothesis

To test for differences between groups, there are many different methods available. According to Tabachnick and Fidell (2013), the t-test compares the means of two groups. The two groups are independent in this case as they are two different classrooms. The analysis of variance (ANOVA) is used when there are three or more groups. This test was not selected for this study because there were only two groups. The one-way ANCOVA is used when two groups and one independent variable exist. This test was the initial test as it examined the pre and post-scores for the two different classrooms. Meanwhile, the factorial ANCOVA is used with more than one independent variable. To begin, the one-way ANCOVA was used for the reading levels of both classrooms. As shown in Table 9, the p-value was >.05, and the null hypothesis was accepted.

Table 9

Tests of Between-Subjects Effect for BOG and EOG Level Difference

Source	Type III SS	*Df*	MS	F	Sig.	Partial Eta Squared
iPad Classroom	.161	1	.161	.169	.682	.001

The next test used the one-way ANCOVA to test for the differences between classrooms using the raw reading scores. As shown in Table 10, the test was also not significant; thus, the null hypothesis was accepted.

Table 10

Tests of Between-Subjects Effect for BOG and EOG Raw Reading Score Difference

Source	Type III SS	*Df*	MS	F	Sig.	Partial Eta Squared
iPad Classroom	6.186	1	6.186	.139	.710	.000

Next, a one-way ANCOVA was used to test the null hypothesis regarding the differences between iPad and non-Pad classrooms for third-grade reading tests and the covariates of gender and ethnicity, as this data was available in the dataset. The null hypothesis failed to be rejected at a 95% confidence level where $p = .197$. The effect size was $p = .006$. There was neither a statistically significant difference nor a practically significant difference in reading levels between the iPad classroom and the non-iPad classroom when analyzing the difference between the beginning-of-grade and end-of-grade reading levels.

Table 11

Tests of Between-Subjects Effect for BOG and EOG Level Difference

Source	Type III SS	*Df*	MS	F	Sig.	Partial Eta Squared
iPad Classroom	1.595	1	1.595	1.675	.197	.006
B3 Level*iPad Classroom	2.490	2	1.245	1.308	.272	.009
Gender*iPad Classroom	3.761	2	1.880	1.975	.141	.014
Ethnicity*iPad Classroom	.522	2	.261	.274	.760	.002

Another ANCOVA test was performed to examine the differences between classrooms of the raw reading scores. Again, as shown in Table 12, the null hypothesis was accepted because the p-value was .766 and the effect size was $p < .001$.

Table 12

Tests of Between-Subjects Effect for BOG and EOG Raw Score Difference

Source	Type III SS	*Df*	MS	F	Sig.	Partial Eta Squared
iPad Classroom	3.964	1	3.964	.089	.766	.000
B3 Score*iPad Classroom	163.560	2	81.780	1.831	.162	.013
Gender*iPad Classroom	59.427	2	29.713	.665	.515	.005
Ethnicity*iPad Classroom	13.869	2	6.934	.155	.856	.001

For further consideration, an independent samples *t*-test was performed to determine if there were differences in reading levels between iPad classrooms and non-iPad classrooms when evaluating the dependent variable of beginning-of-grade and end-of-grade raw scores. As shown

in Table 18, the *p*-value for raw scores was .891. Additionally, an independent samples *t*-test was performed to determine if there were differences in reading levels between iPad classrooms and non-iPad classrooms when evaluating the dependent variable of beginning-of-grade and end-of-grade reading levels. The *p*-value for the reading level was .496. Therefore, there was no difference between groups in the present sample when comparing beginning-of-grade and end-of-grade reading levels and raw scores for iPad and non-iPad classrooms.

Table 13

Independent Samples t Test

Variable	iPad Classroom			Non-iPad Classroom			95% CI	*t*	*Df*
	n	*M*	*SD*	*N*	*M*	*SD*			
Raw Score Difference	123	7.34	6.33	170	7.05	6.92	-1.851, 1.262	-.372	291
Reading Level Difference	123	0.76	.984	170	0.81	0.97	-.180, .275	.411	291

CHAPTER FIVE: CONCLUSIONS

Overview

This chapter discusses how the research results of the study relate to and contribute to the body of literature that presently exists. The researcher will re-examine and discuss the theoretical framework of Jerome Bruner (1966) with contributions from Jean Piaget, Lev Vygotsky, and John Dewey as they support the constructivism theory. The study will also discuss the digital divide and the possible effects it has on the results of the study. Chapter Five will also present outcomes discovered within the research and the implications. The chapter concludes with an additional discussion on the limitations and the recommendations for future research.

Discussion

This quantitative, causal-comparative study assessed the hypothesized difference between third-grade students utilizing 1:1 iPad technology during reading instruction and those who did not utilize 1:1 iPad technology. This study focused on one research question, represented with the following null hypothesis: No significant differences exist in End-of-Grade reading achievement between third-grade students who utilize 1:1 iPad technology during reading instruction and those who do not use 1:1 iPad technology during reading instruction while controlling for prior achievement.

In this study, the researcher focused on Bruner's discovery of learning, the theory of scaffolding, and the theory of instruction. In discovery learning, Bruner intertwined his ideas with those of Piaget. The belief was to encourage teachers to manipulate the content by allowing children to manipulate it by taking a hands-on approach to their learning (Clark, 2018). The teachers in the 1:1 iPad technology classroom had unlimited resources and materials to offer students a hands-on approach to their lessons. Teachers can assign students games, activities, and

other assignments that allow the students to interact with the content material. The available interactive resources and manipulatives provide students with numerous opportunities to acquire knowledge and deepen their understanding of the teacher's lessons. The teachers in the traditional classroom have a different level of interaction to offer their students. They can teach on a technological device, but the students must complete their games, assignments, and activities by engaging in concrete resources or using paper and pencil methods. Teachers can develop and present practical hands-on lessons without technology. Research reiterates that technological devices offer a faster way to differentiate instruction and provide feedback for knowing a student's strengths and weaknesses (Ok et al., 2017; Spector et al., 2014).

The theory of scaffolding framework allowed Bruner to collaborate with the ideas of Vygotsky and the zone of proximal development. The zone of proximal development instructs teachers to present explicit instructions and scaffold the content to a desired goal (Johnson, 2019). The outcome of scaffolding is for children to understand the age-appropriate content matter and gain the ability to perform the tasks with limited assistance (Follari, 2019). The teachers in the 1:1 iPad classroom can guide students through lessons as they follow. Programs allow teachers to interact with their students at the same time. Teachers can guide students through a task, and the students can work with the teacher. These programs also offer the ability for teachers to complete a quick informal assignment that will provide teachers with the information to know the level of support each student needs to succeed. The students in the traditional classroom can also complete the task with the teacher. The traditional setting allows teachers to perform informal assessments. Still, it will take additional time for the teacher to know what the student understands and their individualized academic levels while planning activities for all students. The scaffolding the teachers provided during instruction benefited the

group utilizing the 1:1 iPads because the state testing was slowly transitioning to being taken electronically instead of paper-pencil. In the same instance, as the iPad was better equipped to transition during COVID-19, it was customary for the group to complete their assessments on the iPads. Ok and Kim (2017) discussed that these factors would benefit the iPad group by setting the stage for a 1:1 iPad group to demonstrate higher engagement and achievement levels than the non-iPad users. The results in this study directly contradict that notion because there was no significant difference in the test scores.

Bruner's theory of instruction can be considered an extension of Dewey's cognitive learning theory. Bruner's theory embraced four components that encouraged teachers to provide a prevalent social interaction environment. This environment will allow students to gain knowledge by utilizing their critical thinking and problem-solving skills (Bruner, 1966). The study demonstrated that the 1:1 iPad allowed students to develop various skills to acquire new knowledge. The increase in testing scores measured the increase in learning in the study demonstrated from the beginning to the end of the school year for both groups.

As illustrated in the literature review, this study investigated a research gap regarding the effectiveness of 1:1 iPads in the classroom. The current research contradicts the finding of Konig and Frey (2022) because their results concluded that schools that implemented 1:1 iPad devices pre-COVID had a higher level of achievement than those that did not. The reasoning was that students and teachers in schools that had already implemented the technological devices had normalcy in utilizing them. The research highlighted that schools with the devices had different challenges for at-home learning (Konig & Frey, 2022). The researcher can agree that based on the investigation of schools in the study, minimal preparation was needed for the students to transition to virtual learning because of high exposure to the online environment. The system had

e-learning days built into the calendar for the years before COVID-19. On e-learning days, students must log into a learning management system and complete their current assignments from home. Instructions were delivered in various ways to support the student. Teachers are required to hold office hours to support the students when needed; these days also doubled as teacher workdays. The actions of the iPad group in the study are consistent with the ideas of White (2022) that the 1:1 iPad presented an opportunity for both groups to demonstrate growth. This study confirms Miller's (2017) finding because the results showed no significant difference in the student achievement levels of the students accessing 1:1 iPad devices compared to those who do not. The research for using 1:1 iPads in the classroom to increase student achievement still needs to be represented.

White (2022) discussed the challenges that schools faced with implementing technology, thus causing a barrier to utilizing 1:1 iPads to promote student achievement effectively. The literature review provided a comprehensive view of the increasing achievement gap and the factors that are widening the gap. The primary factor is the digital divide. Hammond (2015) completed a study to provide an analysis of gender and ethnicity as identifiers within the digital divide. Hammond (2015) identified gender and ethnicity as factors that could impact a student's access to technology. While the study reading was not the primary focus, the researcher focused on science and social studies and measured it utilizing the South Carolina state's standard exam. The study's results demonstrated no significant difference between students from different ethnic groups. The digital divide has components that work in unison to ensure that the reading achievement gap is increasing (Hanushek et al., 2019).

This study comprised schools from two different school districts, whereas one system has been 1:1 iPads and one that does not have the same access. The school that does not have access

has all the components described within the digital divide's perimeters. The digital divide addresses more than the availability of allotted funding, access to technological devices, and the infrastructure equipment to support device connectivity. The digital divide pinpoints other challenges and gives active descriptions of these challenges that include the geographic locations, socioeconomic status, and ethnicities to implement 1:1 iPads in the classrooms (Powers et al., 2020). However, in 2020, school systems nationwide had to modify their instruction methods because of the Coronavirus. Students and teachers had to adapt to using 1:1 iPads or other technological devices to receive instruction online (Moser et al., 2021). The impact of the coronavirus changed the delivery of instruction for both districts.

The 2019-2020 school year testing data was originally the focus of this study. However, the Federal Department of Education canceled testing due to the pandemic. In regrouping, the 2020-2021 was also eliminated because the Federal government offered testing waivers. The state of NC applied and received the waiver, meaning students in NC were exempt from taking the end-of-grade test (Pogaric, 2021). The various accommodations offered led to examining the previous year's testing, mainly to have more defined data examples. In examining the impact of 1:1 iPad instruction in the classroom, the researcher examined the federal laws of NCLB (2001) and ESSA (2015) that passed and addressed the usage of technology, technological devices, and other computer-related resources in the classroom. The act allotted funding to allow schools to transition to implementing technology. However, the funding was often limited and distributed unequally. Funding was a major issue in ensuring all students had access to technology to close the achievement gap (David et al., 2015). The school district in the study utilized 1:1 iPad technology and integrated 1:1 iPads into their classrooms during the 2014-2015 school year. The reason for utilizing is the 2018-2019 school year dataset.

Rambo-Hernandez et al. (2019) argue that the achievement gap is increasing because the policy mandates focus on students meeting grade-level standards or gaining minimal proficiency. The testing standards have redirected our attention by providing students with approaches that will benefit their individualized learning. This new standard of learning is widening the achievement gap between students of different ethnicities, socioeconomic status, and academic abilities (Rambo-Hernandez et al., 2019).

Implications

This study suggested that utilizing 1:1 iPads on the reading achievement of third-grade students would impact student achievement. The results of this study demonstrated that the 1:1 iPads did not affect students' achievement levels based on the beginning of the year and end-of-grade testing cycles given in NC. There is limited research identifying and comparing two groups and whether they are utilizing iPads and those that do not. However, a wide range of research focuses on the implementation and impact 1:1 iPads will have on instruction, motivation, and engagement (Boon et al., 2021). This study added to the current research by providing whether 1:1 iPads benefit student achievement. The study examined female and male students' BOG3 and EOG testing scores. The results showed no significant difference for students who utilized 1:1 iPad technology during reading instruction compared to those who did not have access to the iPad technology. The findings of this study directly contradicted some previous studies. Hammond (2020) concluded that male and female students utilizing technology demonstrated a significant difference as opposed to those who did not. Using 1:1 iPads in the classroom is the newest trend that is supposed to promote student achievement (Boon et al., 2021; Hammond, 2020. One implication of this study was the need to implement technology in classrooms. The study did not measure the amount of training given to the teachers or students,

which questions whether this could have impacted the results. Another implication is the data analysis of the study. The findings in the study did not detail a significant difference in academic achievement for those students who utilized 1:1 technology compared to those who did not. However, both groups showed growth by comparing the beginning and end test scores that examined the student's reading raw and scale scores.

Hammond (2020) concluded that male and female students utilizing technology demonstrated a significant difference in academic achievement as opposed to those who did not. The results of this study did not confirm this assertion, leaving one to ponder why. It should be clear to anyone who has ever taught in a classroom that a difference exists between theory, research, and practice. Many institutional and environmental variables influence the effectiveness of an intervention, strategy, or technique. Using technology is no different: Nothing works every time, and everything will work sometimes. The current research underscores the value of contingencies in teaching and learning as mediating and moderating influences on the complex, intricate, reticular, and challenging nature of teaching, learning, and academic achievement. A few of these contingencies will be addressed below in the limitations.

Limitations

The researcher concludes that the study has some limitations pertinent to discussion. The limitations in this study could have impacted the results that were received. The first limitation noted is the sample size. Even though the study consisted of two different school districts in two different counties, the sample size was 293 students, comprised of the following breakdown of students: 170 for the non-iPad group and 123 for the iPad group. It would strengthen the study if various geographical locations could yield a larger sample size or one where the groups were proportionate to the participants. The second limitation is needing access to the classification of

students such as special education, academically gifted, and English language learners to examine any possible correlation between the student test scores and students receiving support services. The third limitation is that school data could not break down the data on the individual schools as stated in the methodology. The data coding would prolong the process of receiving the data from both districts.

The fourth limitation that presented the most challenges to the study was obtaining the archived test score data from the different schools' systems; this information encompasses the second and third limitations presented in the study. The data collection process for School District A was to apply through the district's office of accountability to receive approval and receive the requested data for both sets of test scores. After the approval, the data receives specific codes as instructed by the researcher. However, it was the wrong data, and to receive corrected data would take an absorbent amount of time to reorganize and code. The researcher compromised by not requiring the support services data and district to pre-code the identity of students, teachers, and schools. The data, however, remained anonymous.

School District B presented a different challenge because the school district personnel needed help accessing the data needed for the study. Even with prior approval, this process took four months to complete. The data also needed some components from the requests, but it was still enough to complete the data collection and analysis. The researcher proposes that when completing a study, become acquainted with the director of accountability, superintendents, assistant superintendents, and principals to ensure that the lines of communication remain open when challenges arise; maintain contacts in leadership to maneuver through the process to ensure the collection of data occurs effortlessly.

Amid all the frustrations with the data collection, the researcher lobbied the NC Department of Education for guidance to receive the data from their organization. The requirements determined that conferring with the two local school districts would yield the best results. The requirements included completing an application to the state database and writing a 5–10-page study summary. Although the feedback was returned rapidly, the conclusion was to resubmit the proposal to the IRB and add changes that would benefit their organization. The researcher accepted the compromises from the school districts to receive the data needed for the study.

Recommendations for Future Research

In thinking about the recommendations that would benefit future research, the researcher believes that this study is an asset to the field of education. This study is a reliable addition to the existing body of literature that measures the impact of 1:1 iPads on student achievement in reading. The researcher concludes that there are several recommendations based on the outcomes of the study that need addressing. These recommendations can strengthen the knowledge base in technology, student achievement, and reading instruction by utilizing 1:1 iPads in the classroom.

1. An extension for future research could be conducted by comparing the same students' scores using a longitudinal test, utilizing 2022 to demonstrate progression with a paired samples t-test during and after COVID-19.
2. This study limited the geographical locations; future research should allow replication of the study to use different regions, states, and counties, providing the opportunity to examine a large sample size.
3. This study was focused mainly on reading achievement. A new study could be conducted by utilizing the various content areas of math, science, and social studies and comparing

the results. Future research should compare similar students but focus on different content areas such as math, science, or social studies.

4. As intended, future research should examine the different classification groups of students participating in the study. These classifications include students receiving support services such as special education, academically and intellectually gifted, and English language learners.
5. Additional research questions could also focus on direct reading instruction, mainly activities and strategies. The study could also include the time allotted for iPad usage and the attitudes of both the teachers and students regarding technological device.

REFERENCES

Ackley, S. (2017). *A case study of best practices of implementing a one-to-one technology program* (Order No. 10619788). Available from ProQuest Central; ProQuest Dissertations & Theses Global; Social Science Premium Collection. (1977475645). https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/dissertations-theses/case-study-best-practices-implementing-one/docview/1977475645/se-2

Addison, J., & McGee, S. J. (2015). To the core: College composition classrooms in the age of accountability, standardized testing, and common core state standards, *Rhetoric Review*, *34(2)*, 200-218. doi:10.1080/07350198.2015.1008921

Adler-Greene, L. (2019). Every student succeeds act: Are schools making sure every student succeeds? *Touro Law Review, 35*(1), 11.

Aldoobie, N. (2015). Technology integration and learning theory. *American International Journal of Contemporary Research, 5(*6). http://www.aijcrnet.com/journals/Vol_5_No_6_December_2015/16.pdf

Allington, R. L., & McGill-Franzen, A. M. (2021). Reading volume and reading achievement: A review of recent research. *Reading Research Quarterly*, *56*, S231-S238.

Almasseri, M., & AlHojailan, M. I. (2019). How flipped learning based on the cognitive theory of multimedia learning affects students' academic achievements. *Journal of Computer Assisted Learning*, *35*(6), 769-781.

Almulla, M. A. (2023). Constructivism learning theory: A paradigm for students' critical thinking, creativity, and problem solving to affect academic performance in higher education. *Cogent Education, 10*(1)https://doi.org/10.1080/2331186X.2023.2172929

Alqahtani, S. S. (2021). Ipad text-to-speech and repeated reading to improve reading comprehension for students with SLD. *Reading & Writing Quarterly, ahead-of-print*(ahead-of-print), 1-15. https://doi.org/10.1080/10573569.2021.1987363

Aitken, T. (2017). 1:1 initiative for individualized learning. *Teacher Librarian, 44*, 12-15. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/magazines/1-initiative-individualized-learning/docview/1877698142/se-2

Bebell, D., & O'Dwyer, L. M. (2010). Educational outcomes and research from 1:1 computing settings. *Journal of Technology, Learning, and Assessment*, *9*(1). https://ejournals.bc.edu/index.php/jtla/article/view/1606/1463

Brawner, C. E., & Allen, R. H. (2006). Future teachers' classroom applications of technology. *Computers in the Schools, 23*(1-2), 33-44. https://doi.org/10.1300/J025v23n01_04

Brown, V. (2021). Project-based learning versus traditional instruction: The effect on fifth-grade students' social studies scores. *Doctoral Dissertations and Projects*. 2942. https://digitalcommons.liberty.edu/doctoral/2942

Bruner, J. S. (1977). *The process of education*. Harvard University Press.

Bruner, J. S. (1966). *Toward a theory of instruction* (Vol. 59). Harvard University Press.

Burnette, D. (2019). Everybody supports 'equity,' but how do they define it? On K-12 funding, ESSA may fuel a long-running debate. *Education Week*, *39*(13), 6. https://link.gale.com/apps/doc/A606537153/BIC?u=vic_liberty&sid=summon&xid=b996c5cf

Carver, L. B. (2016). Teacher perception of barriers and benefits in K-12 technology usage. *TOJET the Turkish Online Journal of Educational Technology, 15*(1)

Cha, H. (2015). *Soviet launch of Sputnik: Sputnik-inspired educational reform and changes in private returns in America* (Order No. 3745355). Available from ProQuest Dissertations & Theses Global. (1756713407). https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/dissertations-theses/soviet-launch-sputnik-inspired-educational-reform/docview/1756713407/se-2

Chambers, D., Jones, P., McGhie-Richmond, D., Riley, M., May-Poole, S., Orlando, A. M., Simsek, O., & Wilcox, C. (2018). An exploration of teacher's use of iPads for students with learning support needs. *Journal of Research in Special Educational Needs : JORSEN.*, *18*(2), 73–82. https://doi.org/10.1111/1471-3802.12394

Clark, K .R., (2018). Learning theories: Constructivism. Radiologic Technology., 90(2), 180–182.

Clausen, C. K., & Greenhaigh, S. D. (2017). Developing technological literacy with all students in mind. *Technology and Engineering Teacher, 77*(1), 17.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: Lawrence Erlbaum

Cohen, S. (2012). A 1:1 iPad initiative-vision to reality. *Library Media Connection*, *30*(6), 14-16.

Colter, R., & Ulatowski, J. (2017). The unexamined student is not worth teaching: Preparation, the zone of proximal development, and the Socratic model of scaffolded learning. *Educational Philosophy and Theory, 49*(14), 1367-1380. https://doi.org/10.1080/00131857.2017.1282340

Cook-Harvey, C. M., Darling-Hammond, L., Lam, L., Mercer, C., & Roc, M. (2016). Equity and ESSA: Leveraging educational opportunity through the Every Student Succeeds Act. *Learning Policy Institute*.

Corey, L. (2019). A case study of iPad implementation in one rural elementary school. *Journal of Educational Technology Systems*, 48(2), 305–316. https://doi-org.ezproxy.liberty.edu/10.1177/0047239519862999

Crompton, H., Burke, D., Jordan, K., & Wilson, S. (2022). Support provided for K-12 teachers teaching remotely with technology during emergencies: A systematic review, *Journal of Research on Technology in Education*, 54:3, 473-489, DOI: 10.1080/15391523.2021.1899877

Crompton, H. (2018). *Education reimagined: Leading systemwide change with the site standards*. International Society for Technology in Education.

David, K., & Marchant, G. (2015). The achievement gaps in the United States: race, poverty, and interactions over ten years. *The International Journal of Assessment and Evaluation, 22*(4), 1-15. https://doi.org/10.18848/2327-7920/CGP/v22i04/48378

Davies, R. S., & West, R. E. (2014). *Technology integration in schools. In Handbook of Research on Educational Communications and Technology* (pp. 841-853). Springer, New York, NY.

Demiroz, E. (2018). A case study of the literacy experiences of 3rd grade struggling readers with the use of interactive digital books. University of Missouri-Kansas City.

Dewey, J. (1915). Schools in society. Chicago, IL: University of Chicago Press. Retrieved from https://www.questia.com/read/101427391/the-school-and-society.

Ditzler, C., Hong, E., & Strudler, N. (2016). How tablets are utilized in the classroom. *Journal of Research on Technology in Education, 48*(3), 181-193. doi:10.1080/15391523.2016.1172444

Dolan, J. E. (2016). Splicing the divide: A review of research on the evolving digital divide among K-12 students. *Journal of Research on Technology in Education, 48*(1), 16-37. https://doi.org/10.1080/15391523.2015.1103147

Earle, R. S. (2002). The Integration of instructional technology into public education: promises and challenges. *Educational Technology.*, *42*(1).

Eun, B. (2019). The zone of proximal development as an overarching concept: A framework for synthesizing Vygotsky's theories. *Educational Philosophy and Theory, 51*(1), 18-30. https://doi.org/10.1080/00131857.2017.1421941

Fien, H., Chard, D. J., & Baker, S. K. (2021). Can the evidence revolution and multi-tiered systems of support improve education equity and reading achievement? *Reading Research Quarterly, 56*, S105-S118. https://doi.org.ezproxy.liberty.edu/10.1002/rrq.391

Felvégi, E., & Matthew, K. I. (2012). eBooks and literacy in K-12 schools. *Computers in the Schools, 29*(1-2), 40-52. https://doi.org/10.1080/07380569.2012.651421

Fenton, D. (2017). Recommendations for professional development necessary for iPad integration. *Educational Media International, 54*(3), 165-184. doi:10.1080/09523987.2017.1384150

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (North American 5th ed.). SAGE.

Follari, L. M. (2019). *Foundations and best practices in early childhood education: History, theories, and approaches to learning.* Pearson Education, Inc.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction.* Hoboken, NJ: Pearson.

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice* (3rd ed.). Teachers College Press.

Gilmour, A. F., Fuchs, D., & Wehby, J. H. (2019). Are students with disabilities accessing the curriculum? A meta-analysis of the reading achievement gap between students with and without disabilities. *Exceptional Children*, *85*(3), 329-346.

Gignac, G. (2011). Manova - SPSS (part 1). How 2 Stats. Retrieved April 8, 2022, from https://youtu.be/3pzCa4Whv74

Goos, S. (2020). 1:1 iPads and student achievement (Thesis, Concordia University, St. Paul). Retrieved from https://digitalcommons.csp.edu/teacher-education_masters/20

Gordon Biddle, K. A., Garcia-Nevarez, A., Roundtree Henderson, W. J., & Valero-Kerrick, A. (2014). *Early childhood education: Becoming a professional.* SAGE.

Granados, A. (2021). State board roundup: what's going on with student testing this year? Education North Carolina. https://www.ednc.org/2021-04-08-state-board-roundup-whats-going-on-with-student-testing-this-year/

Green, S. B., & Salkind, N. J. (2011). *Using SPSS for Windows and Macintosh: Analyzing and understanding the data.* New York, NY: Pearson Education, Inc.

Geer, R., White, B., Zeegers, Y., Au, W., & Barnes, A. (2017). Emerging pedagogies for the use of iPads in schools. *British Journal of Educational Technology*, *48*(2), 490-498.

Hagans, K. S., & Good, R. H. (2013). Decreasing reading differences in children from disadvantaged backgrounds: The effects of an early literacy intervention. *Contemporary School Psychology, 17*(1), 103-117. https://doi.org/10.1007/BF03340992

Hanushek, E. A., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2019). The achievement gap fails to close. *Education Next*, *19*(3), 8-17.

Hamilton, B. (2018). *Integrating technology in the classroom: Tools to meet the needs of every student*. International Society for Technology in Education.

Hammond, Z. (2015). *Culturally responsive teaching & the brain: Promoting authentic engagement and rigor among culturally and linguistically diverse students*. Corwin.

Harper, B., & Milman, N. B. (2016). One-to-one technology in K–12 classrooms: A review of the literature from 2004 through 2014*, Journal of Research on Technology in Education,* 48:2, 129-142. doi: 10.1080/15391523.2016.1146564

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252. https://doi.org/10.1007/s11423-006-9022-5

Hoaglin, D. C., & Iglewicz, B. (1987). Fine-tuning some resistant rules for outlier labeling. Journal of the American Statistical Association, 82(400), 1147–1149. https://doi.org/10.1080/01621459.1987.0478551

Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools: Through the lens of the levels of digital divide in schools. *Computers & Education, 113*, 135-161. doi:10.1016/j.compedu.2017.05.01

Holen, J. B., Hung, W., & Gourneau, B. (2017). Does one-to-one technology really work: An evaluation through the lens of activity theory. *Computers in the Schools, 34*(1-2), 24-44. https://doi.org/10.1080/07380569.2017.1281698

Jensen, E. (2022). Teaching with poverty and equity in mind*:* Succeed with students who need you most. ASCD.

Johnson, A. P. (2019). Essential learning theories: Applications to authentic teaching situations. Rowman & Littlefield

Johnson, J. A., Dupuis, V. L., Musial, D., Hall, G. E., & Gollnick, D.M. (2003). Essentials of American Education. Pearson Education, Inc.

Kaniuka, T. (2017). Early college high school achievement outcomes in North Carolina: End of grade and ACT performance. *International Journal*, *6*(4), 91-107.

Kassinger. (2019). The effect of the 1:1 initiative on school-wide performance level percentages in secondary U.S. history. Liberty University.

Kereluik, K., Mishra, P., Fahnoe, C., & Terry, L. (2013). What knowledge is of most worth: Teacher knowledge for 21st century learning. *Journal of Digital Learning in Teacher Education, 29*(4), 127-140. https://doi.org/10.1080/21532974.2013.10784716

Kilfoye, C. (2013). A voice from the past calls for classroom technology. *Phi Delta Kappan*, *94*(7), 53–56. https://doi.org/10.1177/003172171309400717

Kim, J. S., Guryan, J., White, T. G., Quinn, D. M., Capotosto, L., & Kingston, H. C. (2016). Delayed effects of a low-cost and large-scale summer reading intervention on elementary school children's reading comprehension. *Journal of Research on Educational Effectiveness*, *9*(sup1), 1-22.

Klein, A. (2018). For 2019-20, only one district seeks to use ESSA's weighted-funding pilot. *Education Week*, *38*(01), 4. https://link.gale.com/apps/doc/A552753108/BIC?u=vic_liberty&sid=summon&xid=a5062298

König, C., & Frey, A. (2022). The impact of Covid-19 related school closures on student achievement-A meta-analysis. *Educational Measurement: Issues and Practice,* https://doi.org/10.1111/emip.12495

Matheny, K. T., Thompson, M. E., Townley-Flores, C., & Reardon, S. F. (2023). Uneven progress: Recent trends in academic performance among U.S. school districts. *American Educational Research Journal, 60*(3), 447-485. https://doi.org/10.3102/00028312221134769

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of research on technology in education*, *48*(3), 194-211.

McLoone, S. C., Villing, R., & O'Keeffe, S. (2015). Using mobile touch devices to provide flexible classroom assessment techniques. *International Journal of Mobile Human Computer Interaction*, *7*(4). Retrieved from https://bi-gale-com.ezproxy.liberty.edu/global/article/GALE%7CA425891808?u=vic_liberty&sid=summon

Metsämuuronen, J., & Räsänen, P. (2017). Cognitive–linguistic and constructivist mnemonic triggers in teaching based on Jerome Bruner's thinking. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.02543

Miller, N. G. (2017). *The impact of 1:1 laptop environments on the English language arts achievement of fifth grade students from diverse socio-economic backgrounds* (Order No. 10619269). Available from Dissertations & Theses @ Liberty University; ProQuest Central; ProQuest Dissertations & Theses Global; Social Science Premium Collection. (1973268077).

https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/dissertations-theses/impact-1-laptop-environments-on-english-language/docview/1973268077/se-2

Milman, N. B., Bancroft, A. C., & Boogart, A. V. (2014) Examining differentiation and utilization of iPads across content areas in an independent, preK–4th grade elementary school, *Computers in the Schools*, *31*(3), 119-133, doi:10.1080/07380569.2014.931776

Moon, A. L., Francom, G. M., & Wold, C. M. (2021). Learning from versus learning with technology: Supporting constructionist reading comprehension learning with iPad applications. *TechTrends, 65*(1), 79-89. https://doi.org/10.1007/s11528-020-00532-1

Moser, K. M., Wei, T., & Brenner, D. (2021). Remote teaching during COVID-19: Implications from a national survey of language educators. *System, 97*, 1. https://doi.org/10.1016/j.system.2020.102431

Murray, O. T., & Ocelese, N. R. (2011). Teaching and learning with iPads, ready or not? *TechTrends, 55*(6), 42-48. https://doi.org/10.1007/s11528-011-0540-6

National Assessment of Educational Progress. (2019). National achievement levels in reading. https://www.nationsreportcard.gov/reading/nation/achievement/?grade=4

National Education Association. (2022). Rankings of the states 2021 and estimates of school statistics 2022. https://www.nea.org/sites/default/files/2022-04/2022%20Rankings%20and%20Estimates%20Report.pdf

NC Department of Public Instruction. (2018). The North Carolina testing program technical report. Retrieved from https://www.dpi.nc.gov/documents/technical-report-2012–2015-ela-eog-3–8-and-eoc-english-ii

NC Department of Public Instruction. (2019). Grade 3 read to achieve (RtA). Retrieved from https://www.dpi.nc.gov/districts-schools/testing-and-school-accountability/state-tests/grade-3-read-achieve-rta

NC Department of Public Instruction. (2019). End-of-Grade (EOG). Retrieved from https://www.dpi.nc.gov/districts-schools/testing-and-school-accountability/state-tests/end-grade-eog

NC Department of Public Instruction. (2019). Beginning-of-grade 3. Retrieved from https://www.dpi.nc.gov/districts-schools/testing-and-school-accountability/state-tests/beginning-grade-3Olejnik, S. F., & Algina, J. *(1984). Parametric ancova and the rank transform ancova when the data are conditionally non-normal and heteroscedastic. Journal of Educational Statistics, 9(2), 129–149. https://doi.org/10.2307/116471*Ormrod, J. E. (2011). *Educational psychology developing learners*. Pearson Education, Inc.

Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Routledge.Parks, A. N., & Tortorelli, L. (2021). Impact of a district-wide one-to-one technology initiative on kindergartners' engagement and learning outcomes, *Journal of Research in Childhood Education, 35*(4), 602-615. doi: 10.1080/02568543.2020.1809578

Pasini, N. (2018). A collective impact approach to the reading achievement gap. *Journal of Library Administration*, *58*(6), 605-616.

Pew Research Center. (2013). King's dream remains an elusive goal; many Americans see racial disparities. https://www.pewresearch.org/social-trends/2013/08/22/kings-dream-remains-an-elusive-goal-many-americans-see-racial-disparities/

Pittman, T., & Gaines, T. (2015). Technology integration in third, fourth and fifth grade classrooms in a Florida school district. *Educational Technology, Research and*

Development, 63(4), 539-554. https://doi-org.ezproxy.liberty.edu/10.1007/s11423-015-9391-8

Pogarcic, A. (2021). North Carolina waives school performance grades for 2020-2021 school year. Education North Carolina. Retrieved from https://www.ednc.org/nc-state-legislature-passes-testing-waiver-bill/

Powers, J. R., Musgrove, A. T., & Nichols, B. H. (2020). Teachers bridging the digital divide in rural schools with 1:1 computing. *The Rural Educator, 41*(1), 61-76. https://go.openathens.net/redirector/liberty.edu?url=https://www-proquest-com.ezproxy.liberty.edu/scholarly-journals/teachers-bridging-digital-divide-rural-schools/docview/2407573936/se-2

Rambo Hernandez, Peters, S. J., & Plucker, J. A. (2019). Quantifying and exploring elementary school excellence gaps across schools and time. Journal of Advanced Academics., 30(4), 383–415.

Rebarber, T. (2020). The common core debacle: Results from 2019 NAEP and other sources. white paper no. 205. *Pioneer Institute for Public Policy Research*.

Retalis, S., Paraskeva, F., Alexiou, A., Litou, Z., Sbrini, T., & Limperaki, Y. (2018). Leveraging the 1:1 iPad approach for enhanced learning in the classroom. *Educational Media International, 55*(3), 213-230. doi:10.1080/09523987.2018.1512463

Rovai, A. P., Baker, JD., & Ponton, M.K. (2013). *Social science and research design and statistics: A practitioner's guide to research methods and SPSS analysis.* Chesapeake, VA: Waterpress, LLC.

Saavedra, A. R., & Opfer, V. D. (2012). Learning 21st-century skills requires 21st-century teaching. *Phi Delta Kappan*, *94*(2), 8-13.

Seward, T. P., & Nguyen, H. T. (2019). The digital imperative in the 21st century classroom: Rethinking the teacher-learner dynamic. *Issues in Teacher Education, 28*(1), 80-98. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/digital-imperative-21st-century-classroom/docview/2210876497/se-2

Siew, N. M., & Ambo, N. (2020). The scientific creativity of fifth graders in a stem project-based cooperative learning approach. *Problems of Education in the 21st Century, 78*(4), 627-643. https://doi.org/10.33225/pec/20.78.627

Smith, K. C., Amendum, S. J., & Jang, B. G. (2020). Predicting performance on a 3rd grade high-stakes reading assessment. Reading & Writing Quarterly., 36(4), 365–378. https://doi.org/10.1080/10573569.2019.1649612

Smith, H. E. (2018). A causal-comparative analysis of the effect of reading instruction on the reading achievement of third-grade students in Title I elementary schools. [Doctoral Dissertation, Liberty University]. Scholars Crossing Liberty University Institutional Repository. https://digitalcommons.liberty.edu/doctoral/1879/

Spears, S. A. (2012). *Technology-enhanced learning: The effects of 1:1 technology on student performance and motivation*. Ph.D. thesis, The University of West Florida. Retrieved April 5, 2020, from https://www.learntechlib.org/p/117496/.

Spector, M. J., Merrill, D. M., Elen, J., & Bishop, M. J. (Eds). (2014). Handbook of research on educational communications and technology. Springer.

Stapleton, L., & Stefaniak, J. (2019). Cognitive constructivism: Revisiting Jerome Bruner's influence on instructional design practices. *TechTrends*, *63*(1), 4-5.

Stone, J. A. (2017). The impact of technology exposure on student perceptions of a 1:1 program. *Education and Information Technologies, 22*(5), 2281-2309. doi:http://dx.doi.org.ezproxy.liberty.edu/10.1007/s10639-016-9541-6

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Pearson Education.

Taylor, D. B., Handler, L. K., FitzPatrick, E., & Whittingham, C. E. (2020). The device in the room: Technology's role in third grade literacy instruction. *Journal of Research on Technology in Education*, *52*(4), 515-533.

Thieman, G. Y., & Cevallos, T. (2017). Promoting educational opportunity and achievement through 1:1 iPads. *The International Journal of Information and Learning Technology, 34*(5), 409-427. doi:10.1108/IJILT-06-2017-0047

Ujifusa, A. (2016). Questions loom as ESSA funding waits. *Education Week*, *36*(02)16.https://link.gale.com/apps/doc/A463196248/BIC?u=vic_liberty&sid=summon&xid=8e6572bb

U.S. Department of Education. (2002). Enhancing education through technology. https://www2.ed.gov/policy/elsec/leg/esea02/pg34.html

U.S. Department of Education. (2017). Transitioning to the Every Student Succeed Act. https://oese.ed.gov/files/2020/02/essatransitionfaqs11817.pdf

U.S. Department of Education, National Center for Education Statistics. (2021). Use of educational technology for instruction in public schools 2019-2020 https://nces.ed.gov/pubs2021/2021017Summary.pdf

U.S. Department of Education, Office of Educational Technology. (2017). Reimagining the role of technology in education. https://tech.ed.gov/files/2017/01/NETP17.pdf

Varier, D., Dumke, E. K., Abrams, L. M., Conklin, S. B., Barnes, J. S., & Hoover, N. R. (2017). Potential of one-to-one technologies in the classroom: teachers and students weigh in. *Educational Technology Research and Development*, *65*(4), 967–992. http://www.jstor.org/stable/45018711

Wall, S. L. (2017). Leveraging technology to impact reading achievement of early elementary students.

Warner, R. (2013). *Applied statistics: From bivariate through multivariate techniques*. Los Angeles, CA: Sage Publications, Inc.

Wong, V. C., Valentine, J. C., & Miller-Bains, K. (2017). Empirical performance of covariates in education observational studies. *Journal of Research on Educational Effectiveness*, *10*(1), 207-236.

Wen, P. (2018). Application of Bruner's learning theory in mathematics studies. In *International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSES 2018)* (pp. 234-237). Atlantis Press.

Weyer, M., & Casares, J. E. (2019). Pre-kindergarten-third grade literacy. In *national conference of state legislatures. https://www. ncsl. org/research/education/prekindergarten-third-grade-literacy. aspx*.

Xu, F. (2019). Towards a rational constructivist theory of cognitive development. *Psychological review*, *126*(6), 841.

APPENDIX A: IRB Permission Approval

[External] IRB-FY22-23-787 - Initial: Non-Human Subjects Research

do-not-reply@cayuse.com <do-not-reply@cayuse.com>
Mon 2/20/2023 11:41 AM
To: Savage, Jeffrey (Doctor of Education) <jsavage2@liberty.edu>;Edwards, Sharla <sedwards27@liberty.edu>

[EXTERNAL EMAIL: Do not click any links or open attachments unless you know the sender and trust the content.]

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

February 20, 2023

Sharla Edwards
Jeffrey Savage

Re: IRB Application - IRB-FY22-23-787 Examining the Effect of Utilizing 1:1 iPad Technology on Third Grade Reading Achievement; A Causal-Comparative Analysis

Dear Sharla Edwards and Jeffrey Savage,

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

Decision: No Human Subjects Research

Explanation: Your study is not considered human subjects research because it will not involve the collection of identifiable, private information from or about living individuals (45 CFR 46.102).

Please note that this decision only applies to your current application. Any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

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

Sincerely,

[redacted]
Administrative Chair of Institutional Research
Research Ethics Office

APPENDIX B: School District Letter of Approval

Letter of Approval

[redacted]
Extraordinary Education Every Day
Be an original.

Re: Examining the effect of utilizing 1:1 iPad technology on third grade reading achievement: a causal-comparative analysis
Date: January 17, 2023
Office of Accountability
[redacted]

Dear Sharla Edwards,

The [redacted] has received and reviewed your Research Request Form. It was determined on January 17th to approve your research request. We are working on compiling your data and will follow-up with you regarding how to receive your data. It'll either come as a CSV or will need to be manually picked up.

Additionally, [redacted] would like to make sure that the schools data is anonymized. Please don't indicate the schools are part of [redacted] and provide only over-arching demographic information about the schools.

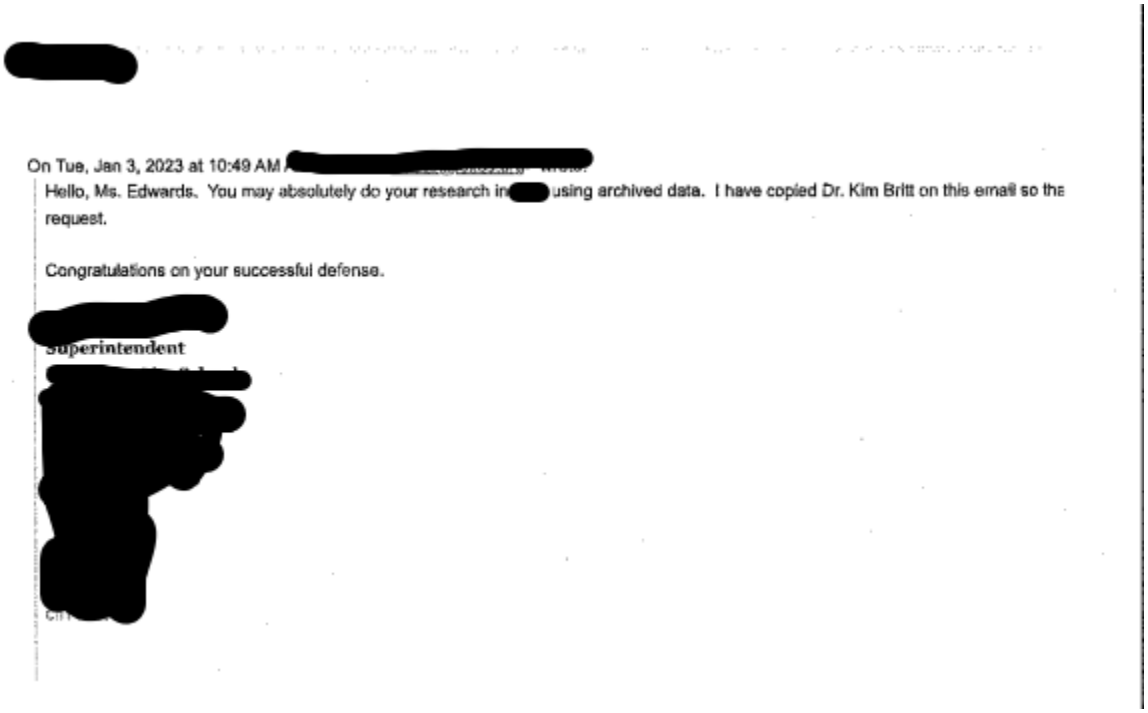
As the Director of Accountability, I have read through your research proposal and can provide the requested data for your doctoral research. Please let us know if there is any data that we can help you with.

Sincerely,

[redacted]

[redacted]
Director of Accountability

School District Approval Email



[redacted]

On Tue, Jan 3, 2023 at 10:49 AM [redacted]

Hello, Ms. Edwards. You may absolutely do your research in [redacted] using archived data. I have copied Dr. Kim Britt on this email so tha request.

Congratulations on your successful defense.

[redacted]

Superintendent

[redacted]

APPENDIX C: Request for Permission-District

[redacted] Data Request Form

Please complete all fields in the request. You can submit this request electronically to [redacted], or you can mail it the address on the bottom page.

Date of Request:	01/03/2023		
Requester:	Sharla Edwards	Title:	Doctoral Candidate/Educator
Phone #	[redacted]	Email	[redacted]
Mailing Address	[redacted]		
Organization	Liberty University		
Description of Organization	Liberty University is an institution of higher education accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) and the Council for the Accreditation of Educator Preparation (CAEP). Liberty University awards undergraduate and graduate degrees.		
Desired Date of Return	I want to start the data collection promptly. I would prefer to receive the data no later than 2/20/2023 or at a time deemed appropriate by the school system before the data collection deadline of March 23, 2023.		
Description of Data Request	The requested data consists of the 2018-2019 archived student data for the third-grade Beginning of Grade and End of Grade Test scores. The researcher needs 50 randomly chosen datasets of students from [redacted] The data should reflect both the raw scores and level scores. The data does not need to include the names of students and teachers. The following examples will detail the necessary information. The student, teacher, and school names will be coded with identification numbers, for example, Schools Name A, B Student name 1, 2, 3, etc. Teacher Name A1, A2, A3-B1, B2, B3 I will also need the demographic background of the students; Gender, SES, ELL, AIG, SPED, and Race/Ethnicity.		
Purpose How will this data be used?	The purpose of the research is to explore the use of 1:1 iPad instruction versus non-1:1 instruction on urban third-grade English Language Arts achievement. One-to-one instruction is a popular means of teaching; understanding how 1:1 instruction affects students' reading performance is significant due to the possible achievement gains such an adaptation can produce. The researcher will use the data to determine if a difference exists in EOG scores based on technology use while controlling for prior achievement, which is the BOG3 score in the study. In addition, the		

	data.
Target Audience	The target audience for this research is educators, administrators, and others interested in the education/technology sectors.
In what format to receive? (i.e. Excel Spreadsheet)	The data can be received in an Excel spreadsheet. A Word document can also be used if the information is formatted into a table.
Potential Benefit to [redacted]	The benefit of the research to the [redacted] is to provide an analysis that can improve student outcomes by demonstrating the significance of utilizing 1:1 iPads on student achievement within the system. The research topic was chosen because of the gap in the literature regarding utilizing 1:1 iPads in the classrooms. Even with most school systems around the country going remote during the coronavirus pandemic, there still needs to be a significant amount of research connecting using 1:1 iPads during instruction and student achievement.
Additional Information	I have been affiliated with [redacted] in various positions. I was a teacher at [redacted] from 2014-2017. I completed my administration internship at [redacted] in 2019. As an Assistant Professor of Education and Director of Field Placement at [redacted] I maintained a positive relationship with the schools in the system to place our students at different levels to complete their student teaching requirements.

I understand and agree to the terms, conditions, and responsibilities set out in this Agreement

[redacted] 1/9/2023

Signature of Requester — Date

You can email a copy of this request form to [redacted] or you can mail it to Director of Accountability [redacted]

December 29, 2022

[redacted]
Superintendent
[redacted]

Dear [redacted],

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a doctoral degree in Curriculum and Instruction. The title of my research project is Examining the Effect of Utilizing 1:1 iPad Technology on Third Grade Reading Achievement: A Causal-Comparative Analysis and the purpose of my research is to explore the use of 1:1 iPad instruction versus non-1:1 instruction on urban third-grade English Language Arts achievement. One-to-one instruction is a popular means of teaching; understanding how 1:1 instruction affects students' reading performance is significant due to the possible achievement gains such an adaptation can produce.

I am writing to request your permission to conduct my research in [redacted] by accessing and utilizing students' archived BOG3 and EOG test data for the 2018-2019 school year [redacted]. I will need test scores for fifty students from each school randomly chosen for the study. I will need the data compiled, and with the BOG3 and EOG test scores and the educational demographics of students, The school district, schools, students, and teachers' names will be anonymous within the study to ensure the confidentiality of the datasets. However, a sample template is included to explain further the demographic information necessary.

Representation for the coding of datasets

Student #	School	Teacher	Gender	BOG3 Raw Score	BOG3 Score Level	EOG Raw Score	EOG Score Level	SES	ELL	SPED	AIG	Race/ Ethnicity
1	A	A1										
2	A	A2										
3	A	A3										
4	A	A4										
5	B	B1										
6	B	B2										
7	B	B3										
8	B	B4										
9	C	C1										
10	C	C2										
11	C	C3										
12	C	C4										
13	D	D1										
14	D	D2										

15	D	D3									
16	D	D4									

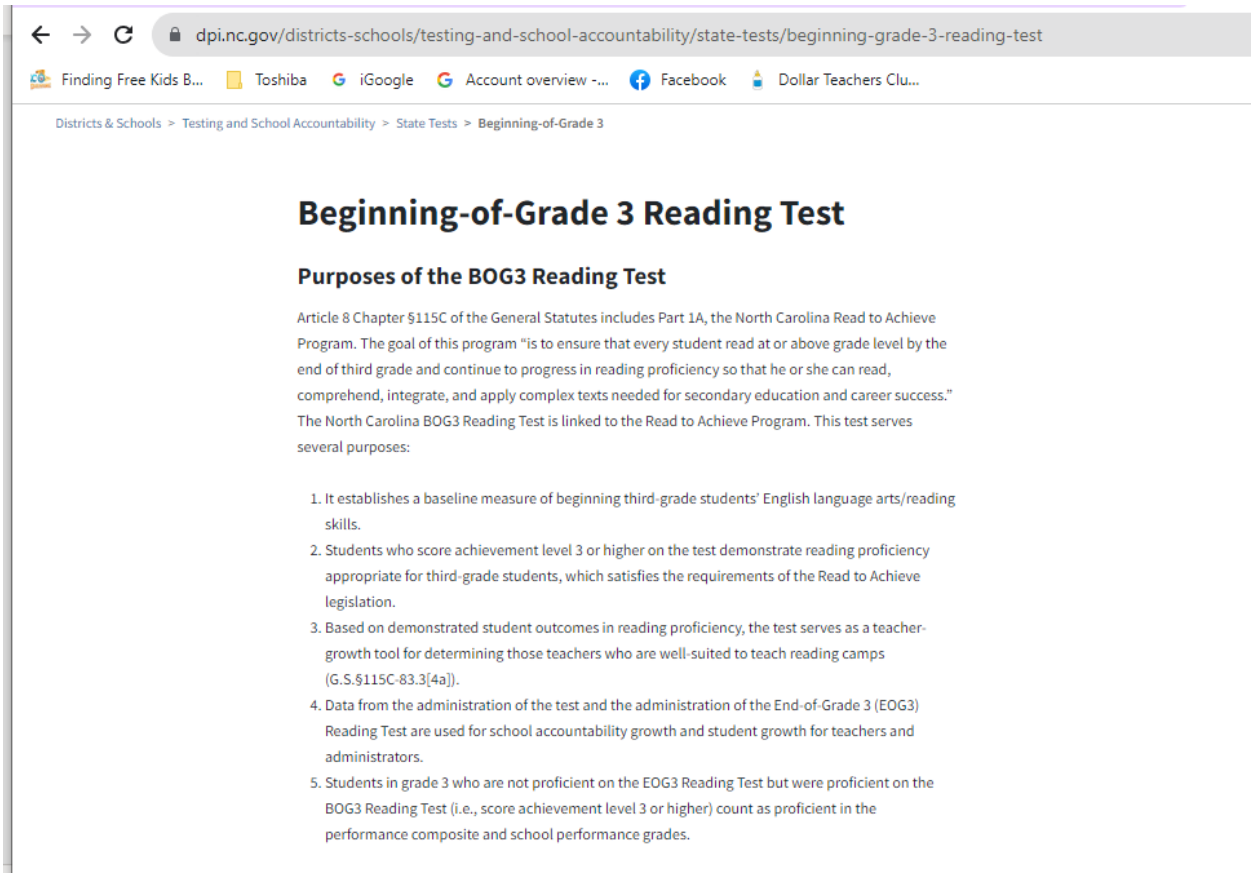
The researcher will use the data to determine if a difference exists in EOG scores based on technology use while controlling for prior achievement, which is the BOG3 scores in the study. In addition, the data will be compared to the archived datasets collected from a neighboring district that has been 1:1 since the 2014-2015 school year. The archived dataset will also come for the 2018-2019 school year. Finally, the data in the study will be analyzed using the Analysis of Covariance.

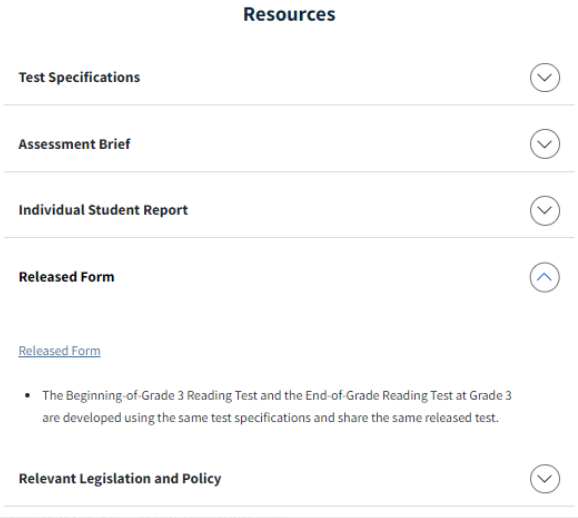
Thank you for considering my request. If you choose to grant permission, please provide a signed statement on an official letterhead indicating your approval or respond by email to the researcher's email address.

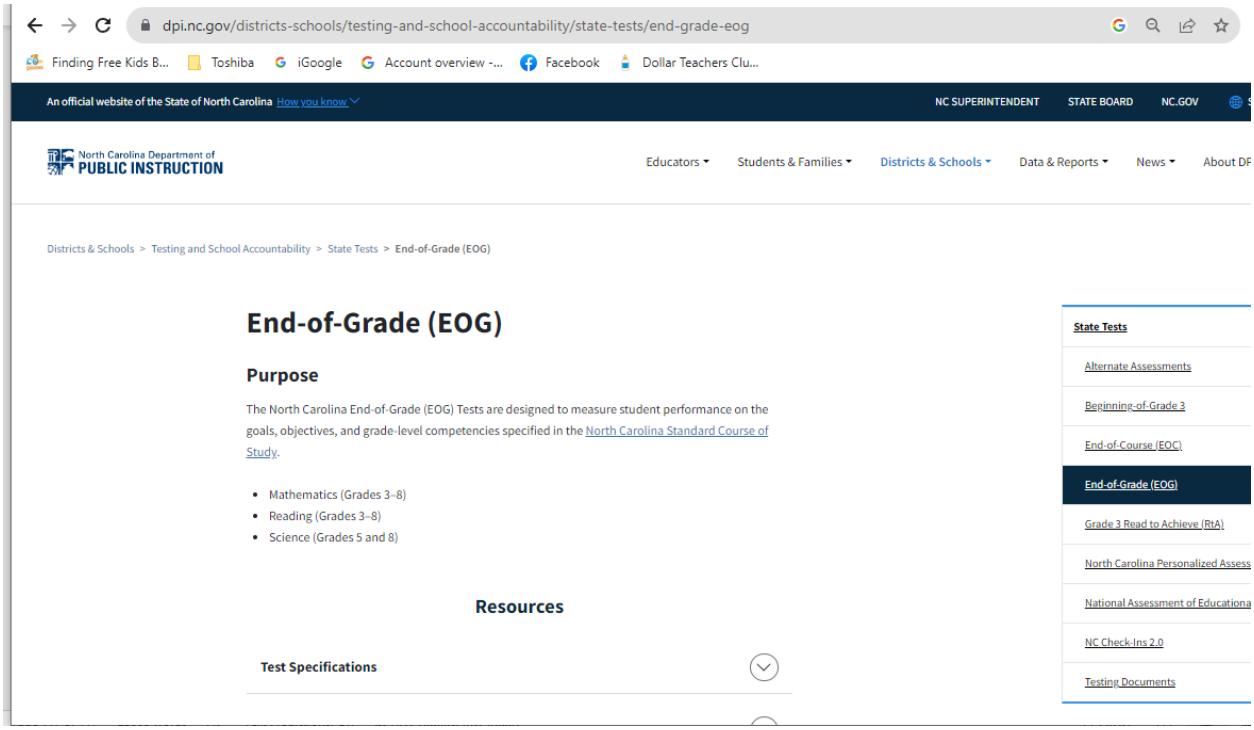
Sincerely,

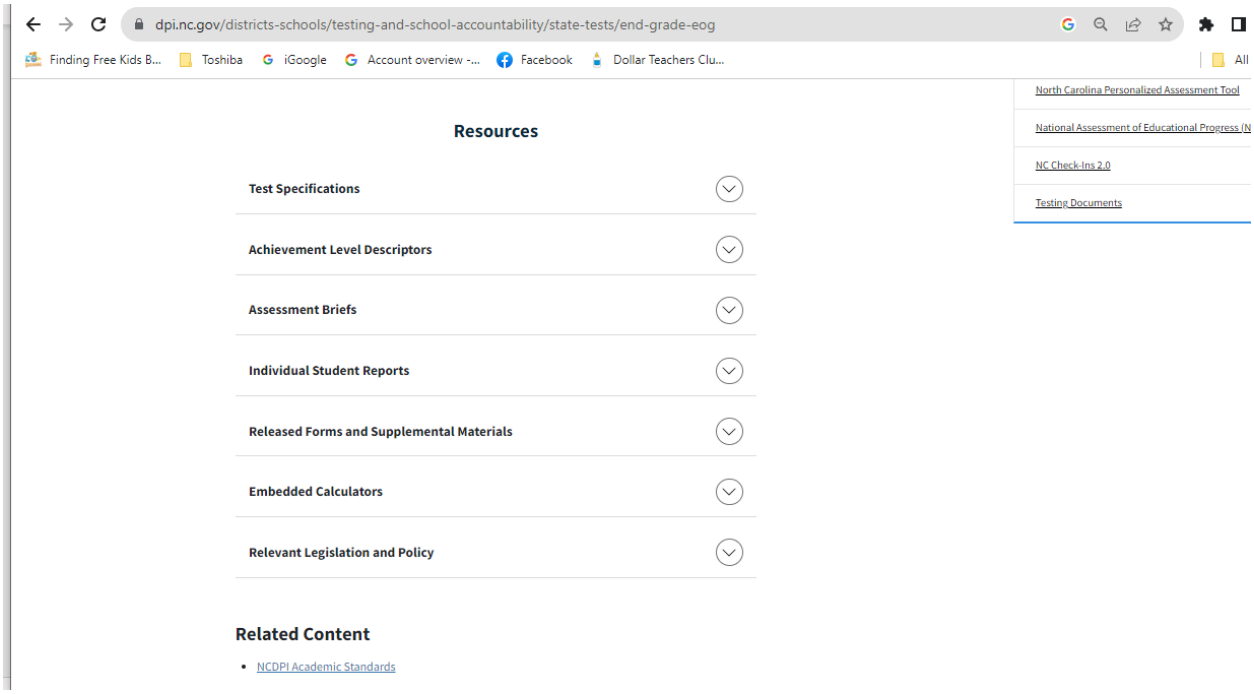
Sharla Edwards, Ed.S

APPENDIX D: Instrument Information






dpi.nc.gov/districts-schools/testing-and-school-accountability/state-tests/end-grade-eog
Finding Free Kids B...
Toshiba
iGoogle
Account overview -...
Facebook
Dollar Teachers Clu...
An official website of the State of North Carolina How you know
NC SUPERINTENDENT
STATE BOARD
NC.GOV
North Carolina Department of PUBLIC INSTRUCTION
Educators
Students & Families
Districts & Schools
Data & Reports
News
About DP
Districts & Schools > Testing and School Accountability > State Tests > End-of-Grade (EOG)
End-of-Grade (EOG)
Purpose
The North Carolina End-of-Grade (EOG) Tests are designed to measure student performance on the goals, objectives, and grade-level competencies specified in the North Carolina Standard Course of Study.
Mathematics (Grades 3–8)
Reading (Grades 3–8)
Science (Grades 5 and 8)
Resources
Test Specifications
State Tests
Alternate Assessments
Beginning-of-Grade 3
End-of-Course (EOC)
End-of-Grade (EOG)
Grade 3 Read to Achieve (RtA)
North Carolina Personalized Assess
National Assessment of Educationa
NC Check-Ins 2.0
Testing Documents


dpi.nc.gov/districts-schools/testing-and-school-accountability/state-tests/end-grade-eog
Finding Free Kids B...
Toshiba
iGoogle
Account overview -...
Facebook
Dollar Teachers Clu...
All
North Carolina Personalized Assessment Tool
National Assessment of Educational Progress (N
NC Check-Ins 2.0
Testing Documents
Resources
Test Specifications
Achievement Level Descriptors
Assessment Briefs
Individual Student Reports
Released Forms and Supplemental Materials
Embedded Calculators
Relevant Legislation and Policy
Related Content
NCDPI Academic Standards