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Remote Learning and Third-Grade Reading Performance in a 1:1 District

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Remote Learning and Third-Grade Reading Performance in a 1:1 District

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Amanda J. Milhorn

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ABSTRACT

Remote Learning and Third-Grade Reading Performance in a 1:1 District

by

Amanda J. Milhorn

The purpose of this quantitative study was to explore a possible relationship between remote learning with 1:1 devices and reading performance for third graders in a school district in Tennessee by comparing differences between universal screener reading data from fall 2020 and universal screener reading data from both fall 2018 and fall 2019. Star Reading universal screener Normal Curve Equivalent (NCE) data from fall 2018, fall 2019, and fall 2020 from three elementary schools were used for the study.

Results indicated that the third-grade students' fall 2020 Star Reading universal screener NCEs were significantly lower than their fall 2018 first grade and fall 2019 second grade universal screener NCEs. The fall 2020 third-grade NCEs were not significantly different from the third-grade fall 2018 and fall 2019 NCEs. There were significant differences in reading performance by gender. The third-grade female students scored significantly lower on their fall 2020 Star Reading universal screener than on their first-grade fall 2018 and second-grade fall 2019 Star Reading universal screener. There were no significant differences in the Star Reading universal screener NCEs for the third-grade male students. Implications for practice and recommendations for further research are discussed.

DEDICATION

To my amazing family- thank you for your encouragement, your love, and your support. To my husband, Bo, thank you for being my rock. You have believed in me every step of the way. I could not have done this without you.

ACKNOWLEDGEMENTS

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Chapter 1. Introduction

COVID-19, also known as the 2019 novel coronavirus, caused unprecedented shutdowns of several countries in 2020, and these shutdowns included school closures. The United Nations Education, Scientific and Cultural Organization (UNESCO) reported that several countries mandated country-wide or localized closures (2020). By the end of March 2020, over 190 countries' closures impacted over 90% of learners enrolled in primary, secondary, and post-secondary education (UNESCO, 2020). The United States was labeled by UNESCO (2020) as having localized closures, with some states mandating school closures and some recommending school closures, to help reduce the spread of COVID-19.

On March 16th, 2020, Tennessee Governor Bill Lee urged school districts to close by March 20th to help lessen the spread of COVID-19 (TN Office of the Governor, 2020a). According to *Education Week,* as of May 15th, 2020, all but two states in the United States had either mandated or recommended school closures for the remainder of the 2019-20 academic year. These recommendations included Tennessee, which was recommended to remain closed for the rest of the school year (Education Week, 2020).

On April 5th, 2020, the Tennessee Department of Education (TDOE) reported that by the end of the 2019-20 academic year, students would miss "50-60 days of classroom-based instruction" (TDOE, 2020b, Slide 6). This indicates that most school systems in Tennessee taught remotely (outside of the physical classroom) for about one-third of the 180-day school year. After factoring in the summer break, most Tennessee students went 19 consecutive weeks without in-person, classroom-based instruction, assuming the districts did not continue to teach remotely during the start of the 2020-21 academic year (TDOE, 2020b). According to Tennessee

Commissioner of Education Dr. Penny Schwinn, as of September 23rd, 2020, students have gone more than six months without in-person, classroom-based instruction in Tennessee school systems that continued to remain remote during the start of the 2020-21 school year (TN Office of the Governor, 2020b).

Statement of the Problem

Existing research on the impact of missing school from summer breaks, school closures (e.g., snow days), and absenteeism was used to project the potential learning loss of students due to remote learning caused by COVID-19 during the spring term of the 2019-20 school year (Kuhfeld et al., 2020). These projections indicated that students could have started the 2020-21 academic year with only about 37-50% of the learning gains in math they would have had during a regular school year and with about 63-68% of the learning gains they would typically have had in reading (Kuhfeld et al., 2020). On September 23rd, 2020, Commissioner of Education Schwinn stated during a COVID-19 briefing, "…in third grade, we typically have a 33% literacy rate. We are probably going to look at somewhere between 12% and 14% literacy statewide" (TN Office of the Governor, 2020b, para. 13). However, while there are projections of learning loss due to remote teaching, these projections are not based on data from the remote learning period.

Significance of the Study

It is crucial to determine how effective remote learning (learning outside the physical classroom) during the spring term of the 2019-20 school year was using actual data from this unprecedented remote learning period instead of relying on projections from previous studies related to missing school from summer breaks, absenteeism, or school closures for snow days. Districts need to understand how remote learning could have already affected student reading

performance and could continue to impact performance because the COVID-19 pandemic is still impacting schools during the 2020-21 academic year. Several districts have continued remote learning or implemented blended/hybrid learning, which includes a mixture of both in-person and remote learning, during the 2020-21 school year.

Purpose of the Study

The purpose of this quantitative study was to explore a possible relationship between remote learning with 1:1 devices and reading performance for third graders in a school district in Tennessee by comparing differences between universal screener reading data from fall 2020 and universal screener reading data from both fall 2018 and fall 2019. The district chosen for this study, referred to as the 1:1 (one-to-one) district, used online remote learning methods for all K-12 students. The 1:1 district has implemented and maintained a 1:1 initiative for over five years and allowed students to take home their devices to use during the remote learning period. This study specifically focused on reading performance for third-grade in the 1:1 district because of Tennessee's Read to be Ready initiative, which was initiated in 2016 by former Governor Bill Haslam and former Commissioner of Education Candice McQueen, with a goal of at least 75% of third graders reading proficiently in Tennessee by 2025 (TDOE, 2018b).

The universal screener reading data from fall 2018 and fall 2019 represents how the students scored before remote learning compared to fall 2020 data, which was gathered from a time that included remote learning. Comparing third graders' fall 2020 data to their past first and second-grade data (from fall 2018 and fall 2019, respectively) helped determine whether there was a significant difference in reading performance growth since remote learning occurred; while comparing fall 2020 third-grade data to fall 2018 third-grade data and fall 2019 third-grade data helped determine whether there was a significant difference in reading performance since

remote learning took place compared to typical third-grade reading performance before remote learning.

Research Questions

      The following research questions were designed to guide the analysis of fall universal screener reading data from the 1:1 school district to examine the possible relationship between remote learning with 1:1 devices during the spring term of the 2019-20 school year and the reading performance of third graders. The research questions also examined the differences between reading performance universal screener scores by gender.

Research Question 1: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

Research Question 2: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

Research Question 3: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and third-grade students' fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

Research Question 4: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and third-grade students' fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

Research Question 5: For the above Research Questions 1 and 2 found to have a significant difference, as a post-hoc analysis, is the difference in Star Reading universal screener NCEs by gender?

Research Question 6: For the above Research Questions 3 and 4 found to have a significant difference, as a post-hoc analysis, is the difference in Star Reading universal screener NCEs by gender?

Definitions of Terms

The following definitions are essential for comprehending this study:

1. 1:1 initiative (one-to-one initiative): program in which every student and teacher in a school is provided with a tablet, laptop, or another electronic device by the school or school district to use for their schoolwork, resulting in a ratio of one device to one student (Stanhope & Corn, 2014; Varier et al., 2017).

2. Literacy: "the quality or state of being literate, especially the ability to read and write" (dictionary.com, 2020, definition 1).

3. Normal Curve Equivalent Scores (NCEs): scores that range from 1-99 with a normal distribution and a mean of 50 (Renaissance Learning, Inc., 2019). NCEs are on "an equal-interval scale," meaning "the difference between two successive scores on the scale has the same meaning throughout the scale" (Renaissance Learning, Inc., 2019, p. 106). NCEs are one of the scores students receive on Star Reading universal screeners and measure student performance from year to year. NCEs can also be averaged, making them useful for measuring school-wide achievement gains or losses.

4. Remote learning (or distance learning): learning in which the student is "physically separated from the educator" instead of being present in the classroom for learning (Foght, 2020, para. 1).

5. Response to Intervention and Instruction (RTI^2): a three-tiered framework that reinforces high-quality Tier I core instruction using grade-level standards for all students and uses universal screeners to help identify students who need additional support. Students in need of additional support receive Tier II or Tier III skills-based small group intervention in addition to Tier I core instruction (TDOE, 2016).

6. Star Reading: one of the Star Assessments created by Renaissance Learning that can be used as a universal screener; Star Reading assesses reading skills for grades K-12 (Renaissance, 2013).

7. Universal screener: skills-based assessment given to students three times a year as part of RTI^2; they provide national norms and assess performance in the following skill areas: "basic reading skills, reading fluency, reading comprehension, math calculation, math problem solving, and written expression" (TDOE, 2016, pp. 10-11). Percentile rankings from universal screeners help schools identify students in need of Tier II or Tier III support in addition to Tier I core classroom instruction.

Limitations and Delimitations

There are limitations to this ex post facto study related to the researcher not being able to "manipulate the independent variable" (Cohen et al., 2013, p. 309). This study explored a possible relationship between remote learning with 1:1 devices during the spring term of the 2019-20 school year and third graders' reading performance via Star Reading universal screener NCEs. There could have been outside variables that potentially influenced the students' scores.

For example, some families chose to opt out of remote learning (discussed below), which could have impacted the fall 2020 universal screener data used for the study.

This study's population was delimited to students in a school district that has implemented and maintained a 1:1 initiative for over 5 years. These students were able to take home and use their 1:1 devices for remote learning. The district provided hotspots as needed so that all students had access to the internet, allowing them to use their devices. Other districts may have used other remote learning methods, such as packets of worksheets, or they may have chosen online methods but could not provide devices or means of internet access for all students. The RTI^2 universal screener that the 1:1 district uses for reading is Star Reading. Therefore, Star Reading NCEs were used as the data for this quantitative study, but other districts may use different universal screeners. The results of this study may not be generalizable to other school districts or universal screener tests.

Chapter Summary

COVID-19 led to long-term school closures worldwide, including in the United States, during the spring term of the 2019-20 school year. Tennessee was no exception, with school districts recommended to close by March 20th, 2020 (TN Office of the Governor, 2020a). Districts had to figure out how to teach remotely, and some implemented online learning, some used printed materials, and others used a blended approach with both online and printed materials. Projections based on previous studies related to missing school for summer break, school closures (e.g., snow days), and absenteeism indicated learning loss due to this shutdown. However, these projections were based on studies that were unlike this long-term one in which teachers continued to instruct students. This study is significant because it used data from this

unprecedented remote learning period instead of relying on past school closures projections to determine the extent of actual learning loss in reading for third graders in a 1:1 school district.

This study is organized into five chapters. Chapter 1 includes an introduction to remote learning during the spring term of the 2019-20 academic year, the statement of the problem, the significance of the study, the purpose of the study, research questions, definition of terms, and limitations and delimitations. Chapter 2 contains an overview of research relevant to remote learning with 1:1 devices and third-grade reading performance. Chapter 2 includes information regarding 1:1 initiatives, methods of remote learning due to the COVID-19 pandemic, challenges with remote learning due to the COVID-19 pandemic, previous research regarding missing school and its impact on achievement, the conceptual framework of the study, Tennessee's Read to be Ready initiative, technology and reading performance, universal screener tests and RTI^2, learning disabilities in reading, and Star Reading universal screeners. Chapter 3 describes the methodology of the study and includes the research questions and null hypotheses, research design, site selection, population and sample, instrumentation, data collection, data analysis, assessment of quality and rigor, and ethical considerations. Chapter 4 presents the findings of this study. Chapter 5 provides a conclusion, implications for practice, and recommendations for further research.

Chapter 2. Review of Related Literature

The purpose of this review of essential literature is to provide research related to exploring the possible relationship between remote learning and reading performance of third graders in a 1:1 district in Tennessee. This section includes information regarding the following areas: (a) 1:1 initiatives, (b) methods of remote learning due to the COVID-19 pandemic, (c) challenges with remote learning due to the COVID-19 pandemic, (d) previous research regarding missing school and its impact on achievement, (e) conceptual framework, (f) Tennessee's Read to be Ready initiative, (g) technology and reading performance, (h) universal screener tests and RTI^2, (i) learning disabilities in reading, and (j) Star Reading universal screeners.

1:1 Initiatives

The district chosen for this study has implemented a 1:1 initiative for over 5 years. According to Varier et al. (2017), districts implement a 1:1 initiative to promote digital literacy and enhance opportunities for 21st-century skills, such as collaboration and self-directed learning. Promoting digital literacy has been at the forefront of education for years, especially since the No Child Left Behind Act of 2001 which promoted students being "technologically literate" by the end of their eighth-grade year and focused on eliminating the digital divide between students no matter their socioeconomic status (SES) or race (Harris et al., 2016, pp. 368-369). Merriam and Bierema (2014) defined the digital divide as "the differences between those who have access to the internet and those who do not" (p. 194).

Researchers have observed that 1:1 initiatives have changed how teachers use technology, transforming it as primarily a tool to deliver instruction to using technology as a learning tool for students, improving student motivation, increasing engagement, and positively

impacting achievement (Powers et al., 2020; Varier et al., 2017). Teaching with 1:1 devices

shifts instruction from a teacher-centered to a learner-centered focus (Varier et al., 2017).

Boylan-Ashraf (2020) described teacher-centered learning as learning in which the teacher

directly explains concepts and students practice these concepts through "rote memorization,"

while student-centered learning was described as learning through "exploration" and

"application" (p. 27). According to Boylan-Ashraf (2020), student-centered teaching methods,

such as problem-based learning and cooperative learning, deepen conceptual understanding more

than teacher-centered teaching methods, such as drill and practice. Lowther et al. (2003) found

that teachers were more likely to incorporate project- and research-based tasks when their

students had devices because the devices gave students access to researching information and

presenting the results. Using 1:1 devices provides students with more opportunities to

collaborate, such as creating group presentations (Varier et al., 2017). Furthermore, using the

devices enables teachers to support students by monitoring student work, providing feedback in

real-time, and providing more extensive differentiated instruction and enrichment opportunities

than what they could provide students through traditional teaching methods (Harris et al., 2016;

Varier et al., 2017).

　　　While several studies have shown positive outcomes related to student performance and

1:1 initiatives, other studies have shown that a lack of training, unclear expectations, "negative

teacher attitudes," and a lack of a "clear, shared vision" regarding using technology for teaching

and learning are barriers that could diminish the effectiveness of the use of technology (Union et

al., 2015, p. 72). Furthermore, Bebell and O'Dwyer (2010) asserted that 1:1 describes access to

technology, but just because it is available does not mean being used to support and enhance

learning (p. 12). Training and supporting teachers, teaching students how to use devices, and

supporting and communicating with parents are essential components of a successful 1:1 initiative.

Training and Supporting Teachers

Bebell and O'Dwyer (2010) emphasized the importance of teacher buy-in for a successful 1:1 initiative because teachers decide how often students will use technology in their individual classrooms. When teachers are committed to implementing the 1:1 initiative, they are likely to use the devices more often with their students. Because teacher buy-in is so important, there must be supports in place to assist teachers in the 1:1 implementation, such as an understandable 1:1 plan for implementation supported by the administration (Bebell & O'Dwyer, 2010).

Having a clear plan of the steps needed to carry out a 1:1 initiative and providing consistent support to teachers is important for sustaining a 1:1 initiative (Bebell & O'Dwyer, 2010). In the studies they reviewed regarding schools that piloted a 1:1 initiative, Bebell and O'Dwyer reported that one of the schools did not have clear direction from the administration or support for implementing their 1:1 program. By the third year of implementation, the school's use of technology was similar to one of the control schools that had not implemented a 1:1 initiative. In contrast, another study Bebell and O'Dwyer (2010) reviewed summarized that having a "consistent administrative policy" for executing a 1:1 initiative led to conditions that increased and sustained the use of 1:1 devices in the classroom for instruction (p. 9).

Training teachers to use technology is also important for a 1:1 initiative. According to Mundy et al. (2012), teachers who have little to no technology training are less likely to use technology or see the value of using it in the classroom. Ferguson (2017) argued that if teachers are not trained to use devices and incorporate them into their teaching, the devices become a

replacement for paper/pencil instruction. The SAMR model (Substitution, Augmentation, Modification, and Redefinition) developed by Puentedura in 2013 explains four ways to incorporate technology in the classroom (Ferguson, 2017). When teachers are not trained to use devices, they tend to use technology for the lowest level, Substitution. Substitution is when technology acts as a substitution for paper and pencil and does not change how students are taught in the classroom (Ferguson, 2017).

Augmentation is the second level of the SAMR model, and this is when technology is used for typical teaching tasks, such as taking an assessment online. However, the technology assists in immediate feedback for the student, which enhances the typical teaching tasks. The third level is Modification, which is when technology is used to begin to transition learning from teacher-centered to learner-centered. This occurs when students use technology to create projects. The final level is Redefinition, which happens when the classroom transitions to a learner-centered classroom. Technology is used for tasks that the students could not do if there were no technology (Ferguson, 2017).

For technology to make a difference in teaching, teachers need to be taught how to use technology for higher levels, such as Modification and Redefinition. Islam and Gronlund (2016) conducted a systematic literature review on the impact of 1:1 initiatives on students. They concluded that technology only improves schools when there is "good pedagogy," and when teachers are shown "good examples" for implementing the devices (p. 216). Similarly, Zhu et al. (2019) argued that the "quality" of how information and communication technology (ICT) is used when teaching can impact student learning (p. 260).

Teachers also need ongoing technological support when they are using technology in the classroom. Stanhope and Corn (2014) conducted a mixed-methods study of the role of the

technology facilitator (TF), which they defined as a "technology professional" who supports

teachers with their 1:1 implementation, and how the TF impacted 1:1 integration (p. 253). For

their study, Stanhope and Corn selected four high schools in North Carolina that each had a full-

time TF during their 1:1 implementation as of spring 2009, but due to budget constraints, none of

the schools had a full-time TF as of spring 2010. The results of the study indicated that teachers'

attitudes towards learning about technology, teaching with technology, and towards the school

infrastructure were higher when a full-time TF was employed. According to Stanhope and Corn

(2014), this is because TFs provide continual support (including resolving technical issues and

support for learning new technologies) and guidance for how to incorporate technology into

lessons.

Union et al. (2015) also discussed the importance of providing teachers with

technological support and training. In their study, Union et al. noted the significance of having

supportive administration that encourages the use of technology in the classroom as well as

"daily support" from "technology-savvy" teachers (p. 79). Union et al. argued the importance of

providing technology-related professional development opportunities to develop "confident,"

"competent," and "technology-literate" teachers who learn how to incorporate technology into

their lessons in a way that increases student achievement (p. 72).

Teaching Students How to Use Devices

Students also need time to learn how to use 1:1 devices. Union et al. (2015) described

how the third-grade teacher in their mixed-methods case study regarding the use of electronic

reading devices (known as eReaders) to improve third graders' reading performance spent the

first half of the school year teaching the third graders the basic functionalities of the eReaders

and how to use them in the classroom to complete ELA assignments. After winter break, the

teacher spent time reteaching students how to use the eReaders before allowing students to begin to take the eReaders home over the weekend to work on ELA assignments. Students were not permanently issued the eReaders until after spring break to give them time to understand how to use the device properly and develop responsibility for bringing the devices to and from school and keeping them charged.

According to Ferguson (2017), students need time to adjust to using devices in the classroom. Ferguson conducted a study in which students in a suburban middle school in New York were surveyed about their perceptions of using iPads. The sixth- and eighth-grade students who participated in the study had been using the iPads for eight months, while the seventh-grade students who participated had been using the iPads for one year and eight months. The results of the study indicated that the seventh-grade students who had been using the iPads a year longer than the other two grades overall had more positive responses regarding the use of the iPads for instruction. Ferguson concluded that this is because students have a learning curve in which they need to learn how to use the devices before they can use the devices to learn.

Ferguson (2017) also discussed differences between the survey responses of students who are English language learners (ELLs) and students whose native language is English. ELLs responded more positively to agreeing that they learn better using iPads than students whose native language is English. Another difference was that students whose native language is English agreed more with the survey statement about iPads being a distraction than ELLs did. According to Ferguson, teachers must work to make sure that students stay on task when using devices so that they do not become a distraction and suggested arranging desks so that the teacher can stand behind the students and view their screens.

Furthermore, Ferguson (2017) found that males tended to answer more positively than females for survey items, such as agreeing that they learn better by using iPads and that their grades have improved since using iPads. Gömleksiz (2012) had similar findings in a study of sixth-grade students' perceptions of technology and science classes. In this study, statistically significant differences were found between the survey responses of male and female students' perceptions regarding the necessity of technology and science classes and their perceptions of those classes' learning environments (Gömleksiz, 2012). Male students tended to score survey items significantly higher than female students regarding their perceptions of these classes' importance and had more positive attitudes towards learning technology and science. Gömleksiz argued that this could be due to confidence levels in their ability, and, based on previous research, stated that even when females have an achievement level in technology and science similar to their male classmates, they still may feel less confident, show a lack of interest, and feel unprepared to learn and participate in technology and science classes. Ferguson (2017) suggested that males might have an easier time adjusting to technology, and females might need extra support. Gömleksiz (2012) asserted that all students learn differently, and teachers need to consider this when planning their lessons to support students.

Supporting and Communicating with Parents

Parental support is also important for a successful 1:1 initiative (Ferguson, 2017). Schools need to communicate information about their 1:1 initiative to parents. Keane and Keane (2018) explained that parents might have little or no personal experience using technology for learning, which causes concerns for how students use them to learn. Keane and Keane surveyed 121 parents over 4 years to study parent perceptions of students using devices for learning. The

results indicated that parents felt devices were distracting to learning, and they were not convinced that using technology would help their children learn.

In another study, Şad et al. (2016) stated that some parental concerns included children getting off task by using technology for non-educational purposes and that using technology could lead to isolation or cause their children to become "unsocial individuals" (p. 166). Şad et al. suggested that parents use filters to block certain websites, sit with their children while they are online, and limit their children's time using technology. Ferguson (2017) suggested that schools or districts should communicate information to parents about the 1:1 initiative and provide parents with training opportunities for using the devices. Teaching parents how to use the devices improves the parents' ability to help their children when they must use devices for homework, and it allows parents to see how the devices are being used to enhance learning.

Districts that have 1:1 initiatives, such as the 1:1 district, may have allowed students to take devices home during the remote learning period of the 2019-20 school year. However, not every district was able to provide students with devices. The following section discusses the various methods of remote learning that took place during the spring term of the 2019-20 academic year.

Methods of Remote Learning Due to the COVID-19 Pandemic

Methods of remote learning during the spring term of the 2019-20 school year included online learning with digital resources, providing students with printed materials to complete at home and turn back in (e.g., packets of worksheets), or a blended approach with a combination of online resources and printed materials.

The TDOE (2020c) provided a toolkit that included both online resources and printable materials and left it up to districts to determine best practices for choosing "fully digital, packet-

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based, or a blended approach and how that might vary across grade bands" (p. 1). The toolkit's

recommendations differed for K-2, 3-5, and 6-12 grade bands, but all favored a blended

approach. The TDOE (2020c) recommended that students in grades K-2 only access online

learning content for up to 30 minutes a day and focus instead on involving parents in the learning

by sending home packets or providing printable materials for students to complete with parental

assistance. The TDOE (2020c) also recommended that students in grades 3-5 limit the amount

of online learning each day and suggested "independent practice activities in all content areas"

and opportunities to involve families in "exploration and inquiry" (p. 4). Recommendations that

spanned for K-5 included practicing handwriting with paper/pencil, "daily reading fluency

practice," and accessing digital platforms to practice math and language arts skills (TDOE,

2020c, p. 5).

Challenges with Remote Learning Due to the COVID-19 Pandemic

Regardless of the remote learning methods used, districts faced many challenges with

remote learning that may have led to inequalities in students' access to learning opportunities.

Some of these challenges were opting out of remote learning, issues with the internet and

devices, challenges with accommodating students, and difficulties with limited and delayed

feedback.

Opting Out of Remote Learning

Sarah Parcak (2020), a professor of anthropology at the University of Alabama at

Birmingham, wrote an article in *Time* stating she and her husband chose to have their 7-year-old

child opt out of remote learning. In the article, Parcak (2020) explained that she and her husband

both work full-time jobs and questioned how parents were supposed to care for their children,

work, and facilitate remote learning. Like Parcak's family, many other families also chose to opt

out of remote learning. For example, during the first 2 weeks of remote learning, the *Los Angeles Times* reported that over 15,000 high school students had not completed any work or logged into online classes (Blume & Kohli, 2020). In Nevada, the Clark County School District reported 100,000 students who had not participated in online learning as of April 2020 (Kelly, 2020).

There were families in Tennessee who also chose to opt out of remote learning. The Tennessee State Board of Education (2020) issued grading requirements for public schools that stated 12th-grade students could not earn a lower grade than what they had earned as of March 20th, 2020; they could only improve their grades, not make them worse. Although 12th grade was the only grade specified in the requirements, districts adapted these requirements to incorporate all grade levels. Once these grading requirements were issued, the number of families opting out of remote learning continued to increase.

Issues with Internet and Devices

While some students opted out of distance learning, others attempted to learn remotely with limited access to devices and reliable, high-speed internet. Correia (2020) referred to the spring term of the 2019-20 school year as "emergency remote teaching" and explained that even if every student were given the "same quality online learning," because of the digital divide, they would not have had equitable to access the learning (pp. 14-15). Merriam and Bierema (2014) discussed that there are significant differences in internet access for adults without a high school education, who earn less than $20,000 per year, and who are 65 or older when compared with adults who have a high school education, who earn more than $20,000 per year, and who are younger than 65. Children living in households of families where any of these factors exist are less likely to have access to the internet, making remote learning a challenge. Correia (2020)

reported that 35% of students between the ages of 6 and 17 living in households that earn less than $30,000 per year do not have access to high-speed internet at home, making remote learning difficult when compared to their classmates who have high-speed internet access.

To help combat internet access inequalities, some schools provided students with Wi-Fi hotspots that they could take home with them to connect a device to the internet (Correia, 2020). Other schools created Wi-Fi hotspots in their school parking lots for students so families could drive to the school to let their students work online. However, not all schools that implemented online remote learning methods could equip students with Wi-Fi hotspots. The Tennessee State Board of Education (2020) required that schools provide students with printed materials if they did not have internet access. However, the printed materials may have been different from the online materials teachers used with students who did have internet.

Some students also struggled to access online distance learning resources because they did not have a device. Some districts provided devices to students to help minimize this inequality, but there were concerns about using them. The Consortium for School Networking (CoSN) reported in its annual survey of K-12 education technology leaders that 42% of elementary schools, 63% of middle schools, and 60% of high schools had implemented a 1:1 initiative (CoSN, 2019). Results of the survey indicated that there are concerns associated with students using devices, such as cybersecurity, unequal access to digital resources outside of school (e.g., having the internet to be able to use the device), having a budget to maintain devices, and supporting teachers to implement using the devices effectively. While the concerns addressed in the survey were based on using devices during a regular school year, these would have also been concerns when allowing students to take their devices home for remote learning.

Even if students had access to devices, a lack of training (for students, teachers, or both) on using the devices could have impacted students' ability to learn remotely. While many districts in the CoSN (2019) survey reported 1:1 implementation, 67% of survey respondents indicated their district uses printed materials for 50% or more of their instruction, and 18% of respondents indicated using printed items for around 75% of their instructional materials. This emphasis on printed materials, even with access to 1:1 devices, could indicate that teachers are not comfortable transitioning to an online teaching and learning format. This could be related to teachers not having the training they need to help them use online resources and 1:1 devices (discussed above). The transition to remote learning would have been a challenge for educators without proper training on creating online resources and organizing them onto a learning management system (LMS) for students to access. Because the closure announcement for Tennessee was March 16th and schools were urged to close by March 20th, that left little to no time for districts to provide teachers with training to create and execute an online curriculum (TN Office of the Governor, 2020a).

If teachers limited the use of technology in their classrooms during the regular school year, this would also mean that students had limited opportunities to become familiar with online resources before remote learning began. Merriam and Bierema (2014) explained that students might have difficulty navigating an LMS to find and complete assignments. Navigating an LMS for distance learning could have been even more difficult for students with multiple teachers that each had a different method for organizing online materials and assignments.

Challenges with Accommodating Students

Transitioning from the regular classroom to distance learning was challenging for teachers trying to create and deliver lessons to meet their students' diverse learning styles.

Research on differences in learning styles based on gender showed that the traditional classroom setting structure was a good fit for female students who can multitask and sit still during class (Carrier, 2009). Moreover, female students specifically need quiet time to learn a difficult or new concept (Pizzo et al., 1990, as cited in Honigsfeld & Dunn, 2003, p. 197). On the other hand, in their study regarding gender differences in learning throughout five different countries, Honigsfeld and Dunn (2003) found that male students preferred background noise.

According to Honigsfeld and Dunn (2003), male students tend to have difficulty concentrating and sitting still during class and instead "learn by doing rather than being passive" (p. 204). Male students prefer an informal classroom environment with opportunities to actively engage in learning to process information. In contrast, female students are more auditory than males, making them more likely to learn from a lecture-format of teaching (typical of a formal classroom environment) than their male peers. Honigsfeld and Dunn found that male students prefer kinesthetic and tactile sensory activities more than female students and favor interacting with their peers more than working alone. In contrast, female students are more inclined than male students to favor variety in how they are taught (as opposed to mainly preferring kinesthetic activities) and were more teacher-motivated and self-motivated than their male peers. According to Sadker and Sadker (1994), teacher-motivated female students could lose their motivation and begin to underestimate their abilities if they receive less attention from their teacher (as cited in Bassi et al., 2018, p. 4). The remote learning period may have made it difficult for teachers to plan and deliver lessons that promoted active learning and used various teaching methods while also trying to recreate the traditional classroom setting structure and give all students attention.

Teachers also needed to determine how to tailor their remote teaching to meet the needs of students with disabilities and ELLs. The TDOE (2020d) created a toolkit specifically for

remote learning for special populations. It specified in the toolkit that students with

individualized education programs (IEPs) should be provided with "special education and related

services identified in the IEP, to the greatest extent possible" (p. 1). The document also

mentioned that districts should make every effort possible to provide supports listed in Individual

Learning Plans (ILPs) for ELLs and services listed in 504s for students. Consistent schedules,

modified versions of assignments, online resources, and ensuring each student in the home had

access to a device were suggestions in the toolkit.

To help with internet access, the TDOE (2020d) provided a list of the primary internet

providers in Tennessee, many of whom offered free connection and service during the remote

learning period. However, even with free internet offers, many students in rural areas could have

struggled to get reliable internet. For students who could not connect to reliable internet, schools

would have needed to provide different options, such as worksheet packets. Schools would have

needed to find alternative methods for academic progress check-ins for students with disabilities

and ELLs, such as phone calls instead of computer-based video conferencing.

Difficulties with Limited and Delayed Feedback

There were still other challenges related to distance learning, including limited and

delayed feedback. Feedback for remote learning would have been limited compared to the

amount of feedback teachers can give students during in-person, classroom-based instructional

times. Fiock (2020) stated that feedback for online courses should be "constructive" and

"immediate" and suggested the use of email, phone calls, chats, or discussions (p. 145).

Immediate feedback is possible for synchronous instruction, which is instruction where learners

meet online at the same time (Merriam & Bierema, 2014). However, it is harder to provide

immediate feedback for asynchronous work, which is work completed by learners at their own

pace and could be in the form of asynchronous online assignments or packets of worksheets (Merriam & Bierema, 2014).

Limited or delayed feedback from teachers during the remote learning period would have made it difficult for students to know if they understood the taught material. Likewise, students' limited or delayed responses to teachers would have made it difficult for teachers to assess understanding to determine whether students needed reteaching or if the teacher could move on to new content. As discussed above, some students are more teacher-motivated than others, and limited or delayed feedback may have impacted them more than it did their classmates (Sadker & Sadker, 1994, as cited in Bassi et al., 2018; Honigsfeld & Dunn, 2003).

Previous Research Regarding Missing School and its Impact on Achievement

The COVID-19 pandemic is an unprecedented crisis that led to long-term school closures, and the extent of potential learning loss due to remote learning is currently unknown. However, there are projections for learning loss during the remote learning period based on previous research regarding the impact of missing school for snow days, absenteeism, and summer break (Kuhfeld et al., 2020). The following sections discuss studies regarding reasons for missing school, including school closures for snow, absenteeism, chronic absenteeism, and summer learning loss, and their impact on student achievement.

School Closures for Snow

Gordon (2014) studied the impact on achievement related to schools closing for snow in Massachusetts. The findings did not show a strong relationship between school closures and achievement. According to Gordon, all students miss the same lesson(s) when the entire school closes for snow. Teachers can adjust lessons by skipping non-tested material or waiting until

after taking standardized tests to teach the non-tested material. In the case of the long-term school closure due to COVID-19, teachers would not have had the opportunity to choose to skip nontested material upon returning to school because schools remained closed for the rest of the academic year. As discussed above, Tennessee districts missed around 50 to 60 days of in-person instruction, which would indicate that many standards had not yet been taught before schools closed (TDOE, 2020b). In the TDOE (2020c) school closure toolkit, it was left up to individual districts and schools to decide whether to review previously taught material or teach new material, which means there could be standards that students were not taught during the 2019-20 academic year.

In another study, Marcotte and Hemelt (2007) analyzed 7 years of reading and math standardized test data of third-, fifth-, and eighth-grade students in various Maryland districts to determine a possible relationship between student achievement and unscheduled school closures (due to snow). Their findings suggested that school closures negatively impact student performance on standardized tests in lower grades more than upper grades. Marcotte and Hemelt estimated that "the pass rate for 3rd-grade math and reading assessments will fall by more than a half percent for each school day lost to an unscheduled closure" with a drop of 0.527% per day for math and 0.508% per day for reading (p. 16). They illustrated this with the example that when school districts had ten days of unscheduled closures due to snow, over 5% fewer third graders scored proficient in reading and math assessments when compared to academic years without unscheduled closures. Marcotte and Hemelt concluded that school closures impact math more than reading. However, reading was still negatively impacted, as indicated by the 0.508% decrease in third-grade reading performance every day that schools have an unscheduled closure.

Absenteeism

In the study discussed above, Gordon (2014) also analyzed the data based on absences (i.e., the schools do not close for snow, but the student does not attend school). Gordon found there was a strong relationship between individual student absences and achievement. Gordon reasoned that when schools remain open, but a student is absent, the teacher needs to spend instructional time catching the student up (which takes away instructional time from all students). The teacher could also choose not to spend instructional time helping the student catch up, which could disrupt other lessons as the absent student struggles to catch up and needs help with future lessons.

Furthermore, Gordon (2014) found that math achievement was impacted more than English language arts (ELA) and argued that math requires an understanding of prior content more than ELA does. "As a result, absences in math thus have longer-run effects in which students lose mastery of both the material for which they were absent and the subsequent material that depends on such knowledge" (p. 18). Gordon contended that being absent from an ELA lesson does not impact a student's ability to understand future material as much as missing a math lesson.

Several other studies have found that student performance is impacted by attendance. Roby (2004) analyzed Ohio Proficiency Test scores of students in grades 4, 6, 9, and 12 and student attendance rates. Roby found a moderate to strong positive correlation between student achievement on the proficiency test and attendance rates. Similarly, Gottfried (2010) investigated the relationship between students' attendance and achievement in urban elementary and middle schools and found that students with better attendance have higher achievement levels. Gottfried also found that as a student's distance from their home to the school increased,

their attendance decreased and that students with higher grade point averages (GPAs) during the previous school year tended to miss fewer school days the next year.

Morrissey et al. (2014) studied kindergarten through fourth-grade students' attendance and achievement related to family income measured by whether they received free or reduced-price lunch. Their findings indicated a link between academic performance and attendance for the kindergarten through fourth-grade students, with a greater number of absences resulting in lower test scores and grades (specifically with five or more absences). Small associations were found between absences and income, with absences increasing by 0.03 days with each grade level for students who received free or reduced-price lunch. Results also indicated negative associations between students receiving free or reduced-price lunch and their standardized scores, and the scores were lower for older grade levels. The longer a student qualified for free or reduced-price lunch, the lower the scores tended to be; however, the effect sizes were small, ranging from 0.04 to 0.18. Morrissey et al. noted the study excluded students with special needs and students who had been retained anytime between kindergarten and fourth grade, which could have impacted the results.

Etim et al. (2020) studied data from 425 North Carolina middle schools based on teacher turnover rate, teacher level of experience, and student attendance compared to school performance scores. School performance scores are letter grades of A, B, C, D, or F. Etim et al. found a negative relationship between teacher turnover rate and school performance scores. However, they found positive relationships between teacher level of experience and students attending school daily compared to school performance scores. Etim et al. observed that the schools with better performance scores had a higher percentage of experienced teachers, had better student attendance, and had lower teacher turnover rates. Etim et al. emphasized the

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importance of schools recruiting and retaining experienced teachers and reaching out to families to help identify and remove barriers that could be causing student absences.

Chronic Absenteeism

Students who miss school due to unexcused absences, excused absences, and suspensions for 10% or more of the school year are considered chronically absent (Attendance Works, 2018). This calculates to missing 18 or more school days out of a 180-day school year. Chronic absenteeism greatly impacts students with disabilities, students of color, and students living in poverty. Barriers, such as a lack of consistent transportation to school, might lead to chronic absenteeism. Morrissey et al. (2014) suggested tracking students to identify barriers and providing transportation to those who need it to combat chronic absenteeism.

Health issues, such as diabetes, asthma, mental health issues, and oral health issues are also linked to chronic absenteeism (Attendance Works, 2018). In a literature review regarding reading achievement and family income, Buckingham et al. (2013) reviewed several studies that indicate the health of children declines with lower SES, leading to poor attendance. Children from lower-income families were more likely than their peers to have poor health conditions, such as persistent asthma or dental issues, impacting school attendance. Buckingham et al. inferred from these studies that literacy is negatively impacted by missing school due to poor health conditions.

The TDOE (n.d.-b) also reported on chronic absenteeism and its negative impact on literacy. The TDOE reported as of fall 2015 that 10% of third graders in Tennessee missed a month of school their third-grade school year. Furthermore, chronically absent third graders missed an average of 80 school days from kindergarten through third grade, and only around

25% of chronically absent students achieved a proficient score in ELA (TDOE, n.d.-b). Chronic absenteeism can lead to "third-graders unable to master reading, sixth-graders failing subjects, and ninth-graders dropping out of high school" (Attendance Works, 2018, para. 1).

Because of the serious impact chronic absenteeism has on students missing instructional time, states such as Tennessee use the Chronically Out-of-School Indicator as one of their school and district accountability measures (TDOE, n.d.-a). However, accountability guidance provided by the U.S. Department of Education (2020) suggested that states "consider a one-year waiver" to exclude chronic absenteeism from their accountability measures due to the issues there were with remote learning, such as students not having internet access to be able to participate or students opting out of remote learning (p. 2). Even though chronic absenteeism did not count against accountability measures for schools and districts for the 2019-20 school year, this did not negate its detrimental impact on student learning if students opted out of distance learning or could not attend class because of issues with the internet or devices.

Summer Learning Loss

Summer learning loss, also known as the summer slide, refers to decreased test scores or a loss of math and reading skills over summer break (Menard & Wilson, 2013). According to Cooper et al.'s (1996) meta-analysis of 39 studies of achievement decline related to summer break, summer learning loss impacts math skills more than reading skills, has a greater effect on students from low-income households, and is worse for older students (as cited in Menard & Wilson, 2013, p. 72). Cooper et al. (1996) suggested that math could be impacted more than reading because fact-based and procedural knowledge is forgotten more quickly than conceptual knowledge. There also tend to be fewer math practice opportunities available than reading practice over summer breaks.

Fiester (2010) stated that students from low-income households could lose up to "two months of reading achievement" over the summer break (p. 20). Cooper et al.'s (1996) meta-analysis also revealed that, while students from low-income households showed declines in reading due to summer break, middle-class students appeared to show gains in reading, which could be caused by differences in opportunities to learn over the summer, such as access to reading materials. As lower-income students show declines while middle- and upper-class students show improvements, this leads to an ever-widening achievement gap between students that increases over the school years (Fiester, 2010).

O'Connor et al. (2005) noted in their study of tiered reading interventions from kindergarten through third-grade that students who eventually received special education services for reading had trends of dropping in reading achievement over the summer break from first to second grade and from second to third grade. Similarly, Menard and Wilson (2013) stated that summer learning loss significantly impacts students who are already struggling readers. They asserted that a decrease in literacy skills each summer could lead to long-term consequences, including "lower educational attainment," which could impact job opportunities (Menard & Wilson, 2013, p. 83).

Research indicates that when summer break does not include learning opportunities, the achievement gap grows over elementary and middle school years and constitutes "about two-thirds of the gap in reading achievement by ninth grade" (Caputo & Estrovitz, 2017, p. 3). Vale et al. (2012) argued the importance of making reading materials available to students year-round, including over summer break. Vale et al. conducted a mixed-methods longitudinal study in Victoria, Australia regarding achievement differences between economically advantaged and disadvantaged students in third through ninth grade. Two common themes among the study's

participants were the belief that students did not read over the break and the importance of making books easily accessible to students. Vale et al. mentioned that many school libraries require students to return their library books before the break, limiting access to reading materials over the summer. However, they noted that some schools in the study allowed students to borrow books over summer break and suggested this could have been a factor for the absence of differences in reading achievement growth in the study between students from lower and higher SES households.

Miller et al. (2018) also emphasized the importance of having access to books every day of the year, including in the summer when there tends to be less opportunity for students to access books. Miller et al. used the terms "book flood" and "book desert" to describe how books are either accessible or inaccessible to students and explained that students in a "book desert" tend to be students of color living in rural or urban areas (p. 45). They suggested providing students with books to read over the summer before they go on break. Miller et al. also discussed rethinking penalizing students with fines or losing check-out privileges when they lose books. Penalties for losing books have a greater impact on students from lower SES households, who are more likely to need access to the books from school or the library over the summer. Finally, Miller et al. also suggested making digital audiobooks and eBooks more accessible to students, but this would only benefit students who have access to devices.

Summer reading programs have been recommended for mitigating the summer slide. Becknel et al. (2017) conducted focus groups with fourth graders from three schools in North Carolina regarding summer reading programs. Each of the three schools comprised two focus groups- one group of participants of the local library's summer reading program and the other group of students who had not participated. The focus group results indicated that students who

already identified themselves as "readers" were more likely to participate in the summer reading program than those who did not (Becknel et al., 2017, p. 5). Students who did not participate in their local library's summer reading program stated that they did not know about the program, were too busy to participate, their parents were unable to take them, or viewed the program as unnecessary remediation. Both the participants and nonparticipants of the program discussed whether their parents could take them to the library as influencing whether they participated. Based on the results, Becknel et al. suggested that libraries communicate about their summer reading programs to both students and parents and provide transportation for students to and from the library as needed.

Conceptual Framework

As discussed above, projections for learning loss during the remote learning period have been based on previous research regarding the impact of missing school (Kuhfeld et al., 2020). However, some theories could also explain why learning loss may have occurred. The conceptual framework for this quantitative study is based on two theories. The first theory is the social cognitive theory, and the second theory is Maslow's hierarchy of needs. Both theories explain why students might have had difficulties with remote learning during the spring term of the 2019-20 school year, even with access to devices and the internet.

The Social Cognitive Theory

A growing number of K-12 virtual schools offer students a completely online curriculum (Toppin & Toppin, 2016). While it is true that the remote learning caused by the COVID-19 pandemic is not the same as an actual virtual school (with families choosing an online school format, with teachers specifically hired to teach online, and with a curriculum created specifically to be implemented online) looking at the performance of students in virtual schools

could provide a picture of student achievement related to learning that is not in-person or classroom-based. Molnar et al. (2019) reported that, of the virtual schools with 2017-18 data, only 48.5% achieved an acceptable performance rating. Toppin and Toppin (2016) reported that K-12 Inc. virtual schools had an on-time graduation rate of 49.1% in 2010-11 compared to a 79.4% on-time graduation rate of in-person public schools. Molner et al. (2019) reported that on-time graduation rates of 290 virtual schools for the 2017-18 academic year were 50.1% compared to 84% nationally.

According to Wei et al. (2012), a possible reason for low achievement and low on-time graduation rates for virtual schools is the social cognitive theory, which also provides a framework for this study. Bandura's social cognitive theory focuses on the importance of social presence and interaction for learning to occur. Bandura (1986) "pictured his model of learning as a triangle in which learning, the person, and the environment are interactive and reciprocal" (as cited in Merriam & Bierema, 2014, p. 35). The social cognitive theory emphasizes that people learn by observing others and imitating them. Interactions with "role models," including peers or teachers, help students develop and evolve their affective, cognitive, and psychomotor abilities (Wei et al., 2012, p. 530). Like virtual learning, remote learning limited interactions between students with their teachers and their classmates, which could have inhibited learning based on the social cognitive theory. Consistent with the social cognitive theory, Commissioner of Education Schwinn stated,

> if students are not in buildings, they are not with peers, they are not getting that direct instruction from an adult, from a highly qualified teacher in the classroom, we know that there is an extraordinary cost in things that we don't measure through standardized tests. The way in which students interact with one another, the way in which they think about

how to solve problems, the way in which they are able to ask for help and receive

immediate feedback on their work (TN Office of the Governor, 2020b, para. 11.)

Molnar et al. (2019) argued that virtual schools' online curriculum does not really adapt

to student needs but instead forces students to redo the same lesson repeatedly until they pass it.

They discussed a report that described K12, Inc. curriculum as a virtual worksheet with sound

effects and animations. This worksheet-based online curriculum does not promote interactive

learning with others. The online curriculum might provide modeled examples and explain wrong

answers, but without human interaction, students do not have an opportunity to discuss modeled

examples, ask questions, or clarify misunderstandings. Similarly, the packets of worksheets and

online resources used during remote learning might have included modeled examples, but there

were limited opportunities to discuss the examples and ask questions. "Being together" with

others to interact, engage in discussions, and receive immediate feedback is an important part of

learning based on the social cognitive theory (Cho & Proctor, 2001, as cited in Wei et al., 2012,

p. 533). However, the limited opportunities in which students could interact with role models

while learning could have hindered learning based on the social cognitive theory (Wei et al.,

2012).

Based on the social cognitive theory, Zhu et al. (2019) concluded that parents could also

act as role models for how their children use ICT. Therefore, the way parents use technology

and their attitudes towards technology could have impacted how students responded to remote

learning. Zhu et al. surveyed students, parents, and teachers in China regarding technology

usage. They found that parental usage and positive attitudes towards technology positively

impacted student ICT self-efficacy (i.e., the confidence students have in their ability to complete

technology-related tasks). In a phenomenological study, Şad et al. (2016) used the term "e-nvolvement" to describe parental involvement in their student's learning related to technology use (p. 163). Şad et al. found that parents mainly used technology to reinforce with their children what was learned at school or to communicate with their children's teacher(s). Parents in the study stressed how important technology was for their children's future, making it important for schools and districts to educate parents on using the technology their children are using (p. 166).

According to Molnar et al. (2019), limited direct contact between teachers and students and reliance on family to instruct students could attribute to the low performance of virtual schools. Like virtual schools, the TDOE (2020c) encouraged parental involvement during distance learning, but this could have been challenging for families for multiple reasons, such as families with working adults, families trying to help multiple children simultaneously with remote learning assignments, or families having to share devices for distance learning. If families could not help with remote learning, this would have limited social presence and interaction for students, which is a crucial component of learning based on the social cognitive theory (Wei et al., 2012, p. 533).

Maslow's Hierarchy of Needs

Another component of the framework for this study is Maslow's hierarchy of needs. Maslow's hierarchy of needs is based on five categories of needs, set in a hierarchy, and the lower levels of needs must be met before the higher ones are a matter of concern (Hoy & Miskel, 2013). For example, people are motivated by physiological needs first (e.g., sleep and food). Hoy and Miskel explained that people seek security and safety once those physiological needs are met; then, they seek friendships, social activities, belonging, and love. The fourth level of

the hierarchy is related to achievement, confidence, self-respect, and a need to be recognized and appreciated by others. The fifth and final level is self-actualization, in which a person realizes their full potential and achieves their life goals.

Some students, such as those from low-income families, might have lower-level needs that go unmet, such as having enough food and consistent shelter, which causes them to place a low priority on schoolwork. Fiester (2010) reported that almost one out of four American children struggles with "food insecurity," which means they do not know when or where they will get their next meal (p. 20). Hungry children feel anxious and find it difficult to concentrate on schoolwork. Hunger is an issue during a normal school year, but it may have been exacerbated during remote learning. Many people had to stay home from work or were laid off because of shutdowns during the COVID-19 pandemic. This could have increased food insecurity for students, and some families could have been forced to find new places to live if they could not afford to continue living where they were.

Other aspects of Maslow's hierarchy of needs that could have impacted remote learning are related to the second level (security and safety). Children exposed to abuse, neglect, or family violence do not have the feelings of safety and security needed to focus on schooling (Fiester, 2010). For some students, school is their way to escape their home life, but remote learning forced them to be at home 24/7. Having structure and stability creates a sense of safety and security (Hoy & Miskel, 2013, p. 140). Related to structure, Diep et al. (2019) wrote that adults in online or blended learning courses need structure in their classes, which includes having clear learning goals and expectations. Although Diep et al. discussed adult learners' needs, K-12 students also need structure. However, the structure of a regular Monday-Friday school schedule

changed during remote learning. This extreme change in structure could have impacted how a student participated in remote learning.

According to Maslow's hierarchy of needs, people also have a desire to socialize and be recognized (Hoy & Miskel, 2013). Social activities, such as sports, clubs, and church events were canceled because of the COVID-19 pandemic. Many students had to miss out on graduations, sports banquets, and awards days. Not socializing with peers or having the opportunity to celebrate accomplishments could impact a student's social and emotional wellbeing.

Related to Maslow's fourth level, Haymon and Wilson (2020) stressed the importance of supporting students' individual needs by personalizing instruction, which reinforces educational success and allows students to "embrace their uniqueness in the school setting, leading to feelings of achievement and confidence" (p. 73). According to Haymon and Wilson (2020), differentiating instruction allows individual students to access instruction challenging for themselves without being too difficult to grasp the concepts fully. When differentiated instruction is combined with positive interactions between the student and teacher, it increases student motivation to learn (Haymon & Wilson, 2020, pp. 73-74). However, differentiating instruction and interactions between students and their teachers would have been limited compared to typical in-class instruction. If any of these levels of Maslow's hierarchy of needs were not met, students may not have done as well with remote learning as they would have with in-person, classroom-based learning and could also explain why some students opted out of remote learning (discussed above).

Tennessee's Read to be Ready Initiative

While many studies related to school closures suggest that math achievement is affected more than reading achievement, this study focused on reading because of Tennessee's Read to be Ready initiative. The 2009 National Assessment of Educational Progress (NAEP) reading test indicated that Tennessee ranked 37th in the United States, with 28% of fourth-grade public school students scoring proficient (as cited in Fiester, 2010, p. 43). The TDOE (2018a) transitioned from the Tennessee Comprehensive Assessment Program (TCAP) end-of-year standardized test to the TNReady end-of-year standardized test, which is meant to be more closely aligned to NAEP than TCAP. The TNReady test contains different types of questions, such as fill in the blank, multiple-choice, and short answer, while the former TCAP test only included multiple-choice questions. The achievement levels changed from below basic, basic, proficient, and advanced for TCAP to below, approaching, on track, and mastered for TNReady. In 2017, 35% of third-grade students scored on track or mastered on the ELA portion of the TNReady test. When breaking down the data to look at subgroups considered "historically disadvantaged," 21% of ethnic/racial minority students, 20% of economically disadvantaged students, 15% of ELLs, and 15% of students with disabilities were on track or mastered for the ELA portion of the third-grade TNReady test (p. 5).

The low levels of reading proficiency in Tennessee (e.g., 28% proficient on the NAEP in 2009 and 35% on track or mastered in 2017) are a matter of concern because students who are not proficient readers by the end of third grade and who struggle to comprehend and apply information from reading material are at risk of failing and are not likely to graduate from high school (Fiester, 2010; Sutter et al., 2019). Those who do graduate but are not proficient readers are unlikely to earn a postsecondary degree. Both circumstances impact the career opportunities that are available to students. Furthermore, "adult workers who cannot read well are less able to

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acquire new skills and adapt to the new needs in a fast-changing global marketplace" (Fiester, 2010, p. 11). The TDOE (n.d.-b) reported that the average annual salary of the high school graduating class of 2012 that went to work without furthering education was "$9,161 in their first full year of employment", which is below the poverty line for an individual (p. 9).

Fiester (2010) explained that through third grade, students are "learning to read," but by fourth grade, they are expected to know how to read and transition into "reading to learn" (p. 9). This means, beginning in fourth grade, students are expected to know how to read already. The focus turns to comprehending grade-level textbooks, problem solving, and critically thinking about what they are reading. Englert et al. (2005) explained that third-grade students who cannot read proficiently could lead to the "fourth-grade slump," which they defined as a "measurable decrease in average reading scores that shows up at or about fourth grade," when an increase in text complexity occurs (p. 357). The ability to read and comprehend texts impacts learning throughout the rest of a student's life, and third grade is a crucial year for making sure that students have learned to read so that they can start "reading to learn" (Fiester, 2010, p. 9).

In 2016, the TDOE (2018b) began the Read to be Ready campaign with a goal of at least 75% of third graders in Tennessee being proficient readers by 2025. Read to be Ready focuses on early literacy development beginning at birth; the notion that with quality support and resources that students who are not reading on grade level can catch up; reading is about comprehending and making connections to the text; teacher knowledge and literacy instruction is crucial to "develop lifelong learners"; and it takes everyone working together "to improve literacy in Tennessee" (p. 4). As part of the Read to be Ready initiative, teachers should "differentiate instruction in early grades" (p. 6). The Read to be Ready initiative also necessitates that teachers "target students' academic and non-academic needs as early as possible

[and] improve RTI² implementation for students who need greater support in specific skill areas" (p. 6). The TDOE (n.d.-b) emphasized the importance of using multiple data points, such as universal screener data, achievement tests, teacher observations, and other diagnostic tests to inform decisions about RTI^2 and ensuring that RTI^2 interventions align with the skill deficits for each student (pp. 20, 25).

At the beginning of the Read to be Ready campaign, the TDOE (n.d.-b) released the report *Setting the Foundation: A Report on Elementary Grades Reading in Tennessee* to provide the state with data from fall 2015, including observations from over 100 ELA lessons from elementary classrooms. In the report, the TDOE (n.d.-b) reported achievement gaps on ELA TCAPs, with one-third of economically disadvantaged students scoring proficient by the end of third grade (p.7). In contrast, two-thirds of their non-economically disadvantaged peers scored proficient. It was also reported that 20% of students with disabilities and less than 33% of ethnic/racial minority students scored proficient by the end of third grade (p.7). Additionally, 20% of third-grade students who scored proficient on the 2013 ELA TCAP dropped to a score of basic on their fifth-grade ELA TCAP, and over 50% of third-grade students who scored advanced on the 2013 ELA TCAP did not score advanced on their fifth-grade ELA TCAP (p. 8). Englert et al. (2005) described a basic level score as having only a "partial mastery" of the skills and prerequisite knowledge needed to understand and complete grade-level work (p. 357).

The TDOE (n.d.-b) suggested that this drop in proficiency was due to too much emphasis on skills-based competencies, such as spelling, phonics, alphabet knowledge, and word reading, and not enough of a focus on knowledge-based competencies, such as vocabulary, comprehension, content knowledge, and learning to express complex ideas to make meaning and connect to the text (p. 11). Two-thirds of the K-2 lessons observed for the report focused on

phonics, while less than 20% of lessons provided students with opportunities to read or listen to their teacher read (p. 14). Thirty-four percent of the ELA lessons observed in grades 3-5 provided students with opportunities to read, and only a little more than 50% of these lessons that included reading used complex grade-level texts (p. 14). Questions focused on recalling facts from the story instead of asking students more complex questions that required students to make connections from the text (p. 14).

As another component of the Read to be Ready initiative, the TDOE (2018b) recommended incorporating the teaching of both skills and vocabulary into reading complex texts, stating that research showed that teaching reading skills in isolation was one reason Tennessee showed little or no reading proficiency improvement throughout the years. According to the National Reading Panel (2000), reading instruction should incorporate all five of the following components in order to be effective: "phonemic awareness, alphabetic knowledge and decoding skills, fluency in word recognition and text processing, vocabulary, and comprehension" (as cited in Sutter et al., 2019, p. 32). Similarly, the TDOE (n.d.) emphasized that both skills- and knowledge-based competencies are necessary to help develop a strong foundation for students to transition from learning to read to reading to learn. These skills- and knowledge-based competencies should be developed at the same time instead of being taught individually (TDOE, 2018b). The TDOE (2018b) explained, to help prevent teachers from teaching reading skills in isolation, teachers should develop literacy blocks that incorporate all Tennessee ELA academic standard strands, which are: Foundational Skills, Writing, Speaking and Listening, and Reading (p. 13).

Foundational Skills

Foundational skills include print concepts, phonological awareness, phonics and word recognition, and fluency (Mesmer, 2020; TDOE, 2018b). Print concepts include spacing between words and knowing how to read words from left to right across a page. Print concepts should be taught beginning in kindergarten by modeling them while teaching writing and reading (Mesmer, 2020). Phonological awareness is the ability to identify, differentiate between, and manipulate sounds that create phonemes, syllables, words, and sentences. Phonics and word recognition relate to matching sounds with letters and should be taught with single and multi-syllable words. Finally, reading fluency is defined as reading accurately, with appropriate intonation and pacing, and is an initial component of comprehending reading material (Lange, 2019; TDOE, n.d.-b).

The TDOE (2018b) recommended that teachers explicitly teach foundational skills and then provide students with opportunities to apply them to authentic texts. However, the TDOE (2018a) observed that many lessons stopped short of applying foundational skills into reading and writing. In the winter of the 2017-18 academic year, 48% of the lessons the TDOE observed included the teaching of foundational skills aligned to grade-level standards. Twenty percent of the lessons showed foundational skills being explicitly taught and modeled by the teacher and giving students time to practice foundational skills. However, only 8% of the lessons observed provided students with "sufficient opportunities" to apply their new foundational skills to meaningful writing and reading experiences (p. 12). Mesmer (2020) asserted that all foundational skills are necessary for reading comprehension and learning to write and should be taught consistently through fifth grade using teaching materials aligned to the grade-level ELA standards. Time should be built into lessons to apply the newly learned foundational skills into

authentic reading and writing tasks because it reinforces the skills more quickly than drill and practice (TDOE, 2017, p. 5).

Writing

Based on classroom observations during fall 2017, the TDOE (2018a) reported that while teachers provided students with opportunities to write, most tasks required students to write about their personal experiences instead of thinking about and responding to the text. Writing tasks should give students opportunities to respond to various texts, be aligned to the writing standards, and incorporate critical thinking that causes them to analyze the text instead of just summarizing it. Students should be given opportunities for authentic writing experiences that allow them to write to a specific audience for different purposes while incorporating sound-spelling correspondences, high-frequency words, and newly learned vocabulary (TDOE, 2017; TDOE, 2018a). Recommended writing strategies for a literacy block include using graphic organizers to help make connections and organize thoughts, modeled writing, small group writing, shared writing, interactive writing, and independent writing with writing conferences (TDOE, n.d.-b; TDOE, 2018b).

Speaking and Listening

Teachers should integrate the grade-level speaking and listening standards into their literacy block by incorporating them into questions and tasks related to the reading material (TDOE, 2017). A recommended strategy for a literacy block that incorporates speaking and listening while reading is an interactive read-aloud (TDOE, 2018b). This involves the teacher reading aloud complex texts and modeling to students how to ask themselves questions while reading and make connections and inferences throughout the text (TDOE, n.d.-b). Modeling to

students how to think about their reading and ask themselves questions is an important part of teaching students how to comprehend texts and develop critical thinking skills.

The TDOE (2017, 2018a) recommends that teachers ask questions about the text in a sequence from basic to complex to scaffold learning and deepen student understanding. The questions should require students to reread and refer to the text to support their answers (TDOE, 2017). Students should also be involved in text-based discussions, such as whole-group discussion, turn and talk, or think-pair-share (TDOE, 2017, 2018b). Providing students with opportunities to interact with their peers by discussing the text and answering questions aloud help students develop and improve speaking and listening skills while improving comprehension and solidifying ideas about the text (TDOE, n.d., 2018b).

Reading

To help launch Read to be Ready in 2016, the TDOE (n.d.-b) created a statewide literacy training model for reading coaches so that teachers in all districts would have training on selecting complex texts for reading and incorporate both skills- and knowledge-based competencies in their lessons. The complex texts should be at or above grade level, include both fiction and nonfiction, and build on the students' vocabulary and world knowledge (TDOE, 2018b). The academic vocabulary needed to understand the chosen text should be explicitly taught and connected to prior knowledge (Goldstein et al., 2017). Lessons should allow students time to learn and apply skills, such as decoding, within the context of the text while also providing opportunities for deepening knowledge and reading comprehension through questions and tasks that promote critical thinking (TDOE, n.d.-b).

According to Lange (2019), reading fluency is an important component of students comprehending what they are reading. However, fluency and comprehension are not the same. Students may be able to read aloud fluently, with the correct pronunciation of words and intonation, making it appear they comprehend the text but may not actually understand what they are reading (Caputo & Estrovitz, 2017). Because students may read aloud fluently but not comprehend what they are reading, the TDOE (2018b) stressed the importance of regularly assessing students' oral reading fluency and reading comprehension. The TDOE suggested using a running record to assess oral reading fluency and taking notes of student answers to questions during small group or interactive read aloud to assess reading comprehension.

Caputo and Estrovitz (2017) explained that reading comprehension is an area of difficulty for many students transitioning from learning to read to reading to learn. Studies indicate that reading comprehension is linked to the amount of time students read independently and are read aloud to (TDOE, 2018b). Therefore, reading instruction should include opportunities for whole group reading, small group reading, and independent reading with reading conferences so that teachers can assess reading comprehension during independent reading time. Caputo and Estrovitz (2017) also stated that some students struggle with comprehending what they are reading because they lack prior knowledge regarding the topic they are reading about. They suggested providing students with learning experiences related to the topic to help create a knowledge base. As discussed above, sequencing questions to scaffold learning, providing time for discussions about the text, and writing about the text are other strategies that help students comprehend what they are reading (TDOE, n.d.-b, 2017, 2018a, 2018b).

Remote learning would have made it challenging to implement these various strategies compared to in-person learning because many of the strategies and recommendations provided

by the TDOE (n.d.-b, 2017, 2018a, 2018b) require collaboration between students with their teachers and peers. However, implementing these strategies through online remote learning methods would have been more feasible than paper-based remote learning options.

Technology and Reading Performance

As discussed above, the ability to read proficiently is an important indicator of whether a student will graduate from high school, attain a post-secondary degree, and have access to certain job opportunities (Fiester, 2010; Sutter et al., 2019). Various strategies have been tried to assist students while learning to read proficiently, including using technology in the classroom to support reading (Lange, 2019). There have been several studies regarding the use of technology to support reading and reading achievement.

Bebell and O'Dwyer (2010) reviewed four empirical studies regarding 1:1 initiatives and K-12 students. Of the studies with ELA data, findings showed increased engagement and achievement of students who had access to 1:1 devices specifically compared to those who did not have access. In one of the studies, the seventh-grade students who had been using laptops as part of a 1:1 initiative for two years were found to have significant gains on their ELA tests compared to students in a school without a 1:1 program. Similarly, in another one of the studies, the students who had been using laptops for two years since fourth grade as part of a 1:1 initiative had higher gains on their ELA tests and on the literary response and analysis and writing strategies subtests than students in the same school district who did not have 1:1 access. The final study that had ELA test data found that student access to and usage of their laptops, specifically when students used their laptops for learning at home, was a positive predictor of student reading achievement.

Union et al. (2015) conducted a mixed-methods case study involving the use of eReaders to improve third graders' reading performance based on reading and ELA standardized test scores. In this study, the reading and ELA standardized test scores of third-grade students from one classroom that used eReaders to read electronic versions of books (known as eBooks) and to complete ELA assignments were compared to the reading and ELA standardized test scores of third-grade students from four other classrooms in the same school that did not use the eReaders. The results revealed that students' average reading test scores increased after using the eReaders, while the reading scores of the students who did not use the eReaders decreased. However, the test was not statistically significant. Union et al. attributed this to a small sample size of only 16 students and argued that the eReaders were a likely factor contributing to improved reading scores. While the reading scores were not significantly different, there was a statistically significant difference between the ELA test scores. The ELA test scores of students who used the eReaders increased after using the eReaders, while the ELA test scores of the students who did not use the eReaders showed little change. The study's qualitative data included researchers' notes of daily activities using the eReaders in the classroom, using the eReaders at home, and observations that indicated the eReaders increased student engagement and motivation to read.

Sutter et al. (2019) conducted a study involving the reading achievement of third-grade students in a southeastern state measured by the Istation's Indicators of Progress Early Reading (ISIP-ER) and the use of computer-adaptive reading programs (CARPs). According to Sutter et al., CARPs provide individualized instruction by presenting students with questions that increase in difficulty related to their reading content. The data were analyzed based on gender, whether students scored at or below the 20th percentile at the beginning of the year ISIP-ER, and whether they received free or reduced-price lunch. The results indicated that males scored significantly

lower than females on the ISIP-ER at the beginning of the year. However, after using the CARP, there was no significant difference by gender by the end of the year. Furthermore, males who used the CARP at home for more than 900 minutes during the school year tended to outperform females in reading achievement. Students at or below the 20th percentile and students above the 20th percentile showed reading gains on the end-of-year ISIP-ER after using the CARP. Students scoring at or below the 20th percentile who used the CARP at home for more than 2,700 minutes during the school year showed the greatest reading achievement gains.

While most of the results indicated reading gains after using the CARP, Sutter et al.'s (2019) findings also showed achievement gaps after using the CARP when comparing scores of students who received free or reduced-price lunch with those who did not. At the beginning of the year, there was no significant difference between students who received free or reduced-price lunch and those who did not. However, by the end of the year, students receiving free and reduced lunch scored significantly lower than those who did not.

Lange (2019) studied the use of an online reading program called *Fluency Tutor* with third-grade students, most of whom were students of color who received free or reduced-price lunch. Lange explained that *Fluency Tutor* is an online reading fluency program with non-fiction and fiction passages of various reading levels. Teachers assign reading passages to the students to read silently, and then, the program reads the passage to the student. Afterward, the student reads the passage aloud into a microphone in their headset, and the program records them so that they can listen to their own fluency. Students take a comprehension quiz at the end of each passage. The program allows students to reread the passage and retake the quiz if needed, and it keeps a record of the total number of minutes the students use the program.

Third-grade students from six classrooms in two schools were randomly chosen to be part of the treatment or control group (Lange, 2019). The treatment group used *Fluency Tutor* for about 30 minutes a week for 3 months, while the control group taught as they regularly would, but they did use other online reading programs. The results showed that students who used *Fluency Tutor* or more than the median number of hours scored higher on the *Measure My Reading* (MMR) fluency test and ELA standardized end-of-year tests than the control students, with 56% of students reaching grade-level compared to 25%, respectively. However, only 10% of students who used the *Fluency Tutor* for less than the median number of hours reached grade-level proficiency. Lange (2019) attributed this to "loss of instructional time" when students could not access the program due to technical issues, such as students forgetting their passwords (p. 1345).

While many studies tend to focus on students who are struggling readers, according to Haymon and Wilson (2020), a significant percentage of students who score advanced in reading tend to either decline or remain stagnant on reading achievement based on state tests over the years, indicating the importance of researching reading strategies for advanced readers (p. 83). Haymon and Wilson studied the use of Achieve 3000, a computer-based reading program, to differentiate reading instruction for advanced sixth-, seventh-, and eighth-grade students in a middle school in Tennessee. The participants were given a pre-test and post-test to determine their Lexile reading levels before and after using the Achieve 3000 reading program, which was incorporated into the ELA classroom instruction. The results showed significant increases in the Lexile reading levels for advanced learners in all three grade levels, with the most significant growth in the sixth grade. Because the most significant growth was in sixth grade, Haymon and Wilson suggested that additional studies be conducted using the Achieve 3000 reading program

and other similar programs that differentiate reading instruction with advanced learners in elementary grade levels.

There have been mixed results regarding whether using technology for reading support can be associated with increased student achievement. Harris et al. (2016) argued that teaching practices must change from teacher-centered to student-centered when introducing technology. The professional development that guides teachers to make this change in their teaching is vital for any academic achievement growth. Furthermore, Harris et al. (2016) asserted that devices must be viewed as tools to assist with teaching and learning and not replace best teaching practices. Teachers must know how their students learn to determine how to best use technology, and they must give students time to become confident in how to use the technology so that they will be motivated to use it for learning. Additionally, Sutter et al. (2019) emphasized the importance of providing family assistance and ensuring home access to all families when implementing technology to support reading achievement.

Universal Screener Tests and RTI[2]

Tennessee and many other states have been implementing a reading intervention to help struggling readers through Response to Intervention and Instruction (RTI[2]). The RTI[2] framework implemented by the TDOE (2016) reinforces high-quality core instruction for all students and uses universal screeners to help identify students who need additional support. RTI[2] is a three-tier model in which all students receive Tier I core classroom instruction using grade-level standards. All K-8 students must take universal screener tests three times a year, typically in the fall, winter, and spring. (It is also recommended that students in grades 9-12 take universal screeners.) Universal screeners must be "skills-based and provide national norms" (p. 10). Universal screeners help identify gaps in the skills needed for students to be successful with

grade-level standards. Universal screeners should assess student performance and progress in the following skill areas: "basic reading skills, reading fluency, reading comprehension, math calculation, math problem solving, and written expression" (p. 11).

Percentile rankings from universal screeners are used to determine whether students need Tier II or III interventions in addition to Tier I core instruction (TDOE, 2016). Percentile rankings range from 1-99 and are norm-referenced comparisons of a student's "achievement level compared to other students in the same grade nationally" (Renaissance, 2013, p. 39). For example, a fifth-grade student scoring in the 75th percentile performed better than or equal to 75% of fifth-grade students.

Students scoring below the 25th percentile on a universal screener are referred for Tier II intervention. Tier II intervention is explicit skill-based daily instruction that occurs in a small group in addition to Tier I instruction. The skill-based instruction is based on deficits in any of the following areas: phonological awareness, phonics, reading fluency, reading comprehension, vocabulary math calculation, math problem solving, and written expression (TDOE, 2016). If a student scores low in multiple skill areas, the focus is on "the earliest skill area," for example, focusing on phonological awareness before reading comprehension (p. 43). If a student scores low in math and reading skill areas, schools tend to focus on reading intervention.

The TDOE (2016) explained that if students receiving Tier II intervention do not make significant progress (which is determined by improvement in the classroom and weekly or biweekly progress monitor assessments of the skills being addressed during Tier II), are more than 1.5 grade-levels behind, or they score below the 10th percentile on a universal screener, they should receive Tier III intervention. Tier III intervention is 45-60 minutes of daily skills intervention and is more intensive than Tier II instruction (TDOE, 2016). Students not making

progress in Tier III may be recommended to be tested for a learning disability. The following

section discusses studies regarding learning disabilities in reading related to students' gender and

environmental factors that could impact reading.

Learning Disabilities in Reading

Limbrick et al. (2011) reviewed several empirical studies that indicate that males tend to

struggle more with reading than females and are more likely to be diagnosed with a learning

disability in reading. Based on their review, there are several theoretical explanations, including

differences in phonological awareness, neurology, auditory processing, problem behavior,

cognitive variance, and motivation towards reading. The studies they reviewed based on

phonological awareness, neurology, and auditory processing reported little or no differences

based on gender. In contrast, cognitive variance, problem behavior, and motivations towards

reading could be factors leading to males being identified more often than females as having a

reading disability. The studies regarding cognitive variance indicated that males show more

variability on tests than females, "resulting in an over-representation of boys at the extreme end

of the distribution" (p. 12).

Problem or troublesome behavior has been linked to reading disabilities, which occurs

more often in males than in females (Limbrick et al., 2011). However, it is unclear if the

relationship between troublesome behavior and reading difficulty is reciprocal, causal, or

correlational. Quinn's (2018) meta-analysis of studies regarding gender and reading difficulty

indicated that males are more likely than females to draw attention to reading difficulties by

acting out and showing frustration when reading. Other studies in the meta-analysis indicated

that referrals for reading disabilities often coincide with male students having attention-deficit/

hyperactivity disorder (ADHD), suggesting a difference between genders regarding behavior more than reading.

Studies reviewed by Limbrick et al. (2011) suggested that females have overall higher motivation for reading than males, which could lead to teachers supporting and encouraging their female students to read more than male students. Alexander et al. (1993) found that students' level of participation, attention span, and interest in what they are learning correlates with reading performance during the first four years of school (as cited in Logan & Johnston, 2010, p. 178). Similarly, according to Logan and Johnston (2010), research shows that children need to be actively engaged in the reading instruction to learn how to read and comprehend text. Ainley et al. (2002) found that males are less likely than females to be actively engaged and persevere through reading a text about an uninteresting topic (as cited in Logan & Mefford, 2011, p. 87). According to Logan and Johnston (2010), males tend to pay less attention during ELA lessons, have poorer behavior, and are not as task-oriented as their female peers, which could attribute to differences in reading abilities between male and female students.

Several other factors could contribute to reading disabilities. Quinn (2018) concluded that males having reading disabilities could be explained by genetics, such as developmental dyslexia. It could also be explained by prenatal testosterone levels, which impact the development of "the brain areas for auditory temporal processing [which] are responsible for language and phonological processing, both of which are critical components of skilled reading" (pp. 1055-1056). Finally, Quinn attributed gender differences in reading disability to environmental factors, such as the "stereotype threat," in which males perceive that females are better readers and assume males have worse consequences than their female peers for poor reading performance (p. 1056). After reviewing several studies, Limbrick et al. (2011)

concluded that it is still unknown whether there are differences in reading based on gender. Other factors, such as SES, could also factor into reading performance (Limbrick et al., 2011; Sutter et al., 2019).

Based on studies reviewed by Buckingham et al. (2013) regarding reading and SES, another environmental factor found to influence reading is the number of books a student has in their home (although these studies were not specific to students having reading disabilities). One of the studies Buckingham et al. reviewed was the Longitudinal Study of Australian Children. In this study, they noted that 65% of children in the lowest SES quartile owned over 30 books, while 93% of children in the highest SES quartile owned over 30 books (p. 195). Studies reveal that the number of books a student has at home is a strong predictor of the student's reading achievement (Allington, 2014).

Similarly, Malhi et al. (2017) found in their study of the reading skills of 6- to 10-year-olds from middle and upper SES households in a city in North India that the likelihood of children reading independently significantly increased when there were multiple kid-friendly books at home. Those who read recreationally were more likely to be good readers. Malhi et al. also found that, while only a small percentage of students in their study had a public library card, those who did were more likely to read for pleasure. Parents who went to the public library with their children were 2.5 times more likely to read to their children. Malhi et al. also found that when parents read aloud to their children, the children were more likely to read independently, especially when they were read to starting before the age of 3.

Another environmental factor influencing reading is parental educational expectations of their children (Buckingham et al., 2013). According to the Longitudinal Study of Australian Children reviewed by Buckingham et al., a mother's education appeared to influence the

educational expectations they had for their children, with 64% of mothers who had not

completed school expecting their children to attain postsecondary education. In comparison,

over 90% of mothers who had postsecondary education expected their children to attain

postsecondary education. Buckingham et al. concluded that several studies indicated a positive

impact on reading ability when parents have high educational expectations of their children and

encourage them to read.

Star Reading Universal Screeners

There are many universal screeners that districts can choose to implement for RTI[2], such

as Star Assessments, developed by Renaissance Learning. The Renaissance Star Assessments

website (2020) stated that over 34,000 districts and schools in the United States use Star

Assessments. Star Reading Enterprise (also called Star Reading) is one of the Star Assessments

developed by Renaissance Learning and assesses reading skills for grades K-12 (Renaissance,

2013).

The Star Reading universal screener test questions are chosen from a test item bank of

over 5,000 questions, and the screener should take students around 15 minutes to complete

(Renaissance, 2013). The Star Reading universal screeners are computer-adaptive tests, meaning

that each question's difficulty level is adjusted based on the student's previous performance.

Reports of Star Reading universal screeners provide numerous measures, such as percentile

rankings (discussed above) and Normal Curve Equivalent scores. Normal Curve Equivalents

(NCEs) are scores that range from 1-99, have a normal distribution, and have a mean of 50

(Renaissance Learning, Inc., 2019). NCEs are on "an equal-interval scale," meaning "the

difference between two successive scores on the scale has the same meaning throughout the

scale" (p. 106).

The *Star Assessments for Reading Technical Manual* explains that NCEs can be averaged, whereas percentile rankings cannot be averaged (Renaissance Learning, Inc., 2019). The fact that NCEs can be averaged makes them useful for measuring school-wide achievement gains or losses. NCEs can also be used for measuring student performance from year to year. "If all students were to make exactly one year of progress after one year of instruction, then their NCE scores would remain exactly the same" (Central Rivers AEA, 2017, para. 2). If students make less than a year's progress, there will be an overall net loss in the NCEs, and if students make more than a year's progress, there will be an overall net gain in the NCEs.

Chapter Summary

COVID-19 led to school closures, and districts taught remotely during the spring term of the 2019-20 academic year. Tennessee school districts were provided with guidance for the remote learning period by the TDOE (2020c) that included both online and paper materials. Even with guidance from the TDOE, districts faced many challenges with remote learning that may have led to inequalities in students' access to learning opportunities. Challenges included students opting out of remote learning, unequal access to the internet and devices, challenges with providing accommodations to students, and issues giving timely feedback. Districts that have implemented 1:1 initiatives may have allowed students to take home their devices, which could have alleviated some of the challenges.

Projections based on research regarding missing school from school closures for snow, absenteeism, and summer break indicate that learning loss may have occurred during this remote learning period (Kuhfeld et al., 2020). However, during snow days and summer break, and when students are absent, students are not taught like they were during this remote teaching time. Therefore, it is unclear whether these learning loss projections are accurate. Nevertheless, two

theories that could explain why students may have had learning loss during this remote learning period are Bandura's social cognitive theory and Maslow's hierarchy of needs (Hoy & Miskel, 2013; Merriam & Bierema, 2014; Wei et al., 2012; Zhu et al., 2019).

This study specifically focused on potential learning loss for third-grade reading because of Tennessee's Read to be Ready initiative. The TDOE (2018b) launched the Read to be Ready campaign in 2016, with a goal of at least 75% of third graders in Tennessee being proficient readers by 2025. Studies show that technology is being used in the classroom to support reading, and states, including Tennessee, have implemented skills-based reading interventions through RTI[2] (Lange, 2019; TDOE, 2016). Universal screeners used for RTI[2] are used to determine whether students need skills-based small group intervention along with regular classroom instruction. Students who do not make sufficient progress from RTI[2] intervention may be tested for a learning disability (TDOE, 2016). Findings show that males are more likely than their female peers to be diagnosed with a learning disability in reading (Limbrick et al., 2011). Factors, such as genetics, or environmental factors, such as SES or the number of books at home, could also impact reading ability (Allington, 2014; Buckingham et al., 2013; Malhi et al., 2017; Quinn, 2018).

Because remote learning has continued as part of the 2020-21 school year and because of Tennessee's Read to be Ready initiative (TDOE, 2018b), it is crucial to know the actual extent of learning loss that occurred in student reading performance during the remote learning period. Universal screeners, such as Star Reading, provide scores, such as NCEs, that can be used to measure student achievement gains or losses (Central Rivers AEA, 2017; Renaissance Learning, Inc., 2019). Chapter 3 describes the methodology of this study, explaining how NCEs were used to explore a possible relationship between remote learning and reading performance for third

graders in a 1:1 district in Tennessee that provided devices for their students to use for distance learning. Chapter 3 includes the research questions and null hypotheses, research design, site selection, population and sample, instrumentation, data collection, data analysis, assessment of quality and rigor, and ethical considerations. Chapter 4 presents the findings of this study. Chapter 5 provides a conclusion of the study and includes implications for practice and recommendations for further research.

Chapter 3. Methodology

The purpose of this quantitative study was to explore a possible relationship between remote learning with 1:1 devices and reading performance for third graders in a school district in Tennessee by comparing differences between Star Reading universal screener data from fall 2018 and fall 2020 as well as by comparing differences between Star Reading universal screener data from fall 2019 and fall 2020. This study specifically focused on reading performance for third grade because of Tennessee's Read to be Ready initiative, which was initiated in 2016 by former Governor Bill Haslam and former Commissioner of Education Candice McQueen, with a goal of at least 75% of third graders reading proficiently in Tennessee by 2025 (TDOE, 2018b). This chapter includes research questions and null hypotheses, research design, site selection, population and sample, instrumentation, data collection, data analysis, assessment of quality and rigor, and ethical considerations.

Research Questions and Null Hypotheses

RQ_1: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

$H0_1$: There is no significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee.

RQ_2: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

$H0_2$: There is no significant difference between third-grade students' fall 2020

Star Reading universal screener NCEs and their second-grade fall 2019 Star

Reading universal screener NCEs in the 1:1 district in Tennessee.

RQ_3: Is there a significant difference between third-grade students' fall 2020 Star

Reading universal screener NCEs and third-grade students' fall 2018 Star Reading

universal screener NCEs in the 1:1 district in Tennessee?

H_{03}: There is no significant difference between third-grade students' fall 2020

Star Reading universal screener NCEs and third-grade students' fall 2018 Star

Reading universal screener NCEs in the 1:1 district in Tennessee.

RQ_4: Is there a significant difference between third-grade students' fall 2020 Star

Reading universal screener NCEs and third-grade students' fall 2019 Star Reading

universal screener NCEs in the 1:1 district in Tennessee?

H_{04}: There is no significant difference between third-grade students' fall 2020

Star Reading universal screener NCEs and third-grade students' fall 2019 Star

Reading universal screener NCEs in the 1:1 district in Tennessee.

RQ_5: For the above Research Questions 1 and 2 found to have a significant difference,

as a post-hoc analysis, is the difference in Star Reading universal screener NCEs

by gender?

H_{05}: There is no significant difference between the third-grade fall 2020 and first-

grade fall 2018 or the third-grade fall 2020 and second-grade fall 2019 Star

Reading universal screener NCEs in the 1:1 district in Tennessee by gender.

RQ$_6$:   For the above Research Questions 3 and 4 found to have a significant difference, as a post-hoc analysis, is the difference in Star Reading universal screener NCEs by gender?

H$_{06}$: There is no significant difference between the third-grade fall 2020 and third-grade fall 2018 or the third-grade fall 2020 and third-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee by gender.

Research Design

This quantitative study was based on an ex post facto research design. An ex post facto research design "is used to explore possible causal relationships among variables that cannot be controlled by the researcher" (McMillan & Schumacher, 2010, p. 23). The variables studied were remote learning with 1:1 devices during the spring term of the 2019-20 school year and third-grade reading performance indicated by fall Star Reading universal screener NCE scores.

The Star Reading universal screener reading data from fall 2020 was gathered from a time that included remote learning, compared to fall 2018 and fall 2019 data representing how the students scored before the remote learning period. The researcher analyzed third graders' fall 2020 universal screener data compared to their past first- and second-grade data (from fall 2018 and fall 2019, respectively) to explore a possible significant difference in reading performance growth since remote learning occurred. The researcher also analyzed third graders' fall 2020 universal screener data compared to fall 2018 third-grade data and fall 2019 third-grade data to explore a possible significant difference in reading performance since remote learning took place compared to typical third-grade reading performance before remote learning.

Site Selection

A school district in East Tennessee was chosen for this ex post facto study via purposive sampling. This district was chosen because all students in the district had an opportunity to participate in remote learning using the same online method. The district has implemented and maintained a 1:1 initiative for over five years, and they allowed students to take home devices for remote learning. Throughout the duration of the 1:1 initiative, the district has worked with families to provide hotspots for internet access outside of school so that all students would have had access during remote learning. There were no issues with devices or the internet that would have caused the district to provide individual families with other distance learning methods, such as packets of worksheets, during the spring remote learning period.

Population and Sample

The 1:1 school district is located in East Tennessee and has approximately 5,200 students. As part of the district's 1:1 initiative, students are issued iPads to use throughout their elementary school years, beginning in kindergarten. Then, the students are issued laptops to use until they graduate high school. All teachers were trained to use either the iPads or the laptops (depending on the grade level they taught) during the initial 1:1 implementation. The district continues to provide school level and system-wide technological training and support during the summer and throughout each school year.

The data collected for this study was secondary data from three elementary schools in the 1:1 school district. The data consisted of Star Reading universal screener NCE scores from fall 2018 during the 2018-19 school year, from fall 2019 during the 2019-20 school year, from fall 2020 during the 2020-21 school year, the Grade Placement for the NCEs, and the gender of the

students whose data were used for the study. The 2020-21 third graders were chosen as the cohort to study because of Tennessee's Read to be Ready Initiative, as discussed above.

The 2020-21 third-grade cohort of 305 students was established based on students who have been in the 1:1 district from their 2018-19 first-grade year through their 2020-21 third-grade year. The researcher was provided with the Grade Placement for each NCE score to determine students for the cohort. The Grade Placement indicates when the student took the Star Reading universal screener. For example, for a second grader, a Grade Placement of 2 meant the student took the universal screener at the beginning of the year. A Grade Placement of 2.2 meant the student took the universal screener two months into the school year (which could occur if a student enrolled in the district later in the year). The cohort of third-graders were students who had Grade Placements of 1 (during fall 2018 of their first-grade year), 2 (during fall 2019 of their second-grade year), and 3 (during fall 2020 of their third-grade year), indicating that they took the universal screeners at the beginning of each school year. Students who did not have Grade Placements of 1 for their fall 2018 universal screener, 2 for their fall 2019 universal screener, and 3 for their fall 2020 universal screener were excluded from the cohort.

Instrumentation

The Tennessee General Assembly passed HB2818/SB2672, which waived spring TNReady and end-of-course standardized tests for the 2019-20 school year (TDOE, 2020a). Although students did not take TNReady and end-of-course standardized tests, they did take universal screener tests before and after the remote learning period as part of Tennessee's implementation requirements for RTI[2]. The 1:1 district uses Star Reading universal screeners for RTI[2], and this was the instrument used for this study. Star Reading universal screeners are one

of the Star Assessments developed by Renaissance Learning, and they assess reading skills for

grades K-12 (Renaissance, 2013).

The measure used in this study from the Star Reading universal screeners was the Normal

Curve Equivalent score (NCE). NCEs are scores that range from 1-99, have a normal

distribution, and have a mean of 50 (Renaissance Learning, Inc., 2019). NCEs are norm-

referenced scores that "report the results of standardized assessments and other instruments in a

way that permits the comparison of an individual's performance with a very well-defined norm

group of similar individuals who have completed the same assessment" (Frey, 2018, para. 1).

Because NCEs are on an equal-interval scale, they can be averaged, allowing scores to be used to

measure achievement gains or losses between groups of students (Atlanta Public Schools, 2020).

The NCEs from fall 2018, fall 2019, and fall 2020 for the third-grade cohort and third-grade fall

2018 and fall 2019 NCEs were analyzed for this study.

Data Collection

In the 1:1 district, the window to take the fall Star Reading universal screener is at the

beginning of each school year in early August. All students took the Star Reading universal

screener at school during fall 2018 and fall 2019. Around 90% of students took the Star Reading

universal screener at school in fall 2020. The remaining 10% of students took the Star Reading

universal screener at home (due to remote or hybrid learning for the 2020-21 school year) with

guidelines from the 1:1 district for parents to not help or assist the student on the universal

screener. The scores are collected within each of the three elementary schools by the RTI[2]

teachers and the students' reading teachers. The data are also collected by the 1:1 district's

Special Projects and Technology Administrator at the Central Office. The Star Reading NCEs of

each student whose data were used for this study, along with the gender of the students and the

Grade Placement for each NCE, was provided by the 1:1 district's Special Projects and

Technology Administrator. The data were de-identified before it was sent to the researcher.

Data Analysis

The third-grade cohort's first- and second-grade Star Reading universal screener NCE

data (from fall 2018 and fall 2019, respectively) was compared to their third-grade Star Reading

universal screener NCE fall 2020 data. The purpose of comparing the cohort's third-grade fall

2020 data to their first- and second-grade data was to determine possible significant differences

in the cohort's reading performance growth since remote learning took place.

The third-grade cohort's Star Reading universal screener NCE fall 2020 data were also

compared to third-grade NCEs from fall 2018 and fall 2019. The purpose of comparing the

third-grade cohort's data to past third-grade data was to determine any possible significant

differences between reading performance since remote learning took place compared to what

third graders in the 1:1 district typically scored before remote learning.

For Research Questions 1 and 2, the researcher conducted paired t-tests to explore the

possibility of significant differences between the third-grade students' fall 2020 Star Reading

universal screener NCEs and their first- and second-grade fall Star Reading universal screener

NCEs. For Research Questions 3 and 4, the researcher conducted independent samples t-tests to

explore the possibility of significant differences between the third-grade students' fall 2020 Star

Reading universal screener NCEs and third-grade fall 2018 and fall 2019 Star Reading universal

screener NCEs. When a significant difference was found for Research Questions 1-2, for

Research Question 5, the researcher disaggregated the data by gender and conducted paired

samples t-tests to explore the possibility of significant differences between the Star Reading

universal screener NCEs by gender. When a significant difference was found for Research

Questions 3-4, for Research Question 6, the researcher disaggregated the data by gender and conducted analyses of variance to explore the possibility of significant differences between the Star Reading universal screener NCEs by gender. The researcher conducted the tests using SPSS software, and the data were analyzed at the 0.05 level of significance.

Assessment of Quality and Rigor

The data used for this study were Star Reading universal screener NCEs. Renaissance Learning has provided evidence of the Star Reading test's validity, showing the relationship between reading achievement scores on Star Reading tests compared to several other reading tests (Renaissance Learning, Inc., 2019, pp. 139-176). Comparing both first-grade fall 2018 and second-grade fall 2019 data to the third-grade fall 2020 data provided a more accurate picture of what the cohort typically scores on the Star Reading universal screener during the fall and helped provide information about growth in reading performance since remote learning took place. Comparing the third-grade fall 2020 data to both third-grade fall 2018 and fall 2019 data provided a more reliable picture of what third graders in the 1:1 district typically score during the fall universal screener compared to what they scored since remote learning took place.

The data collected for the study came from three elementary schools in the 1:1 district. All three schools give their students the fall Star Reading universal screener at the same time each year in early August. All three schools used for the study are relatively similar, with population sizes between 480 and 580, ethnic/racial minority populations ranging from 11% to 16%, and an average teacher turnover rate of 4-5%. All three schools are Title I schools, meaning at least 40% of students at each school come from low-income households (U.S. Department of Education, 2018).

Because the 1:1 district has implemented its 1:1 initiative for over five years, the students in the third-grade cohort would have been familiar with their devices since first grade (determined by the fact that the cohort was chosen based on being in the district for first-, second-, and third grade). Some of the students in the cohort might have been familiar with the devices since kindergarten if they were in the 1:1 district during kindergarten. All three elementary schools implemented similar remote learning plans, including teaching new content instead of reviewing old material. All three schools used an online learning platform and online resources that students and their families were already familiar with throughout the 1:1 initiative. All students could take home their 1:1 devices for remote learning, and the district has worked with individual families throughout the 1:1 initiative to provide means of internet access outside of school.

Ethical Considerations

McMillan and Schumacher (2010) stated that researchers have an ethical responsibility to protect their study's participants. This includes protecting "the confidentiality of the data and the privacy of the subjects" (McMillan & Schumacher, 2010, p. 15). One way to maintain confidentiality is to ensure that the data used in a study cannot be connected to individual participants' names (McMillan & Schumacher, 2010). The pseudonym 1:1 district was used to ensure the confidentiality of the students whose data were used for this study. Additionally, the data provided by the 1:1 district's Special Projects and Technology Administrator did not contain any personally identifiable information. The 1:1 district's superintendent and Special Projects and Technology Administrator were provided with the purpose of the study, the methodology, and, after the study, the findings.

Chapter Summary

An ex post facto study was designed to explore the possible relationship between remote learning with 1:1 devices and reading performance for third graders in a 1:1 school district in Tennessee by comparing differences between Star Reading universal screener NCEs from fall 2018 and fall 2020 and by comparing differences between Star Reading universal screener NCEs from fall 2019 and fall 2020. NCEs were chosen for this study because they can be averaged to compare performance between groups of students and measure gains or losses from year to year (Atlanta Public Schools, 2020).

The study population was third-grade students in a 1:1 district in East Tennessee. The study sample consisted of a third-grade cohort of students from three elementary schools in the 1:1 district. Since their first-grade year, these third graders have been in the 1:1 district and have been familiar with using their 1:1 devices since that time. Paired samples *t*-tests were conducted to compare the third-grade cohort's fall 2020 NCEs to their second-grade fall 2019 and their first-grade fall 2018 NCEs. Independent samples *t*-tests were also conducted to compare the third-grade cohort's fall 2020 NCEs to third-grade fall 2018 and third-grade fall 2019 NCEs. When a significant difference was found, as a post-hoc analysis, the researcher disaggregated the data by gender and conducted either paired samples *t*-tests (for significant differences found in Research Questions 1 and 2) or analyses of variance (for significant differences found in Research Questions 3 and 4) to explore the possibility of significant differences between the Star Reading universal screener NCEs by gender. Chapter 4 presents the findings of this study. Chapter 5 provides a discussion of the findings and includes implications for practice and recommendations for further research based on the findings.

Chapter 4. Findings

This ex post facto quantitative study used statistical tests to explore a possible relationship between remote learning with 1:1 devices and reading performance for third graders in a 1:1 school district in Tennessee by comparing differences between Star Reading universal screener NCEs from fall 2018 and fall 2020 and by comparing differences between Star Reading universal screener NCEs from fall 2019 and fall 2020. The fall 2018 and fall 2019 universal screener NCEs were student data from before remote learning compared to fall 2020 universal screener NCEs which were student data since remote learning took place. A cohort of 305 third-grade students was established based on the students being in the 1:1 district since first grade and having Star Reading universal screener data from fall 2018, fall 2019, and fall 2020. Students who did not have fall 2018 first-grade data, fall 2019 second-grade data, or fall 2020 third-grade data from the 1:1 district were excluded from the cohort.

Research Question 1

RQ$_1$: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

H0$_1$: There is no significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee.

A paired samples t-test was conducted to explore the possibility of significant differences between the third-grade students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs. The test was significant, $t(304)= 2.829$, p

= .005. Therefore, the null hypothesis was rejected. The cohort of third graders in the 1:1

district tended to score significantly lower on their fall 2020 Star Reading universal screener

after the spring remote learning period occurred (M = 51.9715, SD = 19.84034) than they scored

on their first-grade fall 2018 Star Reading universal screener before remote learning (M =

54.5882, SD = 18.17189). The 95% confidence interval for the difference in means ranged from

.79679 to 4.43666. The standardized effect size index, d, was .16, which indicated a small effect

size. Figure 1 shows the distribution for Star Reading universal screener NCE scores for fall

2018 (first-grade data) and fall 2020 (third-grade data).

Figure 1

Fall Star Reading Universal Screener NCE Distribution Between First and Third Grade

Research Question 2

RQ$_2$: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee?
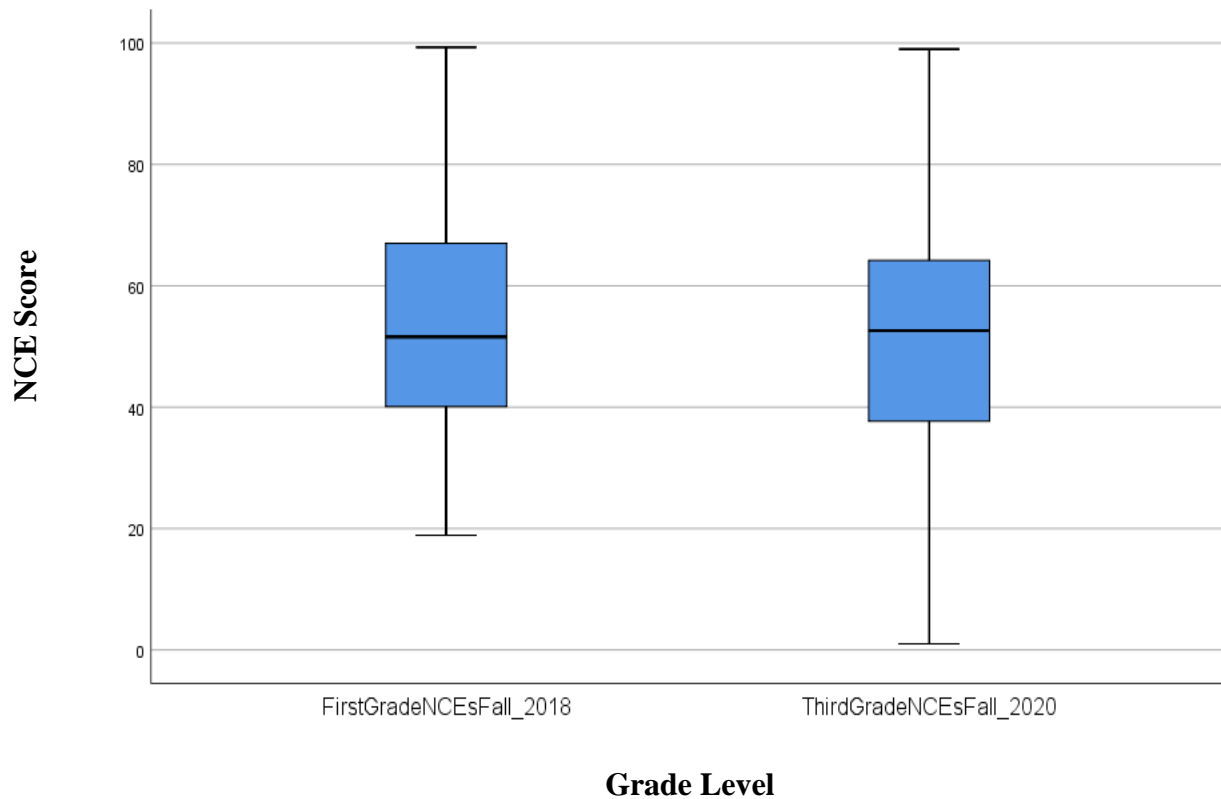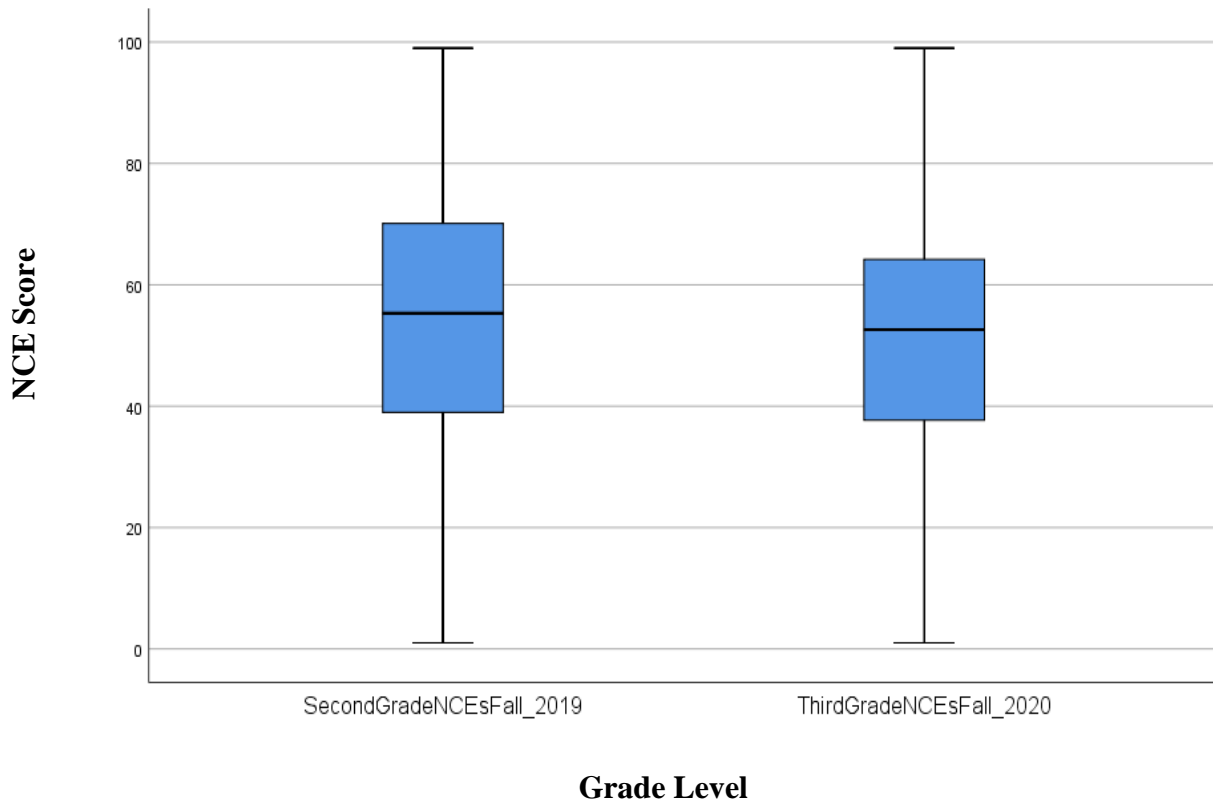
H0$_2$: There is no significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee.

A paired samples *t*-test was conducted to explore the possibility of significant differences between the third-grade students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs. The test was significant, $t(304)=$ 2.076, p = .039. Therefore, the null hypothesis was rejected. The cohort of third graders in the 1:1 district tended to score significantly lower on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 51.9715$, $SD = 19.84034$) than they scored on their second-grade fall 2019 Star Reading universal screener before remote learning ($M = 53.522$, $SD = 22.15587$). The 95% confidence interval for the difference in means ranged from .08062 to 3.02037. The standardized effect size index, *d*, was .12, which indicated a small effect size. Figure 2 shows the distribution for Star Reading universal screener NCE scores for fall 2019 (second-grade data) and fall 2020 (third-grade data).

Figure 2

Fall Star Reading Universal Screener NCE Distribution Between Second and Third Grade

Grade Level

Research Question 3

RQ3: Is there a significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and third-grade students' fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee?

H03: There is no significant difference between third-grade students' fall 2020 Star Reading universal screener NCEs and third-grade students' fall 2018 Star Reading universal screener NCEs in the 1:1 district in Tennessee.
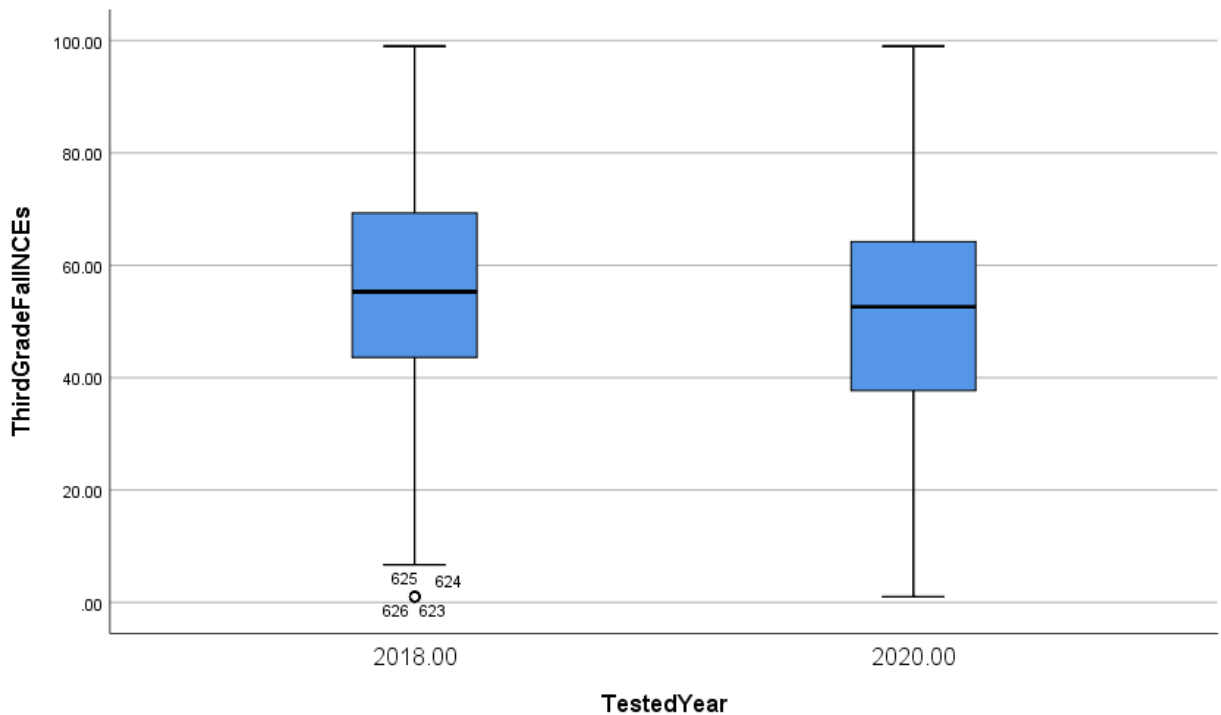
An independent samples *t*-test was conducted to explore the possibility of significant differences between third-grade fall 2020 Star Reading universal screener NCEs and third-grade

fall 2018 Star Reading universal screener NCEs. The grouping variable was the year the third-grade universal screener was given (either fall 2020 or fall 2018), and the test variable was the NCE score. The test was not significant, $t(632) = 1.678$, p = .094. Therefore, the null hypothesis was retained. The cohort of third graders in the 1:1 district tended to score similarly on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 51.9715$, $SD = 19.84034$) compared to the third-grade fall 2018 Star Reading universal screener scores before remote learning ($M = 54.6207$, $SD = 19.88308$). The 95% confidence interval for the difference in means ranged from -.45117 to 5.74955. The standardized effect size index, d, was .13, which indicated a small effect size. Figure 3 shows the distribution for Star Reading universal screener NCE scores for fall 2018 third-grade data and fall 2020 third-grade data.

Figure 3

Star Reading NCE Distribution Between Third Grade Fall 2018 and Third Grade Fall 2020

Research Question 4

> RQ$_4$: Is there a significant difference between third-grade students' fall 2020 Star
>
> Reading universal screener NCEs and third-grade students' fall 2019 Star Reading
>
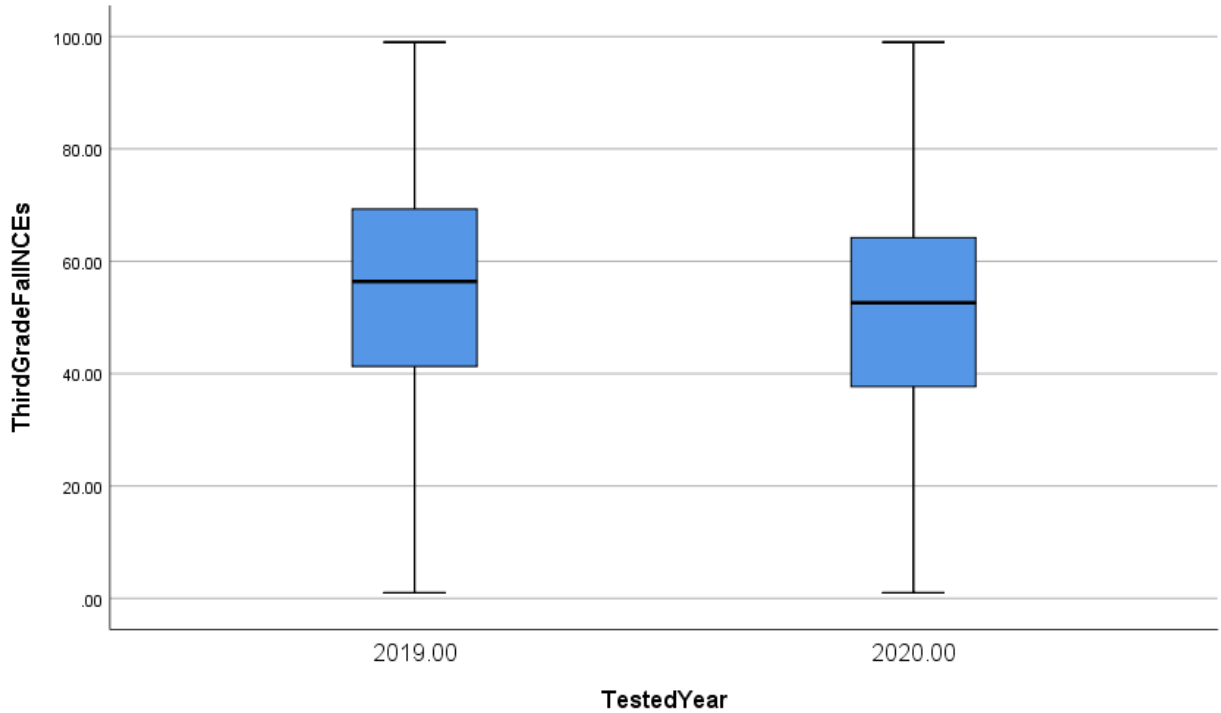> universal screener NCEs in the 1:1 district in Tennessee?
>
> H$_{04}$: There is no significant difference between third-grade students' fall 2020
>
> Star Reading universal screener NCEs and third-grade students' fall 2019 Star
>
> Reading universal screener NCEs in the 1:1 district in Tennessee.

An independent samples *t*-test was conducted to explore the possibility of significant differences between third-grade fall 2020 Star Reading universal screener NCEs and third-grade fall 2019 Star Reading universal screener NCEs. The grouping variable was the year the third-grade universal screener was given (either fall 2020 or fall 2019), and the test variable was the NCE score. The test was not significant, $t(714) = 1.725$, p = .085. Therefore, the null hypothesis was retained. The third graders in the 1:1 district tended to score similarly on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 51.9715$, $SD = 19.84034$) compared to the third-grade fall 2019 Star Reading universal screener scores before remote learning ($M = 54.5715$, $SD = 20.01536$). The 95% confidence interval for the difference in means ranged from -.35876 to 5.55887. The standardized effect size index, *d*, was .13, which indicated a small effect size. Figure 4 shows the distribution for Star Reading universal screener NCE scores for fall 2019 third-grade data and fall 2020 third-grade data.

Figure 4

Star Reading NCE Distribution Between Third Grade Fall 2019 and Third Grade Fall 2020

Research Questions 5

RQ5: For the above Research Questions 1 and 2 found to have a significant difference, as a post-hoc analysis, is the difference in Star Reading universal screener NCEs by gender?

H_{05}: There is no significant difference between the third-grade fall 2020 and first-grade fall 2018 or the third-grade fall 2020 and second-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee by gender.

Due to the significant difference in Star Reading universal screener fall 2018 first-grade scores and fall 2020 third-grade scores, paired samples *t*-tests were conducted to determine whether the difference was by gender. A paired samples *t*-test was conducted to explore the possibility of significant differences between the third-grade male students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs. The test was not significant, $t(157) = 1.24$, p = .217. Therefore, the null hypothesis was retained. The third-grade male students in the 1:1 district tended to score similarly on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 51.381$, $SD = 19.95054$) compared to their first-grade fall 2018 Star Reading universal screener before remote learning ($M = 52.9823$, $SD = 17.87895$). The 95% confidence interval for the difference in means ranged from -.94909 to 4.15162. The standardized effect size index, *d*, was .099, which indicated a small effect size. Figure 5 shows the distribution for Star Reading universal screener NCE scores for male students during fall 2018 (first-grade) and fall 2020 (third-grade data).

Figure 5

Star Reading NCE Distribution Between First Grade (2018 Scores) and Third Grade (2020 Scores) for Male Students

Grade Level
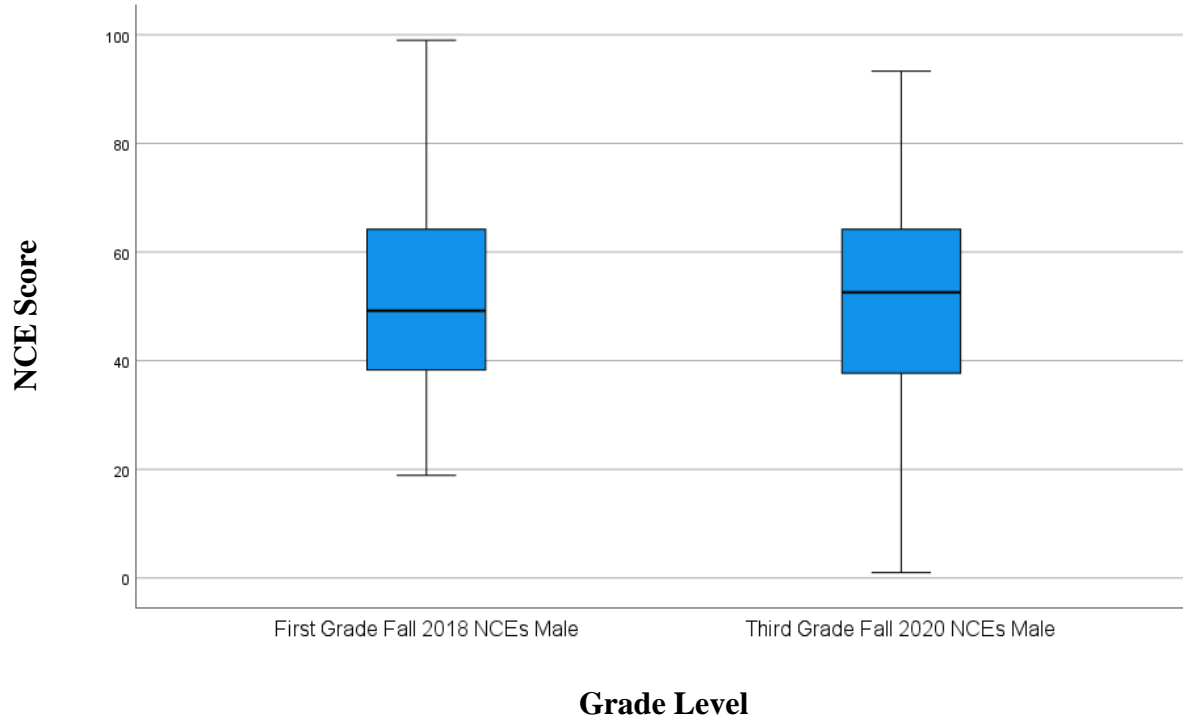
A paired samples *t*-test was conducted to explore the possibility of significant differences between the third-grade female students' fall 2020 Star Reading universal screener NCEs and their first-grade fall 2018 Star Reading universal screener NCEs. The test was significant, $t(146)$ = 2.773, p = .006. Therefore, the null hypothesis was rejected. The third-grade female students in the 1:1 district tended to score significantly lower on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 52.6061$, $SD = 19.76959$) than they scored on their first-grade fall 2018 Star Reading universal screener before remote learning ($M = 56.2735$, $SD = 18.29635$). The 95% confidence interval for the difference in means ranged from 1.0533 to 6.28139. The standardized effect size index, *d*, was .23, which indicated a small

effect size. Figure 6 shows the distribution for Star Reading universal screener NCE scores for female students during fall 2018 (first-grade data) and fall 2020 (third-grade data).

Figure 6

Star Reading NCE Distribution Between First Grade (2018 Scores) and Third Grade (2020 Scores) for Female Students

Grade Level

Due to the significant difference in Star Reading universal screener fall 2019 second-grade scores and fall 2020 third-grade scores, paired samples *t*-tests were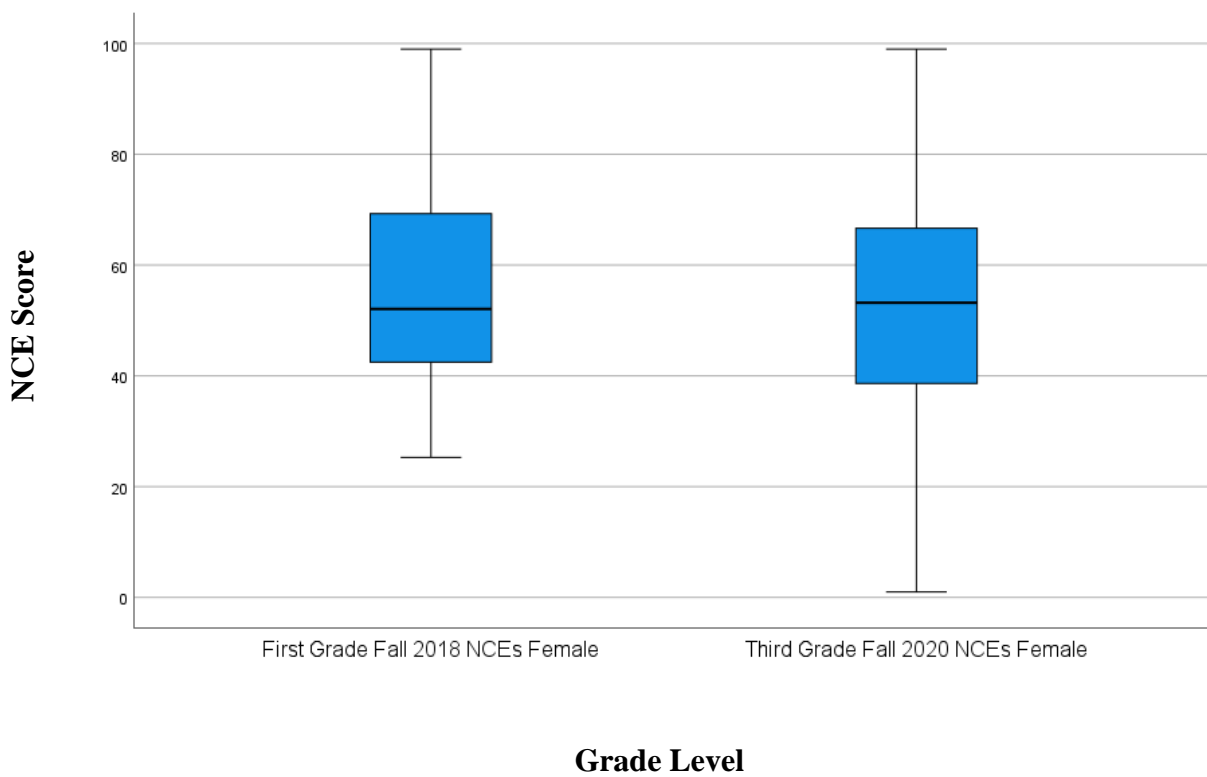 conducted to determine whether the difference was by gender. A paired samples *t*-test was conducted to explore the possibility of significant differences between the third-grade male students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal

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screener NCEs. The test was not significant, $t(157) = .815$, p $= .416$. Therefore, the null

hypothesis was retained. The third-grade male students in the 1:1 district tended to score

similarly on their fall 2020 Star Reading universal screener after the spring remote learning

period occurred ($M = 51.381$, $SD = 19.95054$) compared to their second grade fall 2019 Star

Reading universal screener before remote learning ($M = 52.2468$, $SD = 22.67166$). The 95%

confidence interval for the difference in means ranged from -1.23196 to 2.9636. The

standardized effect size index, d, was .06, which indicated a small effect size. Figure 7 shows

the distribution for Star Reading universal screener NCE scores for male students during fall

2019 (second-grade data) and fall 2020 (third-grade data).

Figure 7

Star Reading NCE Distribution Between Second Grade (2019 Scores) and Third Grade (2020 Scores) for Male Students

Grade Level
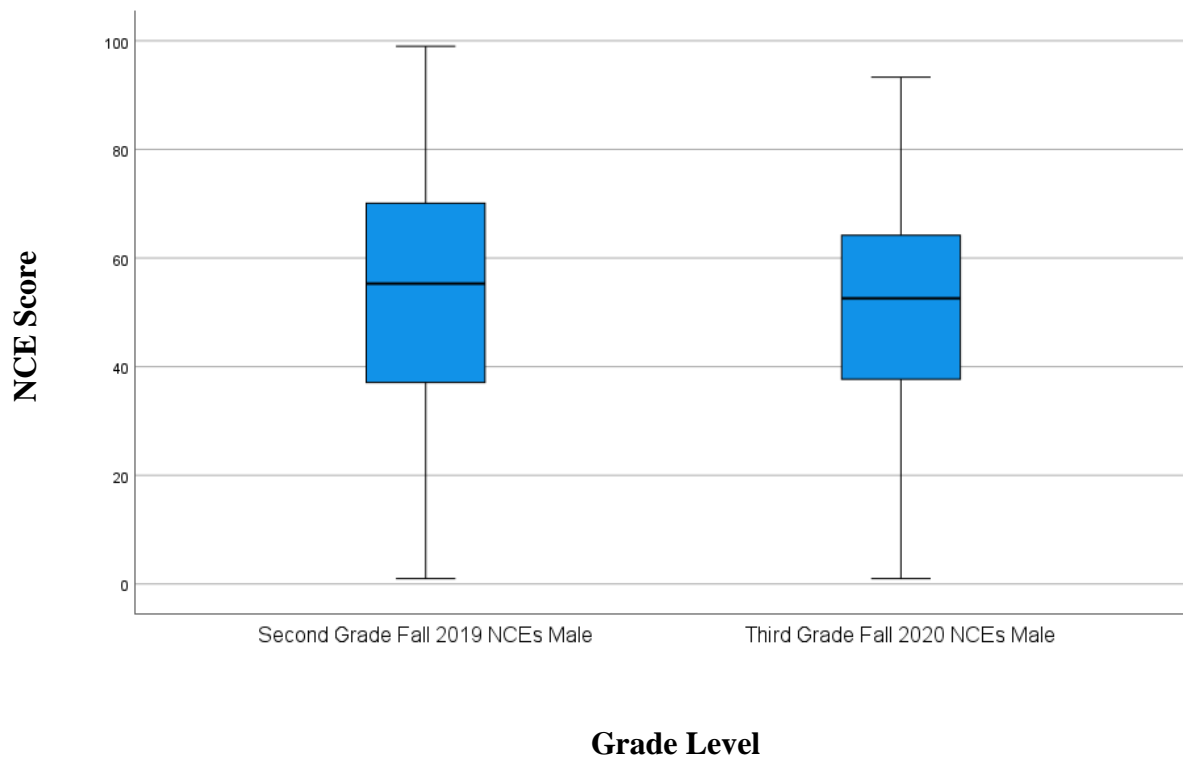
A paired samples *t*-test was conducted to explore the possibility of significant differences between the third-grade female students' fall 2020 Star Reading universal screener NCEs and their second-grade fall 2019 Star Reading universal screener NCEs. The test was significant, $t(146) = 2.186$, p = .03. Therefore, the null hypothesis was rejected. The third-grade female students in the 1:1 district tended to score significantly lower on their fall 2020 Star Reading universal screener after the spring remote learning period occurred ($M = 52.6061$, $SD = 19.76959$) than they scored on their second grade fall 2019 Star Reading universal screener before remote learning ($M = 54.8966$, $SD = 21.5678$). The 95% confidence interval for the difference in means ranged from .21978 to 4.36118. The standardized effect size index, d, was .18, which indicated a small effect size. Figure 8 shows the distribution for Star Reading universal screener NCE scores for female students during fall 2019 (second-grade data) and fall 2020 (third-grade data).

Figure 8

Star Reading NCE Distribution Between Second Grade (2019 Scores) and Third Grade (2020 Scores) for Female Students
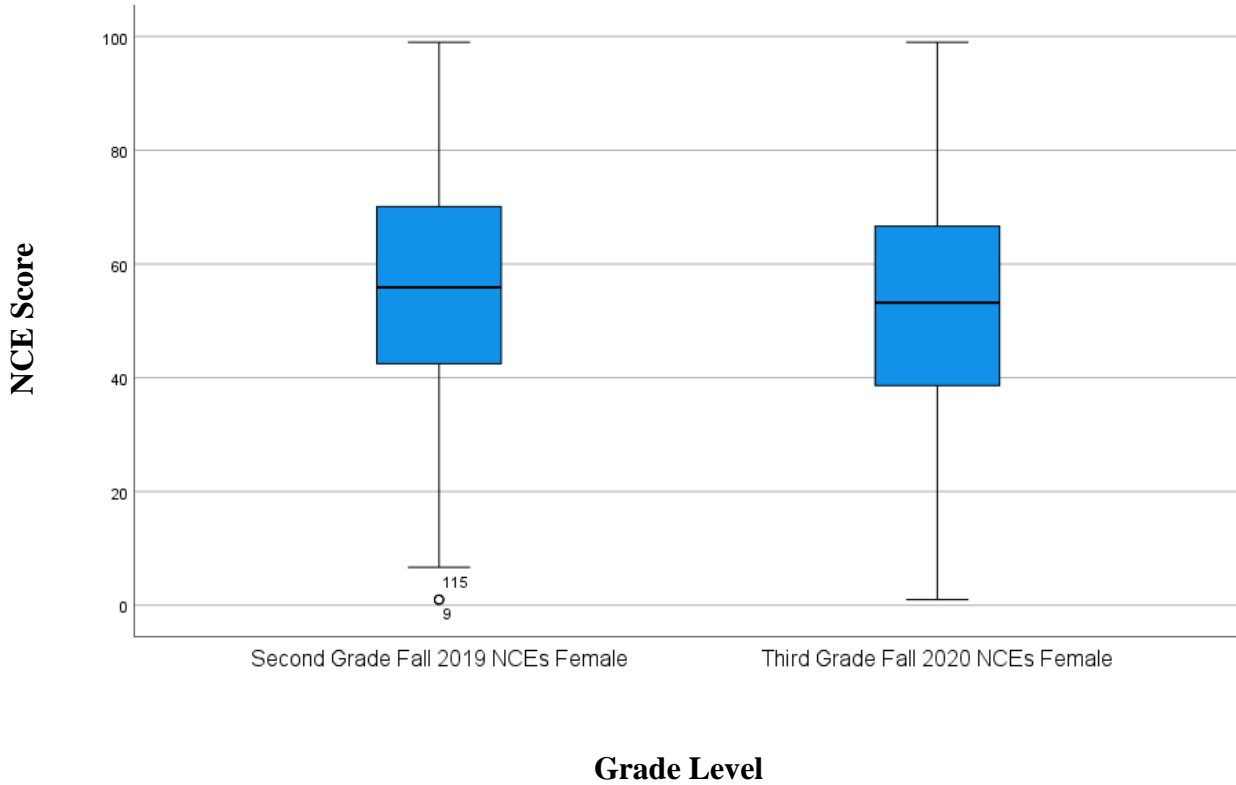

Grade Level

Research Question 6

RQ$_6$: For the above Research Questions 3 and 4 found to have a significant difference, as a post-hoc analysis, is the difference in Star Reading universal screener NCEs by gender?

H$_{06}$: There is no significant difference between the third-grade fall 2020 and third-grade fall 2018 or the third-grade fall 2020 and third-grade fall 2019 Star Reading universal screener NCEs in the 1:1 district in Tennessee by gender.

Based on the results of the independent samples *t*-tests conducted for Research Questions 3 and 4, there were no significant differences between Star Reading universal screener NCEs for

third-grade fall 2020 and third-grade fall 2018 or the third-grade fall 2020 and third-grade fall 2019. Therefore, the researcher did not conduct a one-way analysis of variance to determine any significant differences by gender.

Chapter Summary

Research Questions 1 and 2 explored possible significant differences between the third-grade cohort's reading performance since remote learning took place compared to how the cohort scored before remote learning. Paired samples *t*-tests were conducted for Research Questions 1 and 2 to see if there were significant differences between the third-grade fall 2020 Star Reading universal screener NCEs and the first-grade fall 2018 and second-grade fall 2019 Star Reading universal screener NCEs. Both paired samples *t*-tests were significant, indicating that the cohort scored significantly lower on the Star Reading universal screener after the spring remote learning period occurred ($M = 51.9715$) compared to their first- and second-grade scores before remote learning ($M = 54.5882$ and $M = 53.522$, respectively). The effect size for both paired samples *t*-tests was small. The standardized effect size index, *d*, was .16 for Research Question 1, and the standardized effect size index, *d*, was .12 for Research Question 2.

Research Questions 3 and 4 explored possible significant differences between the third-grade cohort's reading performance since remote learning took place compared to what third graders in the 1:1 district would have typically scored before remote learning. Independent samples *t*-tests were conducted for Research Questions 3 and 4 to see if there were significant differences between third-grade fall 2020 and fall 2018 and between third-grade fall 2020 and fall 2019 Star Reading universal screener NCEs. The tests were not significant, indicating that the third-grade fall 2020 Star Reading universal screener NCEs ($M = 51.9715$) were not significantly different from the third-grade fall 2018 and third-grade fall 2019 NCEs ($M =$

54.6207 and $M = 54.5715$, respectively). The standardized effect size index, d, was .13, for both

Research Questions 3 and 4, indicating a small effect size.

Research Questions 5 and 6 were post-hoc analyses when any significant differences

were found for Research Questions 1-4. Due to the significant differences for Research

Questions 1 and 2, for Research Question 5, the third-grade cohort's data were disaggregated by

gender. The researcher conducted paired samples t-tests to determine whether the significant

difference in the Star Reading universal screener NCEs was by gender. The first post-hoc paired

samples t-test compared male students' third-grade fall 2020 NCEs with their first-grade fall

2018 NCEs. The test was not significant, indicating the third-grade male students' fall 2020

NCEs and their first-grade fall 2018 NCEs were not significantly different ($M = 51.381$ and $M = 52.2468$, respectively). The second post-hoc paired samples t-test compared female students'

third-grade fall 2020 NCEs with their first-grade fall 2018 NCEs. The test was significant,

indicating the third-grade female students' fall 2020 NCEs were significantly lower than their

first-grade fall 2018 NCEs ($M = 52.6061$ and $M = 56.2735$, respectively). The third post-hoc

paired samples t-test compared male students' third-grade fall 2020 NCEs with their second-

grade fall 2019 NCEs. The test was not significant, indicating the third-grade male students' fall

2020 NCEs and their second-grade fall 2019 NCEs were not significantly different ($M = 51.381$

and $M = 52.2468$, respectively). The final post-hoc paired samples t-test compared female

students' third-grade fall 2020 NCEs with their second-grade fall 2019 NCEs. The test was

significant, indicating the third-grade female students' fall 2020 NCEs were significantly lower

than their second-grade fall 2019 NCEs ($M = 52.6061$ and $M = 54.8966$, respectively).

Because there were no significant differences for Research Questions 3 and 4, the

researcher did not conduct a one-way analysis of variance for Research Question 6 to determine

differences in Star Reading universal screener NCEs by gender. Chapter 5 provides a discussion

of the findings and includes implications for practice and recommendations for further research.

Chapter 5. Conclusions

Introduction

  COVID-19 caused shutdowns throughout the world in 2020, including school closures during the spring term of the 2019-20 school year (UNESCO, 2020). Existing research based on missing school due to snow days, absenteeism, and summer break was used to project the extent of learning loss due to this shutdown (Kuhfeld et al., 2020). However, while the physical school buildings were vacated during the COVID-19 shutdowns, teachers continued to educate students through remote learning methods, such as providing students with packets of worksheets or digital resources online. Continuing to teach while schools were closed made this shutdown different from typical school closures. Therefore, instead of relying upon projections from past closures that were unlike this closure, data from the actual remote learning period would need to be used to determine the true extent of learning loss.

  The purpose of this quantitative study was to explore a possible relationship between remote learning with 1:1 devices and reading performance for third graders in a school district in Tennessee by comparing differences between universal screener reading data from fall 2020 and universal screener reading data from both fall 2018 and fall 2019. The Star Reading universal screener reading NCE scores were collected from a 1:1 school district in Tennessee. The 1:1 district had implemented and maintained a 1:1 initiative for over five years and allowed students to use their devices for remote learning. All students in the district had internet access so that they could use their devices at home.

  Statistical tests were conducted to look for differences between Star Reading universal screener NCEs fall 2020 (data from after the spring 2020 remote learning period) and Star Reading universal screener NCEs from fall 2018 and fall 2019 (data from before the remote

learning period). When significant differences were found, post hoc analyses were conducted to explore the possibility of significant differences between the data by gender. The following sections discuss the findings of these analyses.

Discussion

Research Questions 1 and 2

For Research Questions 1 and 2, paired samples *t*-tests were conducted to compare the third-grade cohort's fall 2020 Star Reading universal screener NCEs to their first- and second-grade fall Star Reading universal screener NCEs to determine whether there were significant differences in reading performance growth since remote learning took place. Both paired samples *t*-tests were significant, indicating that the cohort of third-grade students from the 1:1 district scored significantly lower on the Star Reading universal screener after the spring remote learning period occurred ($M = 51.9715$) compared to their first- and second-grade scores before remote learning ($M = 54.5882$ and $M = 53.522$, respectively).

As stated in the review of related literature, Commissioner of Education Schwinn reported projections of the third-grade literacy rate dropping from 33% to an estimated 12-14% literacy rate statewide (TN Office of the Governor, 2020b, para. 13). The findings of this study do not coincide with that low of a percentage. However, the 1:1 district selected for this study had implemented and maintained a 1:1 initiative for over five years. They were able to provide hotspots to make sure all students had internet access to use their devices during remote learning. Therefore, there is a possibility that the amount of learning loss in this district is minor compared to other districts that implemented paper-based methods of remote learning or used online methods but did not have devices for each student.

As discussed above, Ferguson (2017) argued the importance of students, teachers, and parents understanding how to use technological devices for learning. Students and teachers in the 1:1 district were familiar with the devices before the remote learning period began. In contrast, other districts that used devices for distance learning might not have had time to make sure students and teachers knew how to use them properly before transitioning to remote learning. According to Islam and Gronlund (2016), teachers need to be shown how to use technology to teach effectively. If districts did not have time to train teachers on how to use devices and find and implement quality online resources before remote learning started in the spring, this could have impacted student learning.

Furthermore, the third-grade students chosen as the cohort for this study would have had their devices since at least first grade, meaning that parents were most likely familiar with helping their children navigate the devices for schoolwork. However, this would not have been the case in all districts. If parents were unfamiliar with how to help their children use devices, this could have also have impacted reading performance during remote learning.

It is important to note that while the mean NCE score for the cohort of third-grade students decreased to 51.9715, this average score was still above the mean score for NCEs, which is 50 (Atlanta Public Schools, 2020; Central Rivers AEA, 2017; Frey, 2018; Renaissance Learning, Inc., 2019). NCEs can be converted to percentile rankings (Atlanta Public Schools, 2020). For example, an NCE score of 33 is equivalent to around the 20th percentile, an NCE score of 50 is equivalent to scoring in the 50th percentile, and an NCE score of 74 is close to the 90th percentile (Atlanta Public Schools, 2020). An average NCE score of 51.9715 would indicate an overall average Star Reading universal screener score above the 50th percentile. Having an average score above the 50th percentile could mean that several students in the third-

grade cohort do not qualify for RTI[2] Tier II or Tier III interventions but still may have shown a decline in reading performance since the remote learning period. For example, there could have been advanced readers who declined in reading performance, possibly due to difficulties with differentiating instruction during the remote learning period (Haymon & Wilson, 2020). Therefore, to provide interventions within the regular Tier I classroom setting, teachers need to look at data on an individual level to know which specific students showed declines in reading performance.

Research Questions 3 and 4

For Research Questions 3 and 4, independent samples t-tests were conducted to compare the third-grade cohort's fall 2020 Star Reading universal screener NCEs to third-grade Star Reading universal screener NCEs from fall 2018 and fall 2019 before remote learning took place. The tests were not significant, indicating that the third-grade fall 2020 Star Reading universal screener NCEs ($M = 51.9715$) were not significantly different from the third-grade fall 2018 and third-grade fall 2019 NCEs ($M = 54.6207$ and $M = 54.5715$, respectively). Although the third-grade cohort scored significantly lower than their previous reading NCEs, they did not score significantly lower than the typical third-grade reading NCEs from before remote learning.

Research Question 5

Due to significant differences found in the analyses conducted for both Research Questions 1 and 2, as post hoc analyses, the NCEs were disaggregated by gender. For Research Question 5, paired samples t-tests were conducted to explore the possibility of significant differences between the data by gender. The male students' third-grade fall 2020 NCEs were not significantly different from their first- or second-grade fall NCEs. However, the female students' third-grade fall 2020 NCEs were significantly different from their first- and second-

grade fall NCEs. This significant difference indicates that female students scored significantly lower on their Star Reading universal screener after the spring 2020 remote learning period compared to before remote learning.

The factors contributing to a significant decrease in female students' reading performance but not a significant decrease in male students' reading performance are currently unknown. Further investigation is needed to determine what factors surrounding remote learning contributed to the learning loss by gender. However, studies cited in the review of related literature could provide some insight as to why the learning loss occurred for female students. For example, research indicates that female students prefer variety in learning methods while male students mainly prefer kinesthetic activities (Honigsfeld & Dunn, 2003). Providing variety in learning methods was challenging during the remote learning period. Furthermore, the remote learning period relied heavily on technology. Studies indicate that females tend to feel less confident than males when using technology and might have needed more support than their male classmates when using technology for remote learning (Ferguson, 2017; Gömleksiz, 2012).

Maslow's hierarchy of needs and the social cognitive theory provided a framework for this study, and these theories could relate to the differences found in reading scores by gender (Hoy & Miskel, 2013; Wei et al., 2012). Delays in feedback and limited opportunities for students and teachers to interact during the remote learning period could have hindered learning based on the social cognitive theory (Wei et al., 2012). Female students tend to be more teacher-motivated than their male peers (Bassi et al., 2018). Therefore, limited interactions may have impacted female students more than male students based on Sadker and Sadker's (1994) findings that female students might lose confidence and motivation if they receive less attention from their teacher (as cited in Bassi et al., 2018, p. 4).

According to Maslow's hierarchy of needs, lower-level needs, such as the safety and security that comes from structure and stability, need to be met before focusing on higher-level needs, which could impact learning (Hoy & Miskel, 2013). The consistency and structure of a typical school day were missing due to the shutdown during the COVID-19 pandemic, which may have impacted female students who tend to do better in the traditional classroom setting, while male students tend to prefer an informal classroom setting (Carrier, 2009; Honigsfeld & Dunn, 2003).

Research Question 6

Because there were no significant differences for Research Questions 3 and 4, the researcher did not conduct post-hoc analyses for Research Question 6 to determine significant differences by gender.

Possible Factors Contributing to Learning Loss

While the results indicate significant differences in reading performance by gender and potential factors related to this are discussed above, other factors could have contributed to the decrease in reading performance besides factors related to gender. For example, there could be significant differences in different subgroups, such as students from different SES levels, students with disabilities compared to students without disabilities, and ELLs compared to students whose native language is English. Additionally, there could be significant differences between the scores of students who opted out of remote learning compared to those who did not.

All three of the schools in this study are Title I schools, meaning that at least 40% of the students at each school come from low-income households (U.S. Department of Education, 2018). Students from low SES households may have struggled more with having basic needs

met during the remote learning period. The shutdown due to the COVID-19 pandemic caused

job loss, which could have increased food insecurity. Many lower-level basic needs, such as

access to food, were lacking due to the shutdown during the COVID-19 pandemic. Not having

basic needs, such as food, could have made remote learning difficult, even if students had

internet access and devices (Hoy & Miskel, 2013).

Bailey (2020) asserted that low-income students and students of color were hurt the most

academically by schools shutting down because of the COVID-19 pandemic (para. 5). As

discussed above, students in a "book desert" who do not have access to books tend to be students

of color living in rural or urban areas (Miller et al., 2018, p. 45). Students who did not have

books available at home may have had difficulty getting access to books either at school or at a

library during the remote learning period due to the shutdowns caused by the COVID-19

pandemic.

The remote learning period led right into summer break; therefore, the decline in reading

scores could be due in part to the effects of summer learning loss, which has been shown to have

a more significant impact on students from low-income households (Cooper et al., 1996; Fiester,

2010; Menard & Wilson, 2013). As Caputo and Estrovitz (2017) stated, the reading achievement

gap grows when summer break does not include learning opportunities. Learning opportunities

that typically help alleviate the effects of summer learning loss, such as summer reading

programs, may have been limited or unavailable over the summer due to the COVID-19

pandemic.

There could also be significant differences in reading performance among students with

disabilities or ELLs. The TDOE (2020d) provided a toolkit specifically for remote learning for

special populations, indicating that students with disabilities and ELLs might have struggled to

access the digital content used for remote learning. Additionally, teachers might have had

difficulty figuring out how to provide supports and services to students with IEPs, 504s, and

ILPs while teaching remotely.

It is unknown whether the learning loss is related to students opting out of remote

learning. The researcher did not know how many students in this study (if any) opted out of the

spring 2020 remote learning period. However, students opting out of the distance learning

period was not uncommon (Blume & Kohli, 2020; Kelly, 2020; Parcak, 2020). If any students in

this study opted out of remote learning, this would have contributed to the decrease in reading

scores. Tennessee students who opted out of remote learning may have missed around "50-60

days" of the school year, which would be considered chronic absenteeism (TDOE, 2020b, Slide

6). As discussed above, several studies indicate that chronic absenteeism negatively impacts

learning (Attendance Works, 2018; Buckingham et al., 2013; Morrissey et al., 2014; TDOE, n.d.-

b).

Implications for Practice

Several districts have continued to stay remote or have implemented a blended/hybrid

plan of both in-person and remote learning during the 2020-21 school year. Districts and schools

need to provide support for teachers, parents, and students to ensure that students can learn

remotely (if the district is still remote) without compounding the learning loss from the spring

remote learning period. Based upon the findings of this study, and to attempt to mitigate further

learning loss, the researcher suggests the following implications for practice:

- Teachers need to examine student data on an individual level to know which students had

  learning loss and which specific area(s) the learning loss occurred (e.g., phonics, reading

fluency, reading comprehension, vocabulary). Examining individual student data will guide the teachers to know what skills and standards to focus on with individual students.

- Districts and schools must provide internet access for teachers (if they must work from home) and students and maintain devices for both teachers and students. Internet access and device maintenance are essential for schools, especially if they continue to use online remote learning methods.

- Districts and schools should provide professional development and daily technology support for teachers who may be navigating new devices or LMS platforms. Districts and schools should also provide information, training, and support to parents and students who must navigate technology (Ferguson, 2017; Stanhope & Corn, 2014; Union et al., 2015).

- Schools should provide teachers with guidance on finding digital resources or creating their own for remote learning. For example, reading teachers may need assistance using technology to recreate their literacy blocks for remote learning. They might need help learning how to virtually conduct reading and writing conferences, create opportunities for collaboration and group work, differentiate for all students, give timely feedback, and create and implement online assessments for fluency, reading comprehension, and writing skills.

- Teachers should make lessons accessible to all students using synchronous and asynchronous methods if remote learning is still occurring. Correia (2020) discussed how several devices in one household could make internet connection difficult and that some students may have to share devices with siblings. Furthermore, some students may have to babysit siblings while their parents are at work, and some may have difficulty

finding a quiet area in their home that is free from distractions so they can focus on schoolwork. Correia suggested that teachers record live lessons and post them so that students can refer to them as needed or in case something prevents them from attending the live session. Correia also provided ideas for asynchronous work that could also be done collaboratively with classmates, such as working on a Google doc or a discussion board on Padlet. Asynchronous offline activities, such as reading and writing, could reduce the amount of time students have to be on devices.

- Schools should consistently communicate with families. Some students may feel overwhelmed, anxious, or isolated due to the pandemic (Correia, 2020). Correia argued that in this time of crisis, "reaching out and being present is more important than using high tech devices or fancy educational products" (p. 15). Teachers should call or video conference with families regularly to better understand circumstances that could impact learning.

- Districts and schools should equip teachers, students, and parents with strategies for coping with stress related to the COVID-19 pandemic. Pozo-Rico et al. (2020) asserted that teaching could be an emotionally demanding and stressful occupation, and teaching during the COVID-19 pandemic has led to "overexertion" of teachers, which could lead to teacher burnout (p. 14). Similarly, Correia (2020) stated that remote teaching due to the COVID-19 pandemic caused teachers to feel like they were "losing their sense of self-efficacy" (p. 14). Pozo-Rico et al. (2020) studied primary school teachers in southeastern Spain who participated in a training program that taught strategies to cope with stress, improve emotional intelligence (i.e., helping teachers to identify and understand emotions), and improve ICT competency. They found that teachers who

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participated in the training program reported increased emotional intelligence levels and decreased stress levels compared to the control group who did not participate in the training program. According to Pozo-Rico et al., lower stress levels lead to increased teacher self-efficacy and improved student achievement. Schools should also monitor students' social and emotional wellbeing, provide teachers, students, and parents with counseling opportunities, and provide parents with training to help them emotionally support their children (Sunita, 2020).

- Districts and schools should make sure all students have access to meals. As discussed above, food insecurity impacts around 25% of American children, and many students rely on schools for breakfast, lunch, or both (Fiester, 2010). Related to Maslow's hierarchy of needs, if students have difficulty obtaining lower-level needs, such as food, they may have difficulty concentrating on learning (Hoy & Miskel, 2013). Kinsey et al. (2020) reported that an estimated 1.15 billion school meals could not be served to students during the spring 2020 school closures. The USDA issued waivers lifting some restrictions related to providing school meals so that schools can serve multiple meals at once (e.g., several days of meals) and provide these meals to parents or guardians even if the child is not present. Some districts have designated pick up locations, such as school parking lots, for families to get the meals, but families may not be able to go to these locations. Schools need to be aware of this and may need to deliver some meals directly to homes or provide locations closer to homes, such as locations throughout bus routes.

Recommendations for Further Research

The results of this study indicated a significant difference between the third-grade Star Reading universal screener NCEs and the first- and second-grade Star Reading universal

screener NCEs. Post-hoc analyses revealed that while there were no significant differences in third-grade male students' Star Reading universal screener NCEs compared to their first- and second-grade NCEs, third-grade female students scored significantly lower on their Star Reading universal screener NCEs than on their first- and second grade NCEs. While studies discussed in the review of related literature provide research regarding why learning loss could be assumed, these studies are not based on this unprecedented remote learning period. The factors surrounding remote learning that contributed to the learning loss remain unknown, including what factors contributed to the significant differences for female students. Therefore, the researcher suggests further investigations regarding remote learning and reading performance:

- Conduct similar studies using universal screener reading data for other grade levels besides third grade to determine the extent of learning loss in those grades. If significant differences are found, disaggregate the data by gender and conduct further analyses to determine whether there are significant differences by gender for other grade levels.

- Analyze the data by different subgroups, such as students with disabilities, ELLs, students who are ethnic/racial minorities, and students who come from low SES households, to look for significant differences in reading performance.

- Conduct interviews with stakeholders, including administrators, teachers, parents, and students, to determine barriers that may have inhibited remote learning. Look for differences in student interview data by gender. Some examples of what may have inhibited remote learning that should be included in the interviews questions are: opting out of remote learning, factors related to Maslow's hierarchy of needs and the social cognitive theory, issues with technology, and challenges with providing accommodations

to students. Use this data to guide future instruction, including what would improve

remote learning and minimize the digital divide between students.

- Conduct similar studies in other school districts using their universal screener data to see

    if the results are similar or different from this study's results. Note whether the method

    of remote learning was primarily online learning with digital materials, providing printed

    materials, or a blended approach with a combination of online resources and printed

    materials.

- If any districts showed no significant differences in reading performance or showed gains

    in reading performance during the remote learning period, investigate what those districts

    did to mitigate learning loss during the remote learning period.

- Conduct follow up studies with the third-grade cohort using future fall universal screener

    data compared to the fall 2020 third-grade data to continue to monitor reading

    performance

Chapter Summary

In this study, Star Reading universal screener NCE scores from fall 2018, fall 2019, and

fall 2020 were analyzed to determine if there was a significant difference in third-grade reading

performance due to remote learning during the spring term of the 2019-20 academic year. This

study adds to the body of research by analyzing data from the remote learning period instead of

using data from past closures to make projections of the learning loss.

This study's findings indicate that there was learning loss in reading during the remote

learning period, which supports initial projections of learning loss based on previous studies

regarding school closures (e.g., snow days and summer break) and absenteeism (Kuhfeld et al.,

2020). Further analyses revealed that third-grade female students scored significantly lower on

their Star Reading universal screener NCEs after remote learning than before remote learning. However, there were no significant differences in male students' Star Reading universal screener NCEs after remote learning compared to before remote learning.

The social cognitive theory and Maslow's hierarchy of needs provided a conceptual framework for why learning loss could be assumed during the remote learning period. However, while the results indicate learning loss, it is unknown what factor(s) related to remote learning may have contributed to this decrease in third-grade reading scores compared to their first- and second-grade scores. Further inquiry is needed to determine what most impacted students by gender. There could also be significant differences in learning loss by subgroups, such as students from different SES levels. Additional investigations regarding what factors contributed to learning loss during the remote learning period related to the social cognitive theory, Maslow's hierarchy of needs, opting out of remote learning, issues with technology, and challenges accommodating students are recommended. These additional analyses can help educators determine how to mitigate further learning loss as many districts continue remote learning.

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