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Assessment Scores of Remote and In-Person Learning for Grades Three - Six Students in an East Tennessee School District

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ABSTRACT

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The purpose of this comparative, quantitative study was to explore the relationship of interim test scores among remote and in-person learners, low-income students, and students with disabilities. In March 2020, a portion of students enrolled in a K-12 school in Northeast Tennessee was moved into remote learning until the end of the school year in May 2020. In July 2020, parents were given the option for their child to attend remote or in-person learning. While some chose in-person learning, giving reasons such as child-care, work obligations, or personal preference, others chose for their children to continue to receive online learning due to health concerns brought on by the pandemic. Since these decisions were made, some parents that originally opted for online learning chose to send their child back to school due to perceived obstacles faced within the online environment.

This study was conducted to determine the efficacy of online learning in comparison to in-person learning for students grades three – six separated into the following categories: general population, students with disabilities, and low-income students. Comparison of both mathematics and literacy interim third quarter checkpoint data were analyzed using SPSS software to conduct a series of independent t-tests. Data were analyzed at the 0.05 level of significance. Twelve research questions were addressed testing corresponding null hypotheses. Results included third grade online literacy scores significantly exceeding the scores of in-person. Mean literacy and

math scores were approximately equal for online and in-person learners. Overall, scores for students with disabilities and low socio-economic students were approximately equal whether the learners were online or in-person.

DEDICATION

To my Lord and Savior, thank you for giving me the strength to complete this study. I owe all to you and am forever grateful for your love and mercy. To my husband, Matt, for always believing in me even when I did not believe in myself. Your love and encouragement have given me the strength I needed to follow my dreams. Thank you for always being my biggest fan. To my children Elijah, Audrey, and Brooklyn I did this for you so that you can see anything is possible with hard work and determination. I hope you always follow your dreams and continue to be a bright light in this world. I love you.

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Chapter 1. Introduction

The Covid-19 outbreak caused serious global concerns for education when efforts to contain the virus prompted unscheduled school closures (Sunita, 2020). More than 1.5 billion students globally were impacted by school closures at the peak of the outbreak in early April 2020 (University of Kansas, n.d.). The closures created harmful effects on education, including disruptions to learning and a lack of educational facilities and learning resources. Educational organizations relied heavily on technology during the pandemic to ensure the continuation of learning; however, poor infrastructure, including network and accessibility issues, compounded by poor digital skills hindered online education. Furthermore, the pandemic exacerbated disparities in education by diminishing opportunities for the most vulnerable student populations, particularly middle and lower-income students and vulnerable groups such as students with disabilities and special needs (Sunita, 2020).

There was a shift from traditional in-person learning to virtual learning as health concerns of the general public escalated. Students and teachers were forced to shift their thinking within a matter of weeks. School district educators were asked to rethink teaching, learning, and assessment strategies as the pandemic worsened, leaving little time to prepare for the unforeseen challenges of online learning. Nearly 93% of parents report that their children were involved in distance learning (Mcelrath, 2020). When the 2020-2021 school year began, more than half of U.S. elementary students attended school 100% virtually. Fifty-two percent of students attended school strictly virtually, 25% attended solely in person, and the remaining 19% were hybrid, attending online and in person. Four percent of districts remained undecided (Liesman, 2020).

Purpose of the Study

The purpose of this comparative, quantitative study is to explore the relationship of interim test scores among remote and in-person learners, low-income students, and students with disabilities. Identifying the efficacy of online learning in comparison to in-person learning allows school districts to determine what actions need to be taken to ensure all students' instruction and learning are equitable, whether enrolled in-person or in online classrooms.

The district selected for this study provided several learning options to families during the pandemic based on grade level: online learning, in-person learning, and, at times, hybrid learning. K-12 students began school completely online on August 10th and returned to in-person learning or hybrid learning on August 31, 2020. The elementary and intermediate school parents, grades K-6, were given the option of fully online learning or in-person learning for the 2020-21 school year. The middle school offered parents the option of online learning and hybrid learning in the beginning of the school year; however, after cases of Covid-19 began to decline, students were given the opportunity to return to school for in-person learning or to be fully-online, eliminating the hybrid option.

After spring break all middle school in-person students returned to five days a week. When K-12 students returned from winter break, all students were virtual the first week of school. The students were given the option to return to school in person or attend school virtually for the remainder of the school year. Students also had the option to return to in-person learning when they were ready to do so. During this time, interim assessments continued as scheduled with check-point testing being administered every nine weeks.

The study examined third-quarter interim check-point assessment data from students in grades three – six to compare achievement data between online learners and in-person learners. Checkpoint assessments monitor student achievement of grade level, standards-based skills in

mathematics and English Language arts that align with the Tennessee state standards. District checkpoints are created through the Illuminate platform from a bank of pre-written items that align with Tennessee state standards. The checkpoint assessments are district-required and designed to measure student achievement of current state standards. Curriculum coaches in math and language arts departments develop checkpoint tests by closely aligning standards-based questions with subject and grade level. The assessments were administered online using the Illuminate platform.

Significance of the Study

Online learning has been predicted by multiple scholars as being detrimental to students living in low-income situations and students with special needs. Lack of internet connection, parental support, instructional resources, and in some cases the absence of social and emotional support were predicted to be contributing factors for negative performance on achievement tests for low-income students. Students with disabilities faced barriers as school systems were not equipped to deliver specialized services remotely that meet the requirements of an Individual Education Plan (IEP). Parental support for students with disabilities was also predicted to be a challenge as parents were not equipped with the skills needed for implementing therapeutic services within their homes. The general population of online learners faced learning curves while participating in remote learning as well. General population students were required to adapt quickly to new learning platforms and instructional practices that were unfamiliar to them before the pandemic.

Students were required to adapt to new learning platforms, adjust to the daily requirements of online learning, and conform with time restraints established in the online environment. This study will address the areas of online and in-person learning achievement

scores of low-income and students with disabilities as well as the general student population. Therefore, the data gathered, analyzed, and presented will potentially bring greater attention to the efficacy of online learning in comparison to in-person learning.

Research Questions

The study examined the following research questions.

Research Question 1: Is there a significant difference in third grade interim checkpoint literacy scores between online and in-person learners?

Research Question 2: Is there a significant difference in fourth grade interim checkpoint literacy scores between online and in-person learners?

Research Question 3: Is there a significant difference in fifth grade interim checkpoint literacy scores between online and in-person learners?

Research Question 4: Is there a significant difference in sixth grade interim checkpoint literacy scores between online and in-person learners?

Research Question 5: Is there a significant difference in third grade interim checkpoint math scores between online and in-person learners?

Research Question 6: Is there a significant difference in fourth grade interim checkpoint math scores between online and in-person learners?

Research Question 7: Is there a significant difference in fifth grade interim checkpoint math scores between online and in-person learners?

Research Question 8: Is there a significant difference in sixth grade interim checkpoint math scores between online and in-person learners?

Research Question 9: Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students?

Research Question 10: Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities?

Research Question 11: Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students?

Research Question 12: Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities?

Definitions of Terms

This section is a reference for vocabulary used throughout the dissertation that may require particular understanding of these selected terms.

Blended Learning: A movement between face-to-face instruction and online course delivery. Another dimension of blended learning is movement between synchronous and asynchronous learning (Farmer, 2020).

Checkpoint Assessment: A standards-based assessment for grades two – eight given quarterly that measures current mastery of the TN state standards. Checkpoints are administered online at the end of every nine-week grading period.

Distance Education: A style of learning in which teachers and students are physically separated and different technologies are used so that teachers and students can communicate effectively. (University of Kansas, 2020).

Hybrid Learning*:* A combination of remote learning and face-to-face instruction where half of the school's students were in class two days a week and at home for the remaining days. Online resources replaced portions of students' instruction that traditionally would be delivered face-to face (Bentley, 2020).

In-Person Learning*:* Students attend school five days a week in a traditional classroom setting.

Online Learning: A relationship between a student and digital curriculum that has expanded into several modalities of instruction, including: blended, remote, and hybrid (Canvas Team, 2020).

Delimitations

Delimitations associated with this study include the following:

1. Only students who completed the third-quarter district checkpoints were included in this study.
2. Data from only one rural school district in Tennessee were used.

Limitations

Limitations associated with this study include the following:

1. There could be outside variables that effect student scores such as lack of participation, the degree of parent involvement, and attendance in the remote setting.
2. Teacher efficacy could be a variable that effects test scores, as some teachers are more skilled in online instruction than others.
3. Online accessibility could also be a variable that effects participation in learning, possibly impacting test scores.
4. In-person students placed into quarantine due to exposure to the Covid-19 pandemic could be a variable that effects students' scores.
5. Results of this study are not necessarily generalizable to other populations or other settings.

Overview of Study

Chapter 1 includes a brief introduction to the Covid-19 pandemic followed by the problems faced in education as a result of the pandemic. Chapter 1 also includes the problem

statement, purpose of the study, research questions, definition of terms, limitations, delimitations, and an overview of the chapters. Chapter 2 presents a review of the literature from multiple sources and relevant topics, including challenges with online education, teacher preparedness, parental perceptions of online learning, social and emotional challenges, and student achievement. Chapter 3 includes the methodology of the study which includes data source, data collection, and data analysis. Chapter 4 presents the findings of the study and an in-depth analysis of the findings. Chapter 5 provides a discussion of the research findings, conclusions, and recommendations.

Chapter 2. Literature Review

This chapter presents a summary of literature related to online learning in comparison to in-person learning. The following literature review begins with a brief review of the K-12 online environment during the Covid-19 pandemic, perceived obstacles in the online setting, K-12 student achievement in traditional school vs. online learning, and policies and practices in the online environment. Existing research comparing remote learning to in-person learning is also discussed.

Covid-19 Pandemic Effects on Education

SARS-CoV-2, the virus that caused Covid-19, had a major health impact on humans globally, resulting in the infection of a large number of people. Disease and long-term health effects stemming from the virus caused disruption among routine services such as education and other societal functions (World Health Organization, 2020). When the outbreak of the pandemic intensified, schools were among the first to close due to the priority of communities to protect their children (National Academies of Sciences, Engineering, and Medicine, 2020). As the World Health Organization declared the Coronavirus a pandemic, in-person classes were cancelled, and there was a shift in education to the virtual platform (World Health Organization, 2020).

On January 29, 2019, the first U.S. cases of Covid-19 began to emerge (Decker et al. 2020). By February 11, 2019, teachers' unions began to take notice and called for federal guidelines to address controlling the virus. On February 25, 2019, the Center for Disease Control (CDC) warned schools to prepare for the Coronavirus, and by February 27th the first school closed after an employee's relative became ill and tested positive for the illness. By March 11, 2019, a pandemic was declared and school districts began to close, affecting more than 1 million students. On March 16, 2019, 27 states issued orders or recommended that all public schools

close their school buildings. By May 6, 2019, with the exception of Wyoming and Montana, all states closed their schools for the academic year, and remote learning became the substitute for in-person learning (Decker et al., 2020).

The Covid-19 pandemic overwhelmed the education system across the world (Garcia & Weiss, 2020). In early spring 2020, when the Covid-19 pandemic first hit its peak, 55 million students across the United States under the age of 18 were confined to their homes. Overnight, the pandemic forced the cancelation of in-person learning (García & Weiss, 2020). While school districts initially thought that the closure would be brief, the impact of Covid-19 resulted in extensive periods of closure (Hartshorne et al., 2020). For some students, this meant missing classes altogether, while others faced difficulties with online learning due to internet connections (Anderson, 2020).

Even though many schools around the world were prepared to deal with emergencies such as natural disasters, armed violence, etc., the majority were not prepared for long-term closures. Many schools taught online for the majority of the spring semester (Harshorne et al., 2020). During this time, students lacked daily access to school and the basic resources that are provided to students (García & Weiss, 2020). Moreover, many teachers and families lacked guidance on how to continue education during long-term school closures (Anderson, 2020). Teachers and students were forced into a new environment that most had not experienced before. This led to stress, anxiety, sickness, and lack of materials for learning in the online environment (Middleton, 2020).

Instructional Design during Covid-19

During the Covid-19 pandemic, a limitation of instructional design made it challenging to continue instruction using a different modality. Additionally, a lack of guidance for caregivers to

support home-based learning limited the quality of learning. School systems relied on a single-based delivery system that, on average, had limited support plans in the event of system failure (Chabbott & Sinclair, 2020). K-12 educators were left rushing to respond to the pandemic with little time to create a framework for reopening schools (Dibner et al., 2020). Due to the lack of definitive direction from stakeholders, school district supervisors were left on their own to make judgement calls about the operation of schools.

Furthermore, school districts' employees were coping with responding to rapid changes brought on by the pandemic while attempting to combat the consequences of school disruptions (National Academies of Sciences, Engineering, and Medicine, 2020). Public education systems were not prepared for the crisis caused by the pandemic, and, as a result, structures were not in place to sustain effective teaching and learning during the shutdown. Consequently, children who struggled the most found it difficult to receive effective instruction (Garcia & Weiss, 2020).

Achievement Gap due to Pandemic Restrictions

The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2020) predicted that over 100 million children will fall below proficiency level in reading due to the Covid-19 school closures. Before the pandemic, the number of children lacking basic reading skills was decreasing and predicted to fall from 483 million to 460 million. As a result of the pandemic, the number of students lacking basic reading skills jumped to 584 million in 2020, an increase of more than 20%. Moreover, school was disrupted for an average of 25 weeks due to complete or partial school closures. Schools remained closed in 30 countries, impacting 165 million children. In 70 countries schools were partially opened or reduced in-person attendance. These conditions affected two-thirds of our student population globally (UNESCO, 2020).

The pandemic brought attention to inequalities that existed worldwide. When required to attend school online, 50% of students did not have access to a computer and 40% of students did not have internet availability. Fifty-six million children worldwide did not have internet access and 7 million children in the United States did not have internet service (Walters, 2020). Additionally, one third of households with an annual income of under 30,000 did not have access to broadband internet. As a result, learning rates among lower-income students fell by 60%, compared to only 20% of the top income quartile (Taylor & Mallery, 2020). Households among the lower quartile were more likely not to have internet access at home than their higher income counterparts. Some students did not have the appropriate devices at home to facilitate their learning, creating a larger learning gap (Frenette et al., 2020).

There were also challenges for the nations nearly 7 million disabled students whose instruction and support were not easily transferred to the internet (Schaeffer, 2020). School closures have raised questions about the provision of services afforded to the special populations (TDOE, 2020d, May 8). The nation's school districts are federally mandated to provide education to meet disabled students' individual needs under the Individuals with Disabilities Educations Act (IDEA). Each child who qualifies receives an Individualized Education Program (IEP) detailing the services a student is required to receive. During the pandemic, receiving services such as physical therapy and occupational therapy were difficult due to the shift to remote learning. Additionally, parents of students with disabilities said they did not have the training to help teachers provide services to their children in order to fulfill their IEP (Stein & Strauss, 2020).

The coronavirus also contributed to widespread emotional distress and increased risk of psychiatric disorders. In the United States one in six children had a mental health disorder.

Suicide rates among young people ages 10-24 increased by 56% within the last two decades. Students experienced higher levels of anxiety and depression and trauma exacerbating the need for mental health resources. Approximately 72% of children in the United States had experienced at least one major stressful event such as witnessing violence, experiencing abuse, or losing a loved one. Long term closures disrupted the lives of nearly 55 million K-12 students in the United States. Thirty-eight percent of K-12 students were concerned with their well-being, 51% reported being more stressed and 39% felt lonelier (The Hunt Institute, 2020). These types of trauma influenced students' attendance, ability to complete coursework, and often changed the way students learned (Nelson, 2020).

Social-Emotional Support for Online Leaners

The Covid-19 pandemic drew attention to the growing mental health crisis in the United States. Federal data detailed a nationwide surge in mental health cases among children and adolescents due to the public health crisis, social isolation, and economic recession. School closures became especially disruptive for children from lower-income families who were likely to receive mental health care exclusively from their school (The Hunt Institute, 2020). Schools played a role in identifying and addressing mental health issues. Mental health issues left untreated potentially caused a loss in academic progress, chronic absenteeism, dropouts and problems with grade-level advancement (Hickey, 2020). The Hunt Institute posited schools are an essential source of support for students as they provide services including mental health resources.

During the pandemic, it is estimated that 5% of U.S. school children did not have stable home conditions. Children from low-income households faced living conditions that made learning from home difficult. Parents were not able to supervise learning due to work

responsibilities while some students faced homelessness or severe housing instability (Kaden, 2020). Covid-19 widened socio-economic disparities, leaving many children who struggled under normal circumstances experiencing obstacles in their learning that will need to be addressed in the future (García & Weiss, 2020).

DeArmond et al. (2020) analyzed remote learning trends in school districts across the United States. The researchers analyzed how 477 school districts attended to students' social and emotional well-being. During this time, students were coping with the pressures of the pandemic, social isolation, and the economic crisis. The authors argued that success in schools is not only academic focused, but should focus on healthy identity, self-management skills, self-awareness, empathy, and supportive relationships. The researchers' goal was to see whether district leaders remote learning and school reopening plans included social and emotional learning. The researchers found 66% of districts addressed social and emotional well-being in their plans; however, despite the interest in social emotional learning and well-being, very few district plans took a system-wide approach to collecting data on how their students were doing. A study that analyzed parents' perceptions of online learning revealed parents desired school systems check on their child's well-being in addition to the academic support (Daniela et al., 2021)

Schools were an essential source of non-academic supports providing mental health services, food assistance, and interventions for homelessness and mistreatment (Hoffman and Miller, 2020). A growing number of scholars and educators have called for greater attention to students' development beyond mastery of academics such as students' mindsets, beliefs, emotions and behaviors. Social and emotional learning (SEL) is associated with personalities and behaviors that are considered foundational for the success of home and school life (Allbright et al., 2019).

The stress associated with the pandemic such as loss of routines, social isolation, and economic hardships, increased the need for effective social and emotional learning programs that could be implemented remotely. As a result of the pandemic, the need for digital supports for social and emotional health grew significantly. Students were exposed to psychosocial adversity and were in greater need of emotional support. The combination of increased stress and decreased access to support placed students at a heightened risk of developing social-emotional problems and academic and behavioral delays (Linlin et al., 2021). Ellerbeck (2021) stated children with strong social-emotional learning competencies perform better in school due to their ability to focus on instruction and work collaboratively with peers and their teacher.

For low-income families hardships and academic tolls may have deepened (Ellerbeck, 2021). Many students relied on school for meals and stability and may have struggled to focus on school work without these supports (Hough et al. 2021). Ellerbeck (2021) reported high-quality early education and effective after-school programs are influential for low-income students' academic outcomes. Young children in low-income households may have benefitted from efforts made by educators to support their social and emotional health. During the pandemic, the importance of promoting social and emotional learning was significant as children may have struggled to regulate their emotions while facing the added stress of the pandemic (Ellerbeck, 2021).

Disruptions to students' mental and emotional health and support required a new focus on social and emotional well-being with many students experiencing anxiety and depression. For students with disabilities developmental regression was also a concern. Schools in the United States reported cases of increased fear and anxiety, online bullying, depression, and increased cases of abuse. Additionally, school closings were associated with the rise in adolescent suicide

due to the feelings of isolation and hopelessness. Due to online learning, educators did not have as many opportunities to monitor the students' well-being as they did with in-person (Hough et al., 2021).

Parents' Perspectives of Online Learning

The Pew Research Center studied the impact of change in instruction due to the coronavirus outbreak. The study found that there were discrepancies in satisfaction rates between parents of students who attended in-person classes and of those enrolled in online learning. Fifty-four percent of parents of in-person learners were satisfied with the school's instruction compared to 30% of parents whose children received online instruction and 27% of parents who received blended instruction. Additionally, the study found that seven out of 10 parents whose children received online instruction were providing additional instruction or resources beyond what was provided at school. Seventy-two percent of parents of low-income students claimed they were concerned about their children falling behind in school because of the disruptions brought on by the pandemic (Horowitz & Igielnik, 2020).

Parents as Learning-Agents

In the spring of 2020, parents became key learning agents when the education system switched to online learning. Daniela et al. (2021) examined parents' perspectives of the distant learning process and the challenges they faced. The researchers examined parents' views of 738 school-age children grades one - twelve. They found most schools provided information on how remote learning would be organized with 377 parents indicating they received sufficient information while 238 parents claimed to have received minimal information. However, parents indicated there was a low-level of support on the use of digital learning materials.

Information given to parents lacked strategies on how to support students, guidelines for digital tools, as well as learning materials. As a result, parents organized online learning according to their own understanding and provided supports to their children to the best of their ability. Student learning depended largely on parents' ability to provide support to their children. The amount of support parents could offer was linked to a parent's knowledge of different subjects as well as their ability to use digital tools (Daniela et al., 2021).

Opportunities also depended largely on social situations of families and whether children could be provided with digital devices to access learning from home. Work demands were also a factor on the amount of support a parent could provide as some parents did not have the opportunity to monitor their child's learning due to work responsibilities. Researchers concluded more support was needed from administrative staff of educational institutions which could organize extra support for parents to ensure learning loss is mitigated. Furthermore, the study found parents wanted more support from educators on how to help their children during the learning process (Daniela et al., 2021).

Teacher Perspectives on Teaching Online

In numerous online surveys conducted since the pandemic began, teachers indicated their lack of preparedness to teach in the online environment (Middleton, 2020). Trust and Whalen (2020) collected data from teachers regarding their experience switching to emergency remote learning. They found that teachers were overwhelmed and unprepared to teach online and struggled to use online teaching strategies. Teachers were faced with situations such as unreliable internet access and changing personal needs. Moreover, most K-12 teachers did not consider teaching online until the pandemic; consequently, teachers had to quickly create a variety of options for online instruction (García & Weiss, 2020). Nonetheless, teachers used technology, as

well as other forms of communication, to deliver content to students, despite being untrained to handle such responsibilities (Black et al., 2020).

Hamilton et al. (2020) examined multiple aspects of education including teachers' and principals' perspectives of remote learning during the pandemic. Deriving evidence from RAND Corporation's American Educator Panels, researchers found even though educators shifted quickly to distant learning and offered a variety of supports, additional resources were needed. The resources included access to technology and devices for students, teacher training for remote instruction, strategies for motivating students, ways to address the loss of hands-on experiences, and social and emotional supports for students. Additionally, many teachers said they did not get enough support for teaching students with disabilities and homeless students (Hamilton et al., 2020).

Student Demographics Effects on Online Learning

A limited number of studies analyzed online learners' performances in relation to the learners' characteristics, socio-economic standing, age, gender, and disability status (Rizvi et al., 2019). Picciano and Seaman (2007) examined students enrolled in fully online and blended courses in 366 school districts. They found respondents perceived online learning as beneficial due to meeting the learning needs of students who are making up for lost credit. Barriers for online learning, on the other hand, were course quality and development, funding, and teacher training.

Additionally, The National Academies of Sciences, Engineering, and Medicine concluded that elementary school-aged children, as well as students with health care needs, may have struggled with online learning without the support of an adult willing to supervise the online experience. Children in the K-3 setting were still learning how to maintain focus and

monitor their own learning needs and required an adult readily available to monitor their learning experience (Dibner et al., 2020). Research (e.g. Garcia & Weiss, 2020) on the performance of children who attended virtual charter schools supported the importance of parental involvement and self-engagement in order to be successful in the online world. Farmer (2020) argued that student support is related to student success, motivation, and learning, with students indicating satisfaction with their online course when they had support available.

Online Instruction during Covid-19

According to the American Academy of Pediatrics, AAP (2020), due to the lower risk of transmission of coronavirus in younger children, in-person instruction for primary and elementary grades was deemed appropriate. When some schools returned to in-person learning during the fall semester, many school districts gave parents options for learning. Many considered online or blended instruction as an alternative to in-person school learning as the pandemic evolved (Black, 2020). Online learning, defined as a relationship between a student and digital curriculum, has expanded into several modalities of instruction: blended, remote, and hybrid (Canvas Team, 2020). According to Smith and Brame (n.d.), online courses consisted of at least 80% of the course content delivered online, as opposed to blended or hybrid learning that delivered content 30-80% online with some face-to-face interaction.

There are two categories of online learning: synchronous and asynchronous (Delgado, 2020). Synchronous learning allows the students to interact with their teachers and peers in real-time. Asynchronous learning occurs at any time in the day, in person or offline through videos, materials, and educational resources. Since the evolution of technology and expanded bandwidth, synchronous learning has become the more popular alternative due to the advantage of having live interactions between the students and teachers.

Blended Learning

Farmer (2020) defined blended learning as movement between face-to-face instruction and online course delivery but argued another dimension of blended learning is movement between synchronous and asynchronous learning. Synchronous learning is used to receive support from peers during group work, discovery exercises, and peer feedback; while asynchronous is used for independent study and to practice skills at a pace that is optimal for the students, reducing the risk of anxiety for students that cannot move at the same pace as their peers.

Blended learning balanced self-paced learning with one-on-one instruction and allowed students flexibility to demonstrate their learning in multiple ways (Canvas Team, 2020). Additionally, blended learning incorporated a variety of experiences: learning independently, collaborating with peers, learning on campus, and learning from home. Even though there was a significant increase in teaching in the blended learning environment, there was not an increase in professional development to prepare teachers to meet that demand. Traditional educator preparation programs required coursework that incorporated technology; however, there was minimal preparation for the blended learning environment (Graham et al., 2019).

Hybrid Learning

Hybrid learning and blended learning are used interchangeably; however, they are not the same. Hybrid learning is a combination of remote learning coupled with face-to-face instruction. Online resources replaced portions of students' instruction that traditionally would be delivered face-to face (Bentley, 2020). This type of learning provided educators the flexibility to adjust instruction and supported individual learning experiences while adjusting to changes in education (Canvas Team, 2020).

There has been relatively little research in the hybrid setting in K-12 schools with hybrid models being equally as rushed as other online forums. As a result, teachers were left untrained and without a recognized formula for success. However, due to its emphasis on student-centered learning, hybrid instruction was a widely adopted method in the fall (Canvas Team, 2020). Close to two-thirds of district leaders participated in hybrid learning. Most U.S. school districts used hybrid learning although the mix of in-person and online instruction varied from school to school.

Challenges of Online Learning

Lieberman (2020) interviewed faculty and staff from six school districts to gain the district's perspective of online learning. One challenge a teacher identified was the evolution of the composition of her class. For example, when school began, half of her students were online. This changed, however, when students returned to in-person instruction after parents grew comfortable with sending their students back to school, changing the dynamic of her class. Other challenges were managing in-person and virtual instruction simultaneously, barriers for equitable remote instruction, and stress from trying to keep students on the same page. Devices not supporting the resources for the learning programs and lack of adequate resources due to school budgets being stretched increasingly thinner also posed a challenge for teachers (Lieberman, 2020).

Efficacy of Online Learning

Molnar et al. (2019) examined the performance ratings of 320 virtual schools for the 2017-18 school year. The authors examined the percentage of virtual schools with acceptable performance ratings. The study found that 51.5% of full-time virtual schools had an unacceptable performance rating. Comparatively, 55.3% of full-time blended schools were rated unacceptable.

Additionally, students enrolled in full-time virtual or blended schools performed lower than their counterparts attending face-to-face instruction. Moreover, in 2012, the NEPC (National Education Policy Center) examined virtual schools and discovered they achieved only half of the adequate yearly progress compared to public schools. Since then, the results have remained consistent with virtual schools' performance ratings being lower than brick and mortar schools. Additionally, graduation rates were lower than the national average for students attending virtual schools (Molnar et al., 2019).

Relatively little evidence on the effectiveness of online instruction has been available (García & Weiss, 2020). Online education, however, was celebrated as a solution for reaching students who are not successful in the traditional education system (Goldrup, 2020). Proponents for online education argued that virtual education expanded students' choices and tailored to individual students more effectively than traditional classes. As a result, virtual classes had the potential to increase student achievement, even though these claims were not supported by research (Molnar et al., 2019). Online education offered students choices, independence, and responsibility for their own learning, but digital access and connectivity remained a problem (Kaden, 2020).

Loeb (2020) noted that online courses did offer opportunities for students; however, in comparison to in-person classes, online courses were not as effective for most students. On average, students performed worse in the online setting, especially students with weaker academic backgrounds. Moreover, students who struggled in the traditional classes may have struggled even more online. Loeb posited that distractions may have reduced motivation of students in the online environment.

Additionally, procrastination was a factor that negatively impacted the effectiveness of online learning. Hong et al. (2021) analyzed data focused on individual dispositions that influence self-regulated online learning and participants' procrastinating dispositions. Their results revealed that procrastination is negatively related to six sub-constructs of self-regulated learning: task strategy, mood adjustment, self-evaluation, environmental structure, time management, and seeking help. The authors concluded that there are concerns about the effectiveness of online learning with students studying by themselves.

Dewitt (2020) collected 120 comments from pandemic pages on Facebook and found there were numerous posts from teachers highlighting failures of online students signing in to turn in or receive their assignments, indicating that student accountability is an issue with online learning. Additionally, Dewitt claimed teachers perceive online learning as a barrier that limits the amount of control a teacher has over student engagement. Dewitt theorized that students are not signing in to their online classes because of several reasons: (a) some students have no access to internet; (b) many school districts have gone to the no-grading policy, leaving students little incentive to attend class; (c) students with siblings are often left responsible for providing childcare while parents are at work.

Efficacy of Online Learning for Students with Disabilities

Despite the growth of online learning, there is little research on the efficacy of online learning for students with disabilities (Goldrup, 2020). The National Academy of Pediatrics (2020) claimed students receiving special education services may have been more negatively impacted by distance learning. K-12 special education students faced increased pressure due to the rapid expansion of online learning. While some students were beginning to adjust to online learning, students with disabilities who stayed home due to their high-risk health were

experiencing its failures, including stress, anxiety, and lack of social connections (Burdette et al., 2013).

Parents Together Action (2020), a national parent led organization with over two million members, released survey results of more than 1,500 families around the country. The results revealed that remote learning jeopardized the education of the vulnerable population, further expanding existing inequalities among students. The report revealed 20% of parents of children with IEPs did not receive the services they were entitled to, with 39% receiving no support at all. Moreover, children with IEPs were twice as likely as their peers to participate in little to no remote learning, and twice as likely to say distance learning is not going well (ParentsTogether Action, 2020).

As a result, parents experienced difficulties obtaining an appropriate education for their children through the end of the 2019-2020 school year. When school districts reopened, students were required to receive diagnostic assessment for learning loss; however, according to reporting, many students did not receive a diagnostic assessment (Grant, 2020). Additionally, special education services, including occupational, physical, and speech therapy, were difficult to deliver remotely. A variety of factors complicated the delivery of services, such as the range of students' needs served under the Individual with Disabilities Act, the services specified for each student's individualized education program, and the capacity of parents or caregivers to assist in delivering general educations, specialized instruction, and related services for their children (The Government Accountability Office, 2020).

Approximately 7 million students ages three - eighteen received special education services that ranged from providing extra time on assignments to more complex services and technology that allowed the students to communicate (Binkley, 2020). When the U.S Education

Department required students with disabilities to be granted the same opportunities as other students during the pandemic, some districts dropped online instruction entirely, citing concerns about their ability to serve students with special needs. Advocates for students with disabilities argued it is crucial for students to continue to receive online instruction, claiming research supports a break in school, even for a day or two, can cause the students to lose progress on skills they were starting to master (Binkley, 2020).

The Government Accountability Office (GAO, 2020) expanded on the challenges and lessons learned from providing distance learning to students with disabilities. The GAO reviewed distance learning plans from 15 school districts selected for their high number of either English learners or students with disabilities. They documented that students with disabilities are often identified as having one or more disability categories recognized under the Individuals with Disabilities Education Act (IDEA), including but not limited to: intellectual disabilities, hearing impairments, speech or language impairments, emotional disturbances, autism, traumatic brain injuries, as well as other health impairments and learning disabilities.

As a result, the types of services provided and the number of hours per week required for specialized instruction made it difficult for school districts to plan and schedule the delivery of each type of support. This raised concerns about students not receiving services in the same manner as before the pandemic (Government Accountability Office, 2020). Cyndi Wiley, digital accessibility coordinator for Iowa State University, maintained shifting from in-person to online instruction can cause students with disabilities to be overlooked. For example, students who are deaf, blind, or physically/mentally disabled were less of a priority as teachers worked to transfer educational content to a digital format (Anderson, 2020).

The needs of students with disabilities were difficult to measure during remote learning and did not directly align with other students' needs. Since students with disabilities required special accommodations at school, when learning at home, these students may not have had access to the learning assistance they previously received. Blagg et al. (2020) suggested that students with disabilities may have faced other difficulties while learning from home, including: staying on task, difficulties with the change in routine, and lack of equipment for physical or occupational therapy. Additionally, many school districts relied on parents or caregivers to take a more active role in providing education and services for their children. As a result, parents were required to take on the role of a teacher in addition to any necessary support services (Government Accountability Office, 2020). However, parents did not have the resources to provide special education services to their children (Kincart & Soter, 2020).

While moving to online learning was deemed a common-sense approach to a difficult situation, it was not a solution for students with disabilities (ParentsTogether Action, 2020). Little research is available on educating students with disabilities online. Given the circumstances that led to remote learning, it is unlikely teachers received sufficient training to deliver effective special education. Crouse et al. (2018) interviewed fully online teachers, inquiring about their instruction of students with disabilities. Crouse et al. reported that teachers indicated they received no direct preparation for teaching in the online environment and acknowledged "trial by fire" was the initial online experience. Additionally, teachers indicated even technology courses were not dedicated to online learning. Moreover, one of the biggest obstacles teacher programs faced was the lack of teaching models to guide online instruction.

Kincart and Soter (2020) revealed online educators' difficulties with navigating an Individual Education Plan (IEP). This left students without individualized attention to meet their

needs. Twenty percent of parents of children with disabilities said their child did not receive individual services during remote learning (Barnum & Bryan, 2020). Other issues reported by virtual public schools included not being adequately prepared to accommodate students with disabilities, lack of communication between the resident school and the virtual school, and inadequate support for students and staff (Burdette et al., 2013).

Crouse et al. (2018) found the following when interviewing online educators: teachers described a limited ability to modify the curriculum for their students with disabilities; teachers did not feel prepared to teach students with disabilities, having limited experience with this specific student population; and teachers could not describe ways to integrate technology that was differentiated for students with disabilities. Teachers reported being limited in modifying instruction due to a preset curriculum imposed by the organization, eliminating their ability to design their own courses (Crouse et al., 2018; Farmer & West, 2019). When teachers were asked what types of support they needed for online instruction, they requested strategies to help with student engagement and learning remotely (Barnum & Bryan, 2020).

Students in Poverty and Online Learning

The Covid-19 pandemic placed low-income students at a disadvantage in comparison to their more affluent peers (García & Weiss, 2020). According to the American Academy of Pediatrics (2020), schools play a critical role in addressing racial and social inequality. As a result, it was important to reflect on the impact of Covid-19 in populations facing inequality. Black and Hispanic students, as well as students living in poverty, faced widening educational disparities. Kaden (2020) claimed school closures may have caused detrimental social and health consequences for students living in poverty and, likely, exacerbated the current inequalities, widening the learning gap between children from low-income and high-income families.

The Common Sense and Boston Consulting Group used data from the 2018 census bureau and discovered that roughly 30% of the 50 million K-12 students in the United States lacked high-speed internet or devices to access online learning. Additionally, 300,000 teachers lacked adequate high-speed internet to use for teaching from home. In spring of 2020, Parents Together reported 13% of parents from low-income homes lacked devices or internet connection and were 10 times more likely to say their children were doing little to no remote learning at home (Darling-Hammond et al., 2020). Fifty-one percent of students in high-poverty schools reported that most of their students participated in online schooling compared to 84% in affluent communities. Factors contributing to lack of participation include access to technology, stress from the pandemic, and responsibilities at home such as taking care of siblings (Barnum & Bryan, 2020).

Dorn et al. (2020) created statistical models to predict the impact of school closures on student learning. The models were three epidemiological scenarios. In the first scenario, the virus was contained, and in-class instruction resumed in the fall. The second scenario hypothesized a virus resurgence where school closures and part-time schedules continued intermittently, and in-school instruction did not resume until January 2021. In the third scenario, the pandemic escalated, and the virus was not controlled until vaccines were available, meaning schools were fully remote for the 2021 school year (Dorn et al., 2020).

The authors estimated that in all three scenarios students were at risk for significant learning loss. Dorn et al. predicted learning loss would be greatest among low-income, black, and Hispanic students. This was because low-income students were less likely to have access to high-quality remote learning or an environment that is conducive to learning--a quiet place with minimal distractions, high speed internet, and parental academic supervision.

Policies and Practices Related to Virtual Schooling

In 2018, virtual schools continued to be a focus of policymakers (Molnar et al., 2019). In 2019, policymakers implemented a modified version of homeschooling in the U.S. to protect students and staff and to flatten the infection curve (Black et al., 2020). However, decisions made by educational leaders and policymakers were more difficult due to the gaps in evidence related to Covid-19 (Dibner et al., 2020). The American Academy of Pediatrics (2020) recommended all policy considerations for Covid-19 plans should begin with having students physically present in school. They emphasized the importance of in-person learning and argued there was already evidence of negative impacts on children because of school closures.

Gulosino and Miron (2017) studied the growth and performance of fully online and blended K-12 public schools. They compared California's average student proficiency results on state assessments in mathematics and English Language arts in virtual and blended schools. The study found that students enrolled in full-time virtual schools showed a greater decline. Their proficiency was at 26.95%, lower than the statewide percentage of 33%. Proficiency gaps between blended schools and their host states were deemed statistically significant. Molnar et al. (2019) claimed that the 320 virtual schools with performance ratings of 48.5% were rated acceptable. Ahn and McEachin (2017) claimed virtual students were not learning at the same rate as traditional schooling. Additionally, even with higher achieving students outperforming many of their peers, they still did not perform as well as they would have if they were enrolled in traditional public schools.

Due to the evidence of poor performances by full-time virtual and blended learning schools, Molnar et al. (2019) recommended policymakers slow or stop the growth in the number of virtual and blended schools and the size of their enrollments until the reasons for the relatively poor performance were identified and addressed. Moreover, Molnar recommended policymakers

implement measures requiring virtual and blended schools to reduce student-to-teacher ratios. Additionally, sanctions should be enforced for virtual and blended schools that perform inadequately. Research should also be sponsored on virtual and blended learning programs and classroom innovations within traditional public schools and districts.

Darling-Hammond et al. (2020) focused on and provided a framework for how policymakers and educators can support equitable and effective teaching. The framework was intended to help schools reinvent themselves around principles of equity that require changes from policymakers and educators. The first priority in their research was to close the digital divide. To do this, educators must do the following: prioritize federal efforts to close the divide by ensuring that every student has access to adequate computing devices and internet; expand broadband through state and city initiatives by passing progressive regulation and leveraging public and private funding streams; organize access to devices and connectivity by providing WIFI and devices adequate to support schoolwork.

The second priority was to strengthen distance and blended learning models (Darling-Hammond et al. 2020). The authors suggested sharing efforts among districts guided by successful pioneers and principles of equity and implementing well-designed assignments, supported by research, that students could complete from home. Moreover, they recommended developing standards for digital learning that focus on the use of technology to empower learners and transforming community spaces that ensured that students with the highest needs can engage productively in distance and blended learning. For online education to effectively support learning, it must be carefully designed and individualized to not deepen inequality and social divides among students (Kaden, 2020). Educators should adapt their material for students without access to the internet and a stable place to study (Lancker & Parolin 2020).

Call to Action

In-school and remote learning should be connected and seamless, with instructional tasks chosen to highlight the various settings in which learning takes place (Darling-Hammond et al., 2020). Teachers must have the skills to motivate, guide, and assess students in the virtual environment. Collaboration with colleagues who are teaching online across the world would allow teachers to learn how to overcome challenges faced in the online experience (Correia, 2020). For example, some school districts have developed an Instructional Continuity Plan with curriculum designs, plans to access devices and connectivity, and support for parents and teachers that are activated when the need arises to ensure that instruction continues seamlessly (Darling-Hammond et al., 2020).

Additionally, investments in preparedness efforts yields major returns in learning (Chabbot & Sinclair, 2020). Areas struggling to provide electronic communication are unlikely to have a laptop in every student's hand by the time the next crisis occurs. Many countries must make investments in care-giver training to support basic education, as well as teacher/principal training to support home-based learning, including strategies to ensure equity among all students (Chabbot & Sinclair, 2020). All educational institutions, educators, and learners need to adopt technology and improve their digital skills to compete with global trends in education (Sunita, 2020).

The Tennessee Department of Education (2020) provided guidance on supporting students during school closure. The following must be done: prepare teachers, communicate expectations to families, and provide logistical updates to stakeholders by establishing weekly routines for communication updates. Furthermore, clear expectations must be provided to encourage the involvement of the stakeholders in the learning process. School leaders must communicate the learning expectations to families and teachers.

Moreover, teachers should contact students frequently to reinforce consistency and stability. Incorporating information technology personnel into the team planning, implementation, and evaluation creates a common platform for conducting online sessions to create convenience for students and faculty. If using a blended method technique, providing time for students to reflect on what they are learning will allow students to learn at their own pace, while allowing meaningful interaction through discussions. Assigning time frames to every blended unit will help deter inaction and procrastination (Eachempati & Ramnarayan, 2020).

The Tennessee Department of Education (2020) provided guidance for students with special needs. First, the delivery and relevance of services during distance learning much be considered for each student based on his or her individual needs. Some factors to consider when planning accommodations during distance learning are the following: the students' physical, sensory, cognitive, behavioral, and motivational characteristics. The students' level of cognitive function, the ability to maintain attention, and communicative ability should also be considered.

Additionally, providing structure and a consistent schedule that will support all students is an important strategy for students with autism, emotional disturbances, or intellectual disabilities. Immediate intervention to support vulnerable students affected by the pandemic is urgent. School systems must encourage ongoing learning during the summer. Such initiatives should include expansion of existing summer-school programs, working with youth program agencies to add academics to their activities, and enlisting corporations to train volunteer tutors. (Dorn et al., 2020).

In order to address students' social emotional well-being teachers should be given professional development opportunities on addressing challenges of distance learning especially when working with the most vulnerable students. Policymakers should address students'

disparities and promote social and emotional learning when the school year begins. Educators need resources and strategies to promote student engagement while learning remotely as well as resources that support students' social and emotional learning. District leaders should reprioritize goals and tasks and should be prepared to implement plans for emergencies, addressing learning gaps, and addressing mental health issues that may be exacerbated by the effects of the pandemic (Hamilton et al., 2020).

Theoretical Framework

"I have never seen anybody improve in the art and technique of inquiry by any means other than engaging in inquiry." (Bruner, 1961, p. 8).

Jerome Bruner's Constructivist theory proposes that a student is capable of learning if the instruction is organized appropriately (McLeod, 2019). According to Bruner (1961), education should represent the cognitive level of the student as children learn when they discover things for themselves. With this style of learning the teacher remains in the background and offers the students appropriate material that supports classroom instruction with the learner relying on their cognitive structure to select information and make decisions (Tomic & King, 1996). Furthermore, Bruner emphasized that a child's environment, especially his or her social environment, should include adults playing an active role in his or her learning. Bruner highlighted the social nature of learning and argues that students should have adult support when developing skills through a scaffolding process (Bruner, 1961).

Bruner's concept of scaffolding is comparable to Vygotsky's Zone of Proximal Development (ZPD) with the terms often being used interchangeably (McLeod, 2019). The Zone of Proximal Development is the learner's ability to successfully complete a task with appropriate support and scaffolding from the teacher. ZPD involves the transfer of responsibility from the

teacher to the learner (Walker, 2010). Vygotsky maintained that students can achieve their learning goals by completing problem-solving tasks with their teacher or engaging with more competent peers. Moreover, students are not able to reach the same level of learning by working alone but need support to help achieve independence.

Collaborating with teachers and peers aids in making connections between concepts, and learning takes place when meaningful interactions with others are present (Kurt, 2020). Wood et al. (1976) agreed learning involves a scaffolding process that allows students to solve a problem and carry out a learning task that would go beyond his or her unassisted efforts. Scaffolding consists of adults controlling the elements of the task that are initially beyond the learner's ability, requiring the student to focus on completing the elements of the task in their range of competence, leading to a successful conclusion. As a result, the student develops a competence of the task at their own pace.

Bruner (1961) suggested practice in discovering for oneself teaches students to obtain information in a way that is more viable to problem solving. Bruner emphasized that teaching and learning begins with conversation. Students internalize narratives on their own, and once internalization has occurred, they are able to go beyond the information they have been given to generate additional ideas that can be used to form a reasonable hypothesis. At this point students are seeking to gain control over their environment and can treat success as if they are on the right track or can treat failure as being on the wrong track.

Additionally, Bruner suggested teachers should introduce problems that will stimulate children to discover the structure of the subject for themselves (Tomic & Kingma, 1996). Bruner described the term structure as the framework of fundamental ideas, relationships or patterns of the content, or the basic information. Bruner argued that education should be set up so that

children learn to reason by formulating a general thought from examples and details given by the teacher. The teacher and students engage in active dialogue, and the instructor formulates appropriate content that meets the learners' current state of understanding (Bruner, 1961).

For those not intrinsically motivated, Bruner suggested that teachers lead students through guided discovery so teachers can ask questions that excite the children and motivate them to further delve into the subject. Bruner reinforced that learning is an active process in which students construct new ideas derived from their current or past knowledge, and this supports the following principles: instruction must include experiences and context that make the student willing to learn; instruction must be easily grasped by the student, and instruction should be designed to fill in the gaps (Bruner, 1961).

There are powerful effects that come from a student putting things together for himself and being his own discoverer. Discovery favors the well-prepared mind (Bruner, 1961). Discovery is when one can take evidence, rearrange, and transform it, and draw new insights from it in the process. The aim of teachers is to give students a solid grasp of a subject and to make the student a self-propelled thinker who will succeed after their education has ended. Comprehension must precede production, and a student must recognize the relationship between means and ends to get true knowledge of results (Wood et al., 1976).

Chapter 3. Methodology

This chapter presents a summary of the methodology constructed to answer the research questions about the comparison of achievement scores among online and in-person learners, students with disabilities, and low-income students in a Northeast Tennessee school district. The following details the research design, participants involved, instruments used, data collection procedures, and the data analysis.

The purpose of the study was to determine if there was a significant achievement gap between online students compared to in-person students on end-of-term checkpoint assessments. The study was categorized by the following demographics: in-person general education compared to online general education, including students who are not low-income or special education; low-income, in-person compared to low-income, online students; and in-person, special education students compared to online, special education students.

The focus of the study was on students in grades three – four in elementary school and grades five – six in intermediate school. The study first examined the achievement scores of online learners and in-person learners in the general education population. Next, the study examined online learners and in-person learners compared to students' socio-economic status. Finally, the study examined students with disabilities attending online classes compared to students with disabilities enrolled in traditional learning.

The data collection instruments included English Language arts and math scores from the third-quarter district checkpoint assessments for grades three – six. The study examined seven elementary schools and one intermediate school within the district.

Research Questions and Null Hypotheses

The following research questions and null hypotheses were considered during the study:

Research Question 1: Is there a significant difference in third grade interim checkpoint literacy scores between online and in-person learners?

$H_0$1: There is no significant difference in third grade interim checkpoint literacy scores between online and in-person learners.

Research Question 2: Is there a significant difference in fourth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$2: There is no significant difference in fourth grade interim checkpoint literacy scores between online and in-person learners.

Research Question 3: Is there a significant difference in fifth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$3: There is no significant difference in fifth grade interim checkpoint literacy scores between online and in-person learners.

Research Question 4: Is there a significant difference in sixth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$4: There is no significant difference in sixth grade interim checkpoint literacy scores between online and in-person learners.

Research Question 5: Is there a significant difference in third grade interim checkpoint math scores between online and in-person learners?

$H_0$5: There is no significant difference in third grade interim checkpoint math scores between online and in-person learners.

Research Question 6: Is there a significant difference in fourth grade interim checkpoint math scores between online and in-person learners?

$H_0$6: There is no significant difference in fourth grade interim checkpoint math scores between online and in-person learners.

Research Question 7: Is there a significant difference in fifth grade interim checkpoint math scores between online and in-person learners?

$H_0$7: There is no significant difference in fifth grade interim checkpoint math scores between online and in-person learners.

Research Question 8: Is there a significant difference in sixth grade interim checkpoint math scores between online and in-person learners?

$H_0$8: There is no significant difference in sixth grade interim checkpoint math scores between online and in-person learners.

Research Question 9: Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students?

$H_0$9: There is not significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students.

Research Question 10: Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities?

$H_0$10: There is not significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities.

Research Question 11: Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students?

$H_0$11: There is not significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students.

Research Question 12: Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low students with disabilities?

$H_0$12: There is not significant difference in grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities.

Population

The district was chosen due to the consistency of online learning offered throughout the district. The study included elementary and intermediate students in a Northeast Tennessee school district for the 2020-2021 school year. The school district has a population of 8,098 students. The district consists of eight elementary schools that consist of grades Prekindergarten – fourth grade, one intermediate school that includes grades five – six, one middle school, grades

seven – eight, and one high school, grades nine – twelve. The district's ethnic composition is the following: Asian 4%, black/African American 15.5%, Hispanic or Latino 12.2%, and white 67.9%. Of the student population, 4.1% are English learners, 13.2% are students with disabilities, 31.3% are economically disadvantaged, and 1.7% are homeless (reportcard.tnedu.gov).

For the purpose of this study, high school and middle school students were excluded. Seven of the eight elementary schools agreed to be included in the study. The first elementary school's enrollment was 401 students, including 12% with disabilities and 33.9% economically disadvantaged. The second elementary school's enrollment was 522 students, 16.3% with disabilities and 37.4% economically disadvantaged. The third elementary school's enrollment was 532 students, 12.4% with disabilities and 13.3% economically disadvantaged. The fourth elementary school's enrollment was 452 students, 17.9% with disabilities and 75.2% economically disadvantaged.

The fifth elementary school's enrollment was 346 students, 13.3% with disabilities and 40.8% economically disadvantaged. The sixth elementary school's enrollment was 423 students, 10.9% with disabilities and 10.6% economically disadvantaged. The seventh elementary school's enrollment was 402 students, 12.7% with disabilities and 31.8% economically disadvantaged. The intermediate school's enrollment was 1,232 students, 14.4% with disabilities and 33.9% economically disadvantaged.

The study focused only on the students who completed third-quarter district checkpoints. The population consisted of elementary school students broken up into the following grades: third grade with 471 students; fourth grade with 498 students; fifth grade with 493 students; and sixth grade with 419 students.

Data Source

The researcher used existing interim test scores for the 2020-2021 school year on third-quarter checkpoint assessments for grades three – six. Checkpoint assessments were aligned with Tennessee State Standards by subject and grade-level to analyze student achievement. The study examined interim checkpoint assessment data from students in grades three – six to compare achievement data between online learners and in-person learners. Checkpoint assessments monitor student achievement of grade level, standards-based skills in mathematics and English Language arts that align with the Tennessee state standards. When checkpoints are complete, student data is analyzed for possible gaps in achievement, student proficiency, and standard-based deficits.

Checkpoints are created by district leaders using Illuminate, the platform used to gather student data. The checkpoints are administered to grade levels three – eight at the end of each nine-week term to monitor student progress throughout the year. Illuminate provides a holistic view of the student by combining assessment and intervention for each student in past and present years. Illuminate aligns with students' demographics which allows teachers to develop curriculum based on individual need. Illuminate uses comprehensive assessment tools that align with instruction, and intervention supports accelerating learning for all students.

The tests are given online through the Illuminate platform. District leaders have access to the assessment until it is released to teachers approximately a day before testing begins. When the tests are released to teachers, the expectations are that information from the test will not be shared with students. Students are given the test in-person in the classroom using technology provided by the district, with remote learners returning to school for a brief period to complete the assessment. When testing is complete, district leaders and teachers analyze test results to determine how instruction should be altered moving forward.

Data Collection

Data were collected from 2020-21 third-quarter Checkpoint assessments by the district's curriculum coaches. The middle grades ELA curriculum coach for grades five – eight collected English Language arts checkpoint data from the intermediate school grades five – six. The district elementary ELA coach for grades kindergarten–fourth grade collected English Language arts checkpoint data for grades three – four. The district elementary math coach for grades kindergarten–fourth grade collected math checkpoint data for grades three – six. All student identifiers were removed.

Students in grades three – eight took the Checkpoint tests at the end of each nine-week term, with the exclusion of the fourth set of nine weeks when TCAP testing took the place of Checkpoint testing. Students were assessed in English Language arts, math, and science. This study focused only on math and English Language arts scores. Online students were required to take the Checkpoint tests in person, within the school building, with their online teacher. In-person students took the tests in their regular classroom.

The Checkpoint data were collected by the district's math and language arts curriculum coaches. District coaches gathered data and excluded student identifiers from the data. Only test scores were given to the researcher, broken into the following categories: online general education students, in-person general education students, online at-risk students, in-person at-risk students, online special education students, and in-person special education students.

Data Analysis

The data were analyzed by grade level. Checkpoint data from grades three – six were analyzed for proficiency in math and English Language arts. Proficiency level for the district is set at a 70% pass rate for each student. The data were broken into two categories: remote learners

and in-person learners. The study used a series of independent t-tests to compare proficiency levels of students who were remote and in-person for the 2020-21 school year. The purpose of the comparison was to determine if there were significant differences in mean test scores between online and in-person learners. All data were analyzed at the .05 level of significance.

Chapter Summary

This chapter presents a summary of the methodology constructed to answer the research questions about the comparison of achievement scores among online and in-person learners, students with disabilities, and low-income students in a Northeast Tennessee school district. The chapter details the research design, participants involved, instruments used, data collection procedures, and the data analysis.

The study included elementary and intermediate schools in a Northeast Tennessee school district for the 2020-2021 school year. The school district has a population of 8,098 students. The district consists of eight elementary schools, grades PreK – four, one intermediate school, grades five – six, one middle school, grades seven – eight, and one high school, grades nine – twelve. Data were collected from 2020-21 checkpoint data, grades three – six. Data were analyzed using independent t-tests at the .05 level of significance.

Chapter 4. Results

This study was conducted to determine the efficacy of online learning in comparison to in-person learning for students grades three – six. The data were separated into the following categories: general population, students with disabilities, and low socio-economic students. The study included elementary and intermediate students in a Northeast Tennessee school district for the 2020-2021 school year. The data were analyzed by grade level for general population students. Low socio-economic and students with special needs scores were removed from the general population data and analyzed separately with grade levels three – six data combined.

Both mathematics and English Language arts interim third quarter checkpoint test scores were analyzed using SPSS software. Independent-samples t-tests were conducted to evaluate whether the mean literacy achievement scores and mean math achievement scores for three – six grade online learners was significantly different from the mean of in-person learners. Independent-samples t-tests were conducted to evaluate whether the mean literacy and math achievement scores for grades three – six low socio-economic learners was significantly different from the mean of in-person learners.

Additionally, independent-samples t-tests were conducted to evaluate whether the mean literacy and math achievement score for online students with disabilities in grades three – six is significantly different from the mean of in-person learners. The test variables were third quarter checkpoint English Language arts and math scores, and the grouping variable was whether learners were online or in-person. Data analysis for this quantitative study was analyzed at 0.05 level of significance.

Research Question 1:

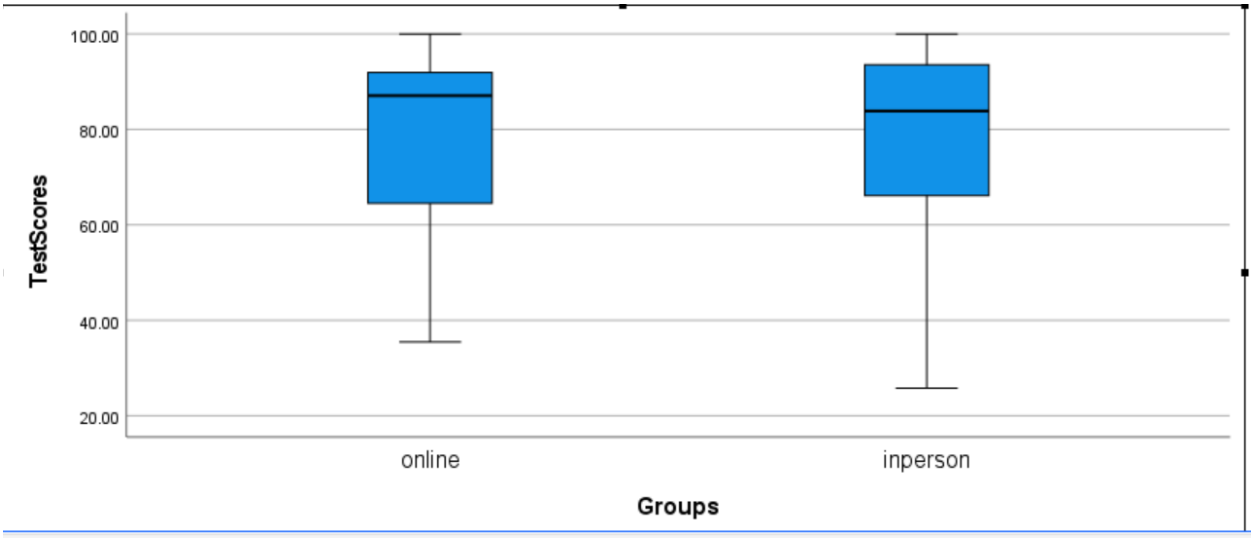
Is there a significant difference in third grade interim checkpoint literacy scores between online and in-person learners?

$H_0$1: There is no significant difference in third grade interim checkpoint literacy scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for third grade online learners is significantly different from the mean of in-person learners. The test variable was third quarter checkpoint English Language arts scores, and the grouping variable was whether learners were online or in-person. The test was significant, t(317)=2.540, p =.006. Therefore, the null hypothesis was rejected. The mean score for online learners (M=88.28, SD=14.54) significantly exceeded the scores of in-person learners (M=81.45 SD=17.27). The 95% confidence interval for the difference in means was 1.52859 to 12.03340. Therefore, there is evidence that third grade online learners' achievement scores are significantly higher than in-person learners. Figure 1 shows the distribution of the two groups.

Figure 1

Third Grade ELA General Population Test Results



Research Question 2:

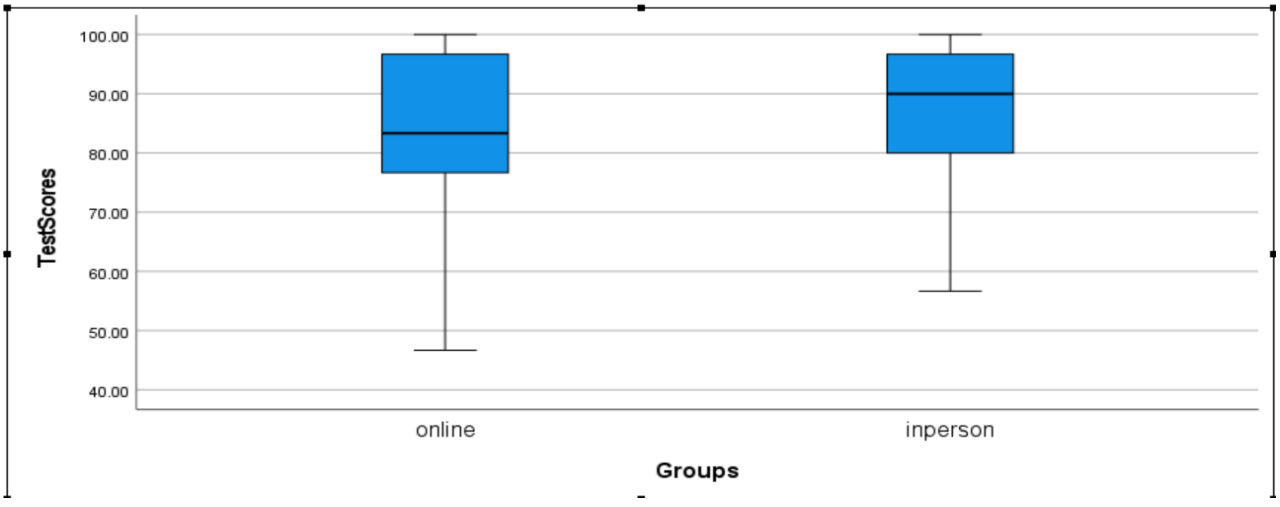
Is there a significant difference in fourth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$2: There is no significant difference in fourth grade interim checkpoint literacy scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for fourth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint English Language arts scores, and the grouping variable was whether learners were online or in-person. The test was not significant, t(364)=1.243, p =.108. Therefore, the null hypothesis was retained. The mean score for online learners (M=81.95, SD=18.44) was lower, but not significantly lower, than the mean score of in-person learners (M=85.14, SD=15.06). The 95% confidence interval for the difference in means was -8.22787 to 1.85491. Therefore, this analysis does not present evidence that fourth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 2 shows the distribution of the two groups.

Figure 2

Fourth Grade ELA General Population Test Results



Research Question 3:

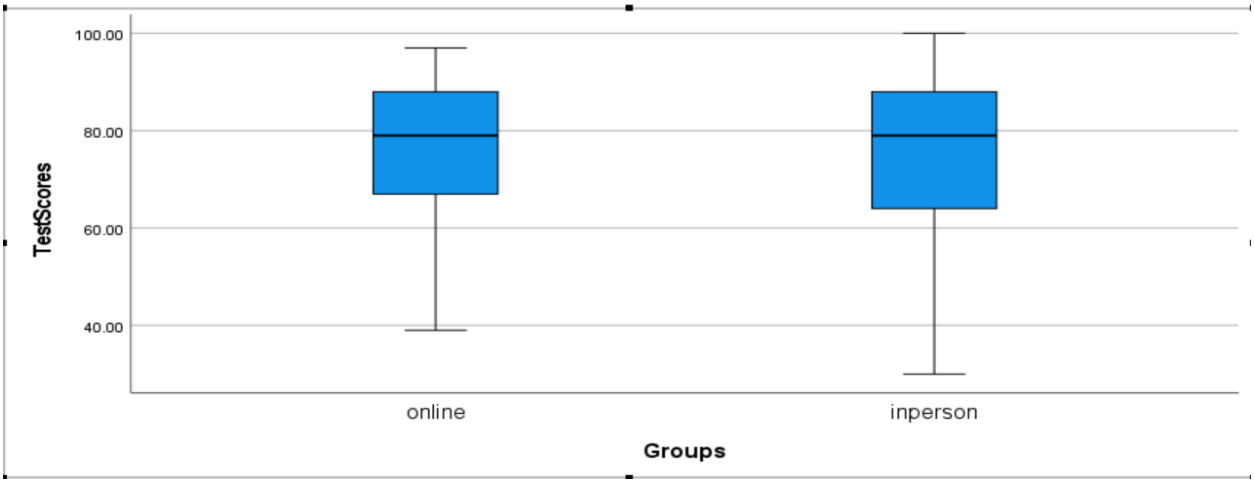
Is there a significant difference in fifth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$3: There is no significant difference in fifth grade interim checkpoint literacy scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for fifth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint English Language arts scores, and the grouping variable whether learners were online or in-person learners. The test was not significant, t(317)=.351, p =.38. Therefore, the null hypothesis was retained. The mean score for online learners (M=75.36, SD=15.07) was approximately the same as the mean score of in-person learners (M=74.63.78, SD=17.59). The 95% confidence interval for the difference in means was -3.38675 to 4.85682. Therefore, this analysis does not present evidence that fifth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 3 shows the distribution of the two groups.

Figure 3

Fifth Grade ELA General Population Test Results



Research Question 4:

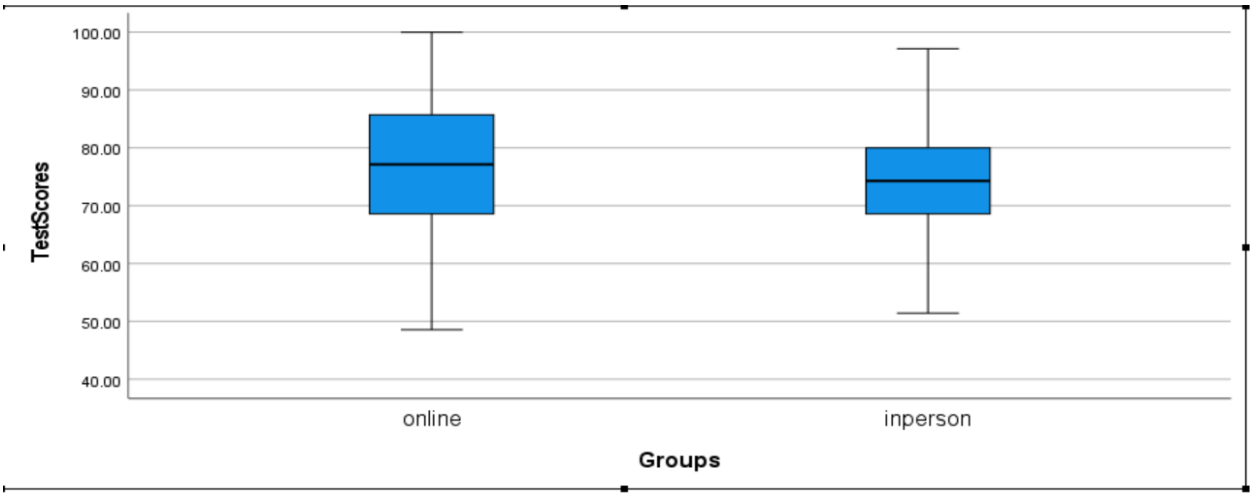
Is there a significant difference in sixth grade interim checkpoint literacy scores between online and in-person learners?

$H_0$4: There is no significant difference in sixth grade interim checkpoint literacy scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for sixth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint English Language arts scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(354)=.197, p =.06. Therefore, the null hypothesis was retained. The mean score for online learners (M=72.80, SD=17.36) was higher, but not significantly higher, than the mean score of in-person learners (M=69.61, SD=18.39). The 95% confidence interval for the difference in means was -.88819 to 7.28171. Therefore, this analysis does not present evidence that sixth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 1 shows the distribution of the sixth grade groups.

Figure 4

Sixth Grade ELA General Population Test Results



Research Question 5:

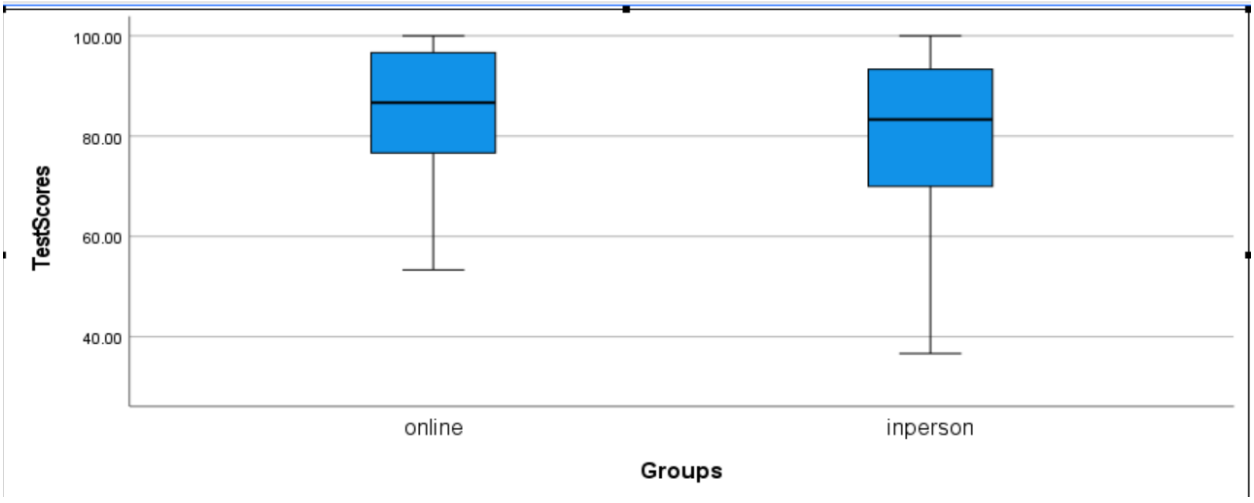
Is there a significant difference in third grade interim checkpoint math scores between online and in-person learners?

$H_0$5: There is no significant difference in third grade interim checkpoint math scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean math achievement score for third grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(338)=.054, p =.48. Therefore, the null hypothesis was retained. The mean score for online learners (M=79.17, SD=20.47) was approximately the same as the mean score of in-person learners (M=79.02, SD=17.05). The 95% confidence interval for the difference in means was -5.23025 to 5.52785. Therefore, this analysis does not present evidence that third grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 5 shows the distribution of the two groups.

Figure 5

Third Grade Math General Population Test Results



Research Question 6:

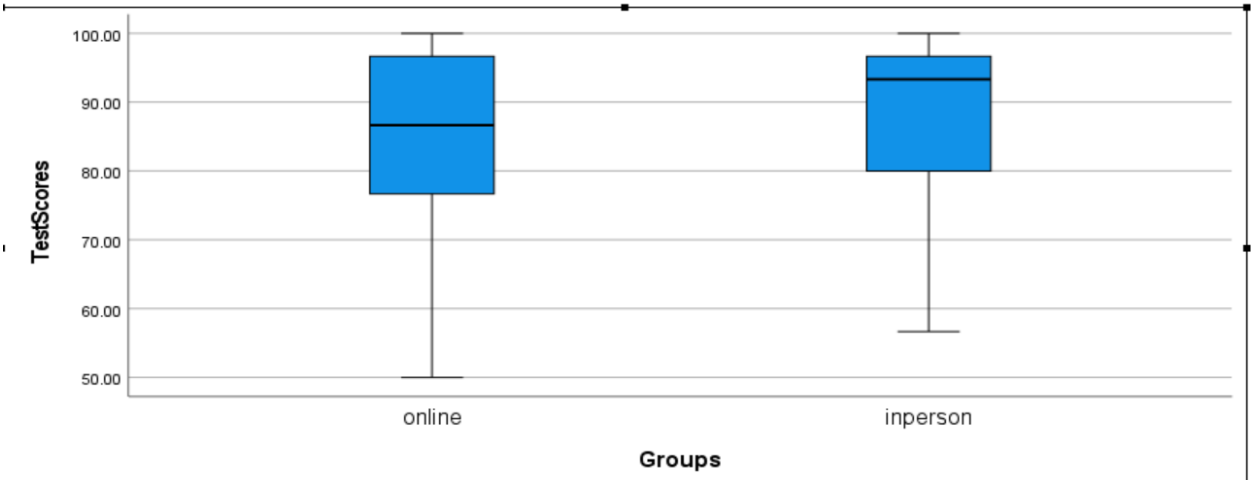
Is there a significant difference in fourth grade interim checkpoint math scores between online and in-person learners?

$H_0$6: There is no significant difference in fourth grade interim checkpoint math scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean math achievement score for fourth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(295)=1.64, p =.051. Therefore, the null hypothesis was retained. The mean score for online learners (M=80.70, SD=19.75) was lower, but not significantly lower, than the mean score of in-person learners (M=85.37, SD=15.83). The 95% confidence interval for the difference in means was -10.26279 to .93431. Therefore, this analysis does not present evidence that fourth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 6 shows the distribution of the two groups.

Figure 6

Fourth Grade Math General Population Test Results



Research Question 7:

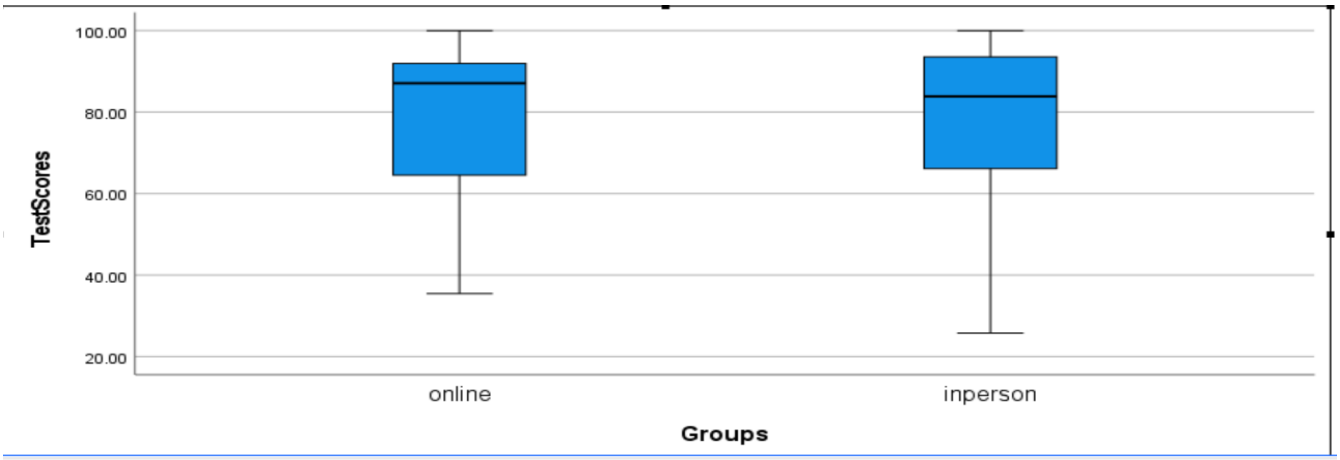
Is there a significant difference in fifth grade interim checkpoint math scores between online and in-person learners?

$H_0$7: There is no significant difference in fifth grade interim checkpoint math scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean math achievement score for fifth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(355)=.273, p =.39. Therefore, the null hypothesis was retained. The mean score for online learners (M=76.82, SD=19.90) was approximately the same as the mean score of in-person learners (M=77.55, SD=19.32). The 95% confidence interval for the difference in means was -5.96825 to 4.51283. Therefore, this analysis does not present evidence that fifth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 7 shows the distribution of the two groups.

Figure 7

Fifth Grade Math General Population Test Results



Research Question 8:

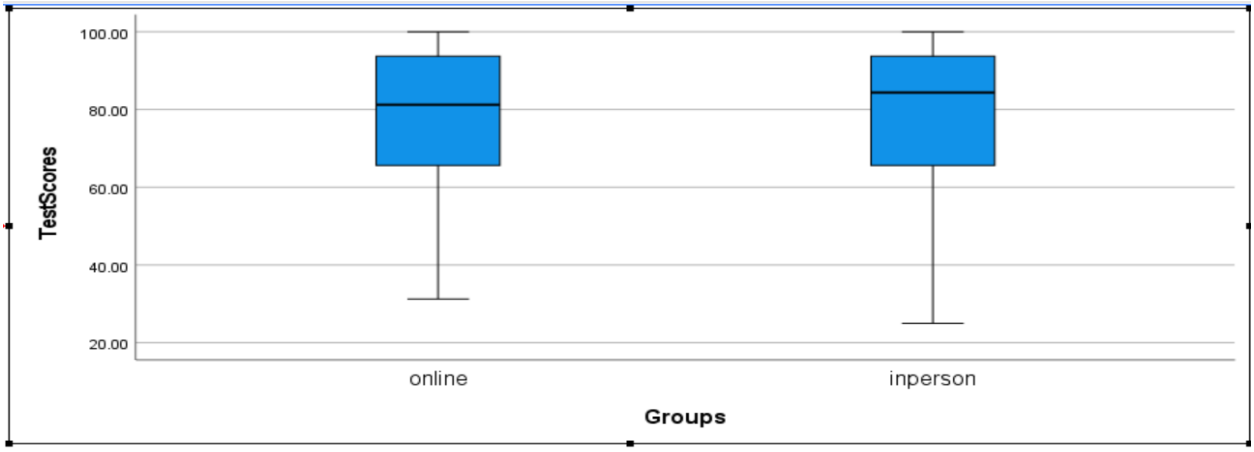
Is there a significant difference in sixth grade interim checkpoint math scores between online and in-person learners?

$H_0$8: There is no significant difference in sixth grade interim checkpoint math scores between online and in-person learners.

An independent-samples t-test was conducted to evaluate whether the mean math achievement score for sixth grade online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(354)=.862, p = .19. Therefore, the null hypothesis was retained. The mean score for online learners (M=76.25, SD=20.58) was approximately the same as the mean score of in-person learners (M=78.36, SD=19.34). The 95% confidence interval for the difference in means was -6.96236 to 2.71750. Therefore, this analysis does not present evidence that sixth grade online learners' achievement scores are significantly lower or higher than in-person learners. Figure 8 shows the distribution of the two groups.

Figure 8

Sixth Grade Math General Population Test Results



Research Question 9:

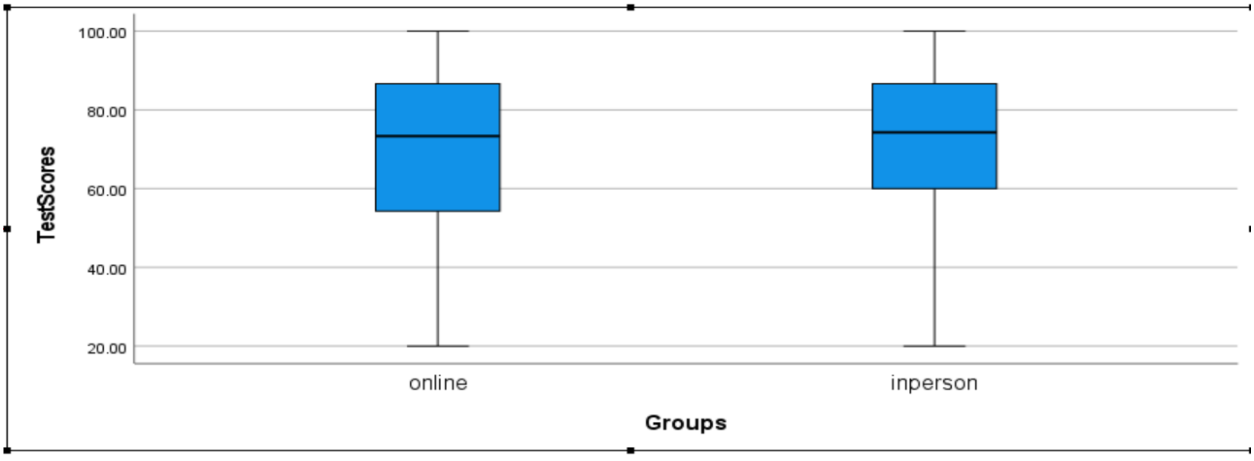
Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students?

$H_0$9: There is not significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for grades three – six online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint literacy scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(298)=.582, p =.28. Therefore, the null hypothesis was retained. The mean score for online learners (M=69.36, SD=20.92) was approximately the same as the mean score of in-person learners (M=71.07, SD=19.62). The 95% confidence interval for the difference in means was -7.45440 to 4.05281. Therefore, this analysis does not present evidence that grades three – six online learners' achievement scores are significantly lower or higher than in-person learners of low socio-economic students. Figure 9 shows the distribution of the two groups.

Figure 9

Grades Three – Six Low Socio-Economic ELA Test Results



Research Question 10:

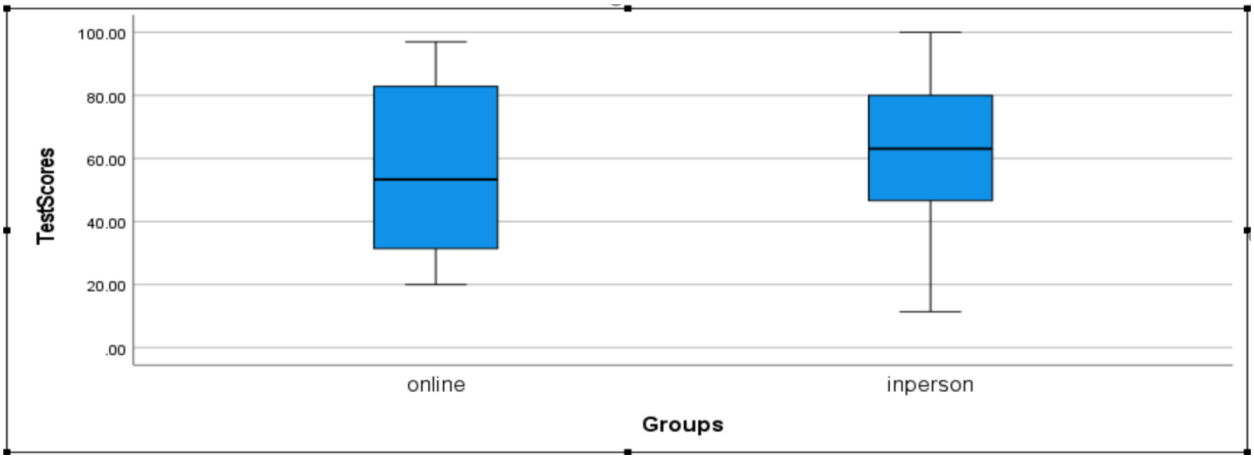
Is there a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities?

$H_0$10: There is not significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for grades three – six online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint literacy scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(81)=.837, p = .20. Therefore, the null hypothesis was retained. The mean score for online learners (M=57.64, SD=28.61) was approximately the same as the mean score of in-person learners (M=62.84, SD=21.14). The 95% confidence interval for the difference in means was -17.53274 to 7.15215. Therefore, this analysis does not present evidence that grades three – six online learners' achievement scores are significantly lower or higher than in-person learners. Figure 10 shows the distribution of the two groups.

Figure 10

Grades Three – Six Students with Disabilities Test Results



Research Question 11:

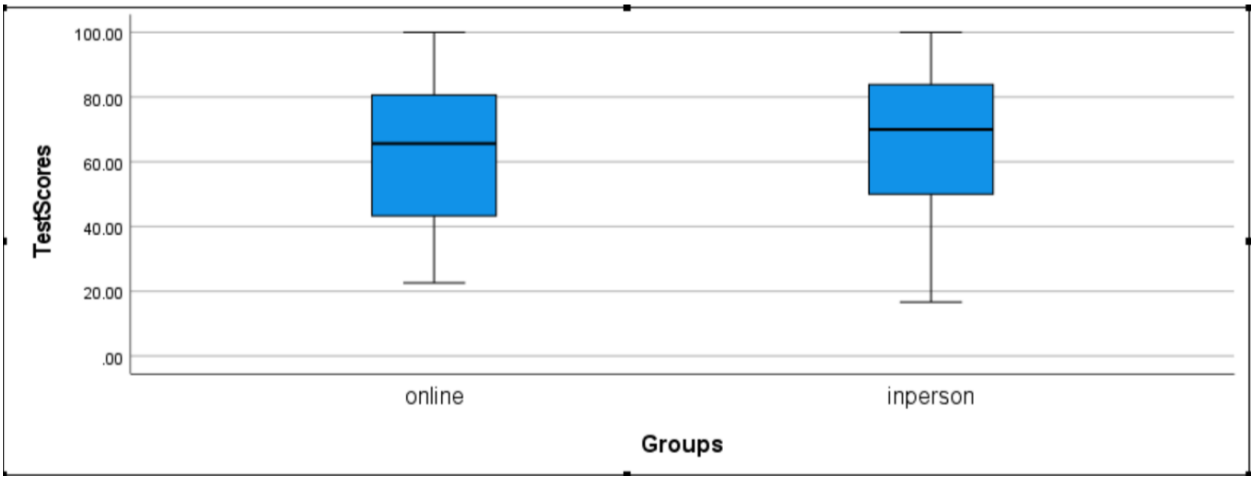
Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students?

$H_0$11: There is not significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students.

An independent-samples t-test was conducted to evaluate whether the mean math achievement score for grades three – six online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(413)=1.346, p =.09. Therefore, the null hypothesis was retained. The mean score for online learners (M=63.34, SD=22.54) was approximately the same as the mean score of in-person learners (M=66.75, SD=21.25). The 95% confidence interval for the difference in means was -8.39991 to 1.57227. Therefore, this analysis does not present evidence that grades three – six online learners' achievement scores are significantly lower or higher than in-person learners of low socio-economic students. Figure 11 shows the distribution of the two groups.

Figure 11

Grades Three – Six Low Socio-Economic Math Test Results



Research Question 12:

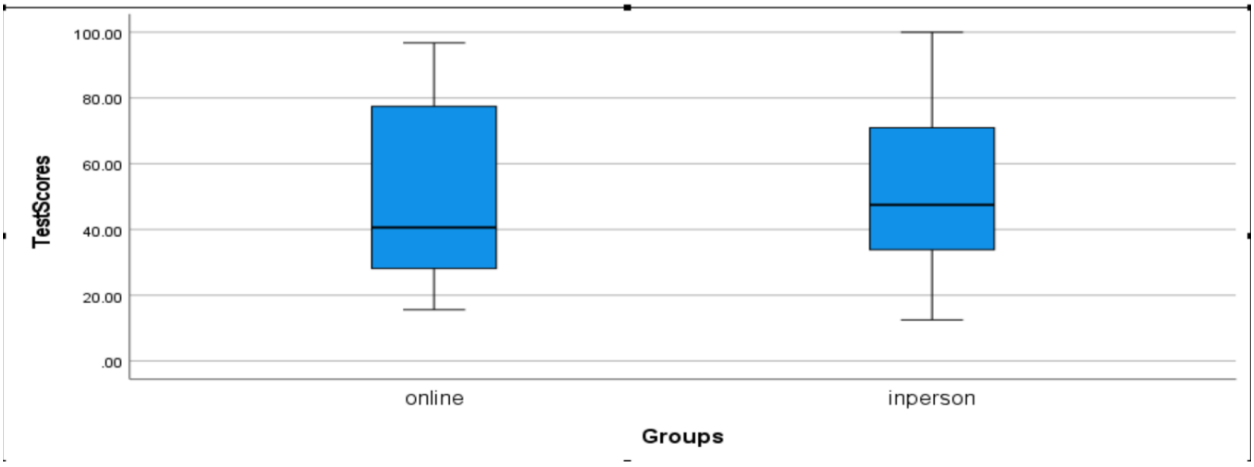
Is there a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities?

$H_0$12: There is not significant difference in grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities.

An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for grades three – six online learners is significantly different from the mean score of in-person learners of students with disabilities. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The test was not significant, t(111)=.726, p = .23. Therefore, the null hypothesis was retained. The mean score for online learners (M=47.79, SD=26.94) was approximately the same as the mean score of in-person learners (M=52.99, SD=23.93). The 95% confidence interval for the difference in means was -19.37819 to 8.98516. Therefore, this analysis does not present evidence that grades three – six online learners' achievement scores are significantly lower or higher than in-person learners. Figure 12 shows the distribution of the two groups.

Figure 12

Grades Three – Six Student with Disabilities Math Test Results



Chapter Summary

This study was conducted to determine the efficacy of online learning in comparison to in-person learning for students grades three – six separated into the following categories: general population, students with disabilities, and low-income students. Comparison of both mathematics and literacy interim third quarter checkpoints data were analyzed using SPSS software to conduct a series of independent t-tests. Data were analyzed at the 0.05 level of significance.

Twelve research questions were addressed testing corresponding null hypothesis. Research Question 1 was significant with third grade online literacy scores exceeding the scores of in-person. Questions 2 – 8 were not significant with mean literacy and math scores being approximately equal for online and in-person learners. Questions 9 – 12 were also not significant for students with disabilities and low socio-economic students with mean scores being approximately equal for online and in-person learners.

Chapter 5. Summary, Conclusions, and Recommendations

The Covid-19 outbreak caused serious global concerns for education when efforts to contain the virus prompted unscheduled school closures (Sunita, 2020). More than 1.5 billion students globally were impacted by school closures at the peak of the outbreak in early April 2020 (University of Kansas, n.d.). The closures created harmful effects on education, including disruptions to learning and a lack of educational facilities and learning resources. Educational organizations relied heavily on technology during the pandemic to ensure the continuation of learning; however, poor infrastructure, including network and accessibility issues, compounded by poor digital skills hindered online education. Furthermore, the pandemic exacerbated disparities in education by diminishing opportunities for the most vulnerable student populations, particularly middle and lower-income students and vulnerable groups such as students with disabilities and special needs (Sunita, 2020).

The purpose of this comparative, quantitative study was to explore the relationship of interim test scores among remote and in-person learners, low socio-economic students, and students with disabilities. Identifying the efficacy of online learning in comparison to in-person learning allows school districts to determine what actions need to be taken to ensure all students' instruction and learning are equitable whether enrolled in-person or online.

Independent-samples t-tests were conducted to evaluate whether the mean literacy achievement scores and mean math achievement scores for online learners in grades three – six were significantly different from the mean of in-person learners. Also, independent-samples t-tests were conducted to evaluate whether the mean literacy and math achievement scores for low socio-economic leaners in grades three – six were significantly different from the mean of in-person learners. Additionally, independent-samples t-tests were conducted to evaluate whether the mean literacy and math achievement score for online students with disabilities in grades three

– six were significantly different from the mean of in-person learners. The test variables were third quarter checkpoint English Language arts and math scores, and the grouping variable was whether learners were online or in-person. Data were analyzed at 0.05 level of significance.

Summary of Results:

Research Question 1

Research Question 1 analyzed whether there was a significant difference in third grade interim checkpoint literacy scores between online and in-person learners. An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for third grade online learners was significantly different from the mean score of in-person learners. The results were the following:

- The test was significant, t(317)=2.540, p =.006. Therefore, the null hypothesis was rejected. The mean achievement score for online learners (M=88.28, SD=14.54) significantly exceeded the score of in-person learners (M=81.45 SD=17.27). The 95% confidence interval for the difference in means was 1.52859 to 12.03340. Therefore, there is evidence third grade online learners scored significantly higher than in-person learners.

As stated in the review of related literature, Loeb (2020) noted that online courses did offer opportunities for students; however, in comparison to in-person classes, online courses were not as effective for most students. Molnar et al. (2019) claimed students enrolled in full-time virtual or blended schools performed lower than their counterparts attending face-to-face instruction.

The findings of this study do not support these claims. Based on the findings of the third grade literacy analysis, results indicate that it is possible online instruction is as effective as in-

person instruction in both math and literacy. However, it is important to note this may not be evident in all school districts. In the Northeast Tennessee School district selected for this study, several resources were implemented to support online learners throughout the pandemic.

Prior to August 31, 2020, before school began, technology leaders implemented professional development opportunities providing teachers with training and access to technology tools focused on online instructional strategies. When school began in August 2020, teacher technology leaders were dispersed to each school to provide assistance and further training to all teachers on technology resources aligned with the Tennessee State Standards. District leaders, principals, and curriculum coaches aligned instruction and curriculum to create equitable learning for all students. Additionally, district leaders engaged principals and technology leaders in professional development by implementing required reading focused on how to implement technology into classrooms as well as hiring a best-selling author and TEDx speaker to address principals and tech-leaders on implementing blended learning strategies.

Chabbot and Sinclair (2020) claimed during the Covid-19 pandemic, a limitation of instructional design made it challenging to continue instruction using a different modality. Additionally, a lack of guidance for caregivers to support home-based learning limited the quality of learning. School systems relied on a single-based delivery system that, on average, had limited support plans in the event of system failure. Garcia and Weiss posited students lacked daily access to school and the basic resources that are provided to students (García & Weiss, 2020). Moreover, many teachers and families lacked guidance on how to continue education during long-term school closures (Anderson, 2020).

These claims are not founded for the school district used in this study. Instructional design for all content levels was created in the summer of 2020 and implemented in the fall by

curriculum coaches and instructional leaders. Pacing guides aligned with the Tennessee State Standards were distributed by curriculum coaches to online and in-person teachers creating cohesive instruction among content level teachers. The district also provided multiple options to students that focused on the continuation of learning when school closed in March, 2020. Before the distribution of laptops, learning packets were created for all students and delivered to their homes if needed. To meet students social and emotional needs, food packets were also delivered to all students free of charge and guidance counselors provided emotional support to students as needed.

Research Questions 2 – 8

Research Questions 2 – 4 analyzed whether there was a significant difference in grades four – six on interim checkpoint literacy scores between online and in-person learners. After disaggregating the grade levels, the evidence revealed there is no-significant difference in online compared to in-person literacy scores in grades four – six. An independent-samples t-test was conducted to evaluate whether the mean literacy achievement score for grades four – six online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint English Language arts scores, and the grouping variable was whether learners were online or in-person. The results were the following:

- Fourth grade, the test was not significant, $t(364)=1.243$, $p =.108$. Therefore, the null hypothesis was retained. The mean score for online learners ($M=81.95$, $SD=18.44$) was approximately the same as the mean score of in-person learners ($M=85.14$, $SD=15.06$). The 95% confidence interval for the difference in means was -8.22787 to 1.85491.

- Fifth grade, the test was not significant, t(317)=.351, p =.38. Therefore, the null hypothesis was retained. The mean score for online learners (M=75.36, SD=15.07) was approximately the same as the mean score of in-person learners (M=74.63.78, SD=17.59). The 95% confidence interval for the difference in means was -7.25029 to 3.84780.
- Sixth grade, the test was not significant, t(354)=.197, p =.06. Therefore, the null hypothesis was retained. The mean score for online learners (M=72.80, SD=17.36) was approximately the same as the mean score of in-person learners (M=69.61, SD=18.39). The 95% confidence interval for the difference in means was -4.61602 to 8.07058.

Therefore, this analysis does not present evidence grades four – six online learners' literacy scores are significantly lower or higher than in-person learners.

Research Questions 5 – 8 analyzed whether there was a significant difference in grades three – six on interim checkpoint math scores between online and in-person learners. After disaggregating the grade levels, the evidence revealed there is no significant difference in online compared to in-person math scores in grades three - six. Independent-samples t-tests were conducted to evaluate whether the mean math achievement score for grades three – six online learners is significantly different from the mean score of in-person learners. The test variable was third quarter checkpoint math scores, and the grouping variable whether learners were online or in-person. The results were the following:

- Third grade mean score was not significant, t(338)=.054, p =.48. Therefore, the null hypothesis was retained. The mean score for online learners (M=79.17, SD=20.47) was approximately the same as the mean score of in-person learners

(M=79.02, SD=17.05). The 95% confidence interval for the difference in means was -5.23025 to 5.52785.

- Fourth grade mean score was not significant, t(295)=1.64, p =.051. Therefore, the null hypothesis was retained. The mean score for online learners (M=80.70, SD=19.75) was approximately the same as the mean score of in-person learners (M=85.37, SD=15.83). The 95% confidence interval for the difference in means was -10.26279 to .93431.
- Fifth grade mean score was not significant, t(355)=.273, p =.39. Therefore, the null hypothesis was retained. The mean score for online learners (M=76.82, SD=19.90) was approximately the same as the mean score of in-person learners (M=77.55, SD=19.32). The 95% confidence interval for the difference in means was -5.96825 to 4.51283.
- Sixth grade mean score was not significant, t(354)=.862, p = .19. Therefore, the null hypothesis was retained. The mean score for online learners (M=76.25, SD=20.58) was approximately the same as the mean score of in-person learners (M=78.36, SD=19.34). The 95% confidence interval for the difference in means was -6.96236 to 2.71750.

Therefore, this analysis does not present evidence grades three – six online learners' math scores are significantly lower or higher than in-person learners.

As stated in the review of literature, Garcia and Weiss (2020) claimed public education systems were not prepared for the crisis caused by the pandemic, and, as a result, structures were not in place to sustain effective teaching and learning during the shutdown. Consequently, children who struggled the most found it difficult to receive effective instruction (Garcia &

Weiss, 2020). Farmer (2020) argued that student support is related to student success, motivation, and learning. The findings of this study do support these claims.

The district chosen for this study conducted several events for teachers and students before the start of the 20-21 school year. With school being delayed, the school district supervisors and district leads took the opportunity to train teachers on how to implement online learning. Technology leaders were dispersed to each school to provide training and support to online teachers on technology usage and online curriculum resources. Group sessions were incorporated on basic technology usage and multiple professional development opportunities were offered to teachers to learn the new technology platforms.

Additionally, the district purchased literacy, math and technology programs such as Canvas studio, Zoom, Study Island, as well as other programs tailored to meet the needs of each grade-level. Content meetings were held to prepare for online learning and web-pages were aligned by content to make sure all students were given rigorous online instruction. As a result, online learners had support needed to be successful whether online or in-person.

Research Questions 9 – 12

Research Questions 9 – 12 focused on whether there was significant difference in grades three – six math and literacy scores for low socio-economic students and students with disabilities. Research Question 9 analyzed whether there was a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students. Research Question 10 analyzed whether there was a significant difference in grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities.

Research Question 11 analyzed whether there was a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students. Research Question 12 analyzed whether there was a significant difference in grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities. The results were the following:

- Grades three – six interim checkpoint literacy scores between online and in-person learners for low socio-economic students mean score was not significant, t(298)=.582, p =.28. Therefore, the null hypothesis was retained. The mean score for online learners (M=69.36, SD=20.92) was approximately the same as the mean score of in-person learners (M=71.07, SD=19.62). The 95% confidence interval for the difference in means was -7.45440 to 4.05281.
- Grades three – six interim checkpoint literacy scores between online and in-person learners for students with disabilities mean score was not significant, t(81)=.837, p = .20. Therefore, the null hypothesis was retained. The mean score for online learners (M=57.64, SD=28.61) was approximately the same as the mean score of in-person learners (M=62.84, SD=21.14). The 95% confidence interval for the difference in means was -17.53274 to 7.15215.
- Grades three – six interim checkpoint math scores between online and in-person learners for low socio-economic students mean score was not significant, t(413)=1.346, p =.09. Therefore, the null hypothesis was retained. The mean score for online learners (M=63.34, SD=22.54) was approximately the same as the mean score of in-person learners (M=66.75, SD=21.25). The 95% confidence interval for the difference in means was -8.39991 to 1.57227.

- Grades three – six interim checkpoint math scores between online and in-person learners for students with disabilities. The test was not significant, t(111)=.726, p =.23. Therefore, the null hypothesis was retained. The mean score for online learners (M=47.79, SD=26.94) was approximately the same as the mean score of in-person learners (M=52.99, SD=23.93). The 95% confidence interval for the difference in means was -19.37819 to 8.98516.

Therefore, this analysis does not present evidence grades three – six online learners' literacy and math scores are significantly lower or higher than in-person learners for low socio-economic students or students with disabilities. Furthermore, this analysis does not present evidence grades three – six online learners' math scores are significantly lower or higher than in-person learners for low socio-economic students or students with disabilities.

Findings Regarding Low Socio-Economic Students

Walters (2020) claimed 56 million children worldwide did not have internet access and 7 million children in the United States did not have internet services. Additionally, one third of households with an annual income of under 30,000 did not have access to broadband internet. As a result, learning rates among lower-income students fell by 60%, compared to only 20% of the top income quartile (Taylor & Mallery, 2020).

It is important to note that the district used for this study maintained a 1:1 initiative for online learners throughout the 2020-21 school year. Additionally, the district provided hot-spots to students in need of internet access for online learning. Teachers were in direct communication with students through Zoom with the understanding that if a student was absent for even a short period of time, teachers contacted parents and guidance counselors to offer support needed for the student to return to the classroom in a timely manner. Parent conferences were also set up

through Zoom in order to keep open communication among the teacher, student, and parent or guardian.

In fall 2020, all students were given a laptop device with online capabilities. Additionally, hot-spots were given to students that could not access internet from their homes. Technology personnel were available for parents to help with technology issues that arose during the pandemic. Teachers and school staff held community events for parents to train parents on how to login into student devices and access their work online. Educators went out into the community to offer support to families in need of social and emotional support. Teachers delivered encouraging messages to students in the form of yard signs with communications such as my student is an all-star or super-reader. Teachers also sent students letters of encouragement during the Covid-19 shut-down. Due to the support given to teachers and students before school began and throughout the school year, it is possible the online achievement scores exceeding that of in-person is unique compared to the other districts.

Findings Regarding Students with Disabilities

According to the literature review, a limited number of studies analyzed online learners' performances in relation to the learners' characteristics, socio-economic standing, age, genders, and disability status (Rizvi et al., 2019). The National Academies of Sciences, Engineering, and Medicine concluded that elementary school-aged children, as well as students with health care needs, may have struggled with online learning without the support of an adult willing to supervise the online experience. Educators described a limited ability to modify the curriculum for their students with disabilities having limited experience with this specific student population, and teachers could not describe ways to integrate technology that was differentiated for students with disabilities (Crouse et al., 2020).

In this study there was no significant difference in math and literacy scores of online learners and in-person learners for students with disabilities. This may be due to district supervisors providing academic interventions and other supplemental supports to students with disabilities in accordance with their IEP. During the pandemic, occupational and physical therapy services continued through Zoom through one-on-one sessions. Students were also given the option to join the special education teachers in the classroom for one-on-one sessions if the home environment was not conducive to meeting the needs of the IEP. If needed, learning devices and supports were delivered to students' homes and parents were educated by special education teachers and physical and occupational therapists through Zoom on how to manipulate the devices. Additionally, teacher assistants had access to Zoom and online classes to offer support to his or her assigned student.

Differentiated instruction was developed through collaboration of special education teachers, general education teachers, and curriculum coaches. Special education teachers met with each student's general education teacher and developed curriculum that aligned with the student's IEP. For example, modification of assignments, extended time, and learning manipulatives were often provided using special education services in collaboration with the general education teacher.

Parent involvement was a priority as well with the IEP team meeting regularly with parents to discuss their child's progress throughout the school year. Check-point tests were also modified to meet each student's needs with supports such as oral presentation, extended time, and classroom breaks being implemented during testing if accommodations were in place in the IEP. Student progress was also monitored through check-point assessments and other learning

resources used in the classroom. Using this data, teachers were able to adjust curriculum around each students' needs.

Conclusions

Based on this study, technology resources provided by district leaders could have been instrumental in contributing to the mean scores of online learners being approximately equal to in-person. In 2015 district supervisors developed a technology initiative that built upon academic programs already embedded in the schools. The goal was to partner with teachers and students to provide technology resources that supported students' individual needs. After launching the technology initiative, technology teacher leaders were recruited to provide technological support to teachers, students, and parents. In 2020, during the pandemic, technology leaders implemented professional development to educate teachers on new learning platforms as well as implementation of instructional design. Additionally, a technology academy was employed to guide teachers on instructional technology and resources available for teachers to use in the online platform. Because of the technology initiative, teachers and students were able to successfully navigate online teaching and learning leading to equitability of instruction for online and in-person learners.

Recommendations for Practice

Due to the continuation of online learning in some districts and because it is possible school districts will have to shift back to online learning in the future, it is important for educators to be prepared to teach in the online capacity. Based on the results of this study, it is possible that the district leaders' support for online teachers, parents, staff and students contributed to online learners mean scores being approximately equal to in-person learners or in the case of third grade literacy, online learning exceeding in-person learning. The result of the

study indicated that if given the proper support, online learners had the potential to exceed or be within approximant mean score of in-person learners. Based on the results of this study, the research suggests the following implications for practice.

In numerous online surveys conducted since the pandemic began, teachers indicated their lack of preparedness to teach in the online environment (Middleton, 2020).

1. District leaders should provide professional development opportunities for teachers that guide educators on how to implement effective instructional strategies and resources to use in the online setting. Technology teams should be developed and implemented within schools to provide support to teachers when navigating through online platforms or to assist students and parents if a problem arises with technology.

Among the challenges of online learning were barriers for equitable remote instruction, and a lack of adequate resources due to school budgets being stretched increasingly thin as a result of the pandemic (Lieberman, 2020).

2. District leaders should allocate funds to provide resources to all stakeholders. Online instructional resources and learning platforms should be purchased for teachers to implement into their classrooms. Parents should be provided with resources and support on how to help their children navigate the online environment. Online training should be provided to students through the form of tutorials on how to navigate an online classroom.

The Common Sense and Boston Consulting Group used data from the 2018 census bureau and discovered that roughly 30% of the 50 million K-12 students in the United States lacked high-speed internet or devices to access online learning. Additionally, 300,000 teachers lacked adequate high-speed internet to use for teaching from home. In spring of 2020, Parents Together reported 13% of parents from low-income homes lacked devices or internet connection and were 10 times more likely to say their children were doing little to no remote learning at home (Darling-Hammond et al., 2020).

3. Students and teachers should be given devices with online capabilities to use at home as well as hot-spots in the event students do not have internet connection. By doing this, all students and staff with have equitable online capabilities.

District leaders and support staff should provide services for special education students that adhere to their Individual Education Plan. The nation's school districts are federally mandated to provide education to meet disabled students' individual needs under the Individuals with Disabilities Educations Act (IDEA). During the pandemic, receiving services such as physical therapy and occupational therapy were difficult due to the shift to remote learning. Additionally, parents of students with disabilities said they did not have the training to help teachers provide services to their children in order to fulfill their IEP (Stein & Strauss, 2020).

4. District leaders should be creative in providing accommodations that meet the educational needs of students with disabilities. Implementation of physical and occupational therapy through Zoom, providing support devices to homes, and educating parents on how to help their students at home are all ways students can be supported. Offering alternative means of instruction such as modifying

assignments, extending time, or providing one-on-one differentiated instruction will ensure students with disabilities are getting support based on their individual needs.

Garcia and Weiss (2020) claimed public education systems were not prepared for the crisis caused by the pandemic, and, as a result, structures were not in place to sustain effective teaching and learning during the shutdown.

5. Technology should become a part of everyday practice in the event of students being shifted back to online learning. This will allow students familiarity with technology when shifting back to online learning resulting in the transition being less difficult for students.

Teachers and students were forced into a new environment that most had not experienced before. This led to stress, anxiety, sickness, and lack of materials for learning in the online environment (Middleton, 2020).

6. District leaders should focus on social and emotional support by providing meals for students in need and immersing counselors into the community. Providing emotional support for teachers and students would help target anxieties brought on by a shift in instruction. Moreover, online teachers and teacher leaders should be engaged within the community to create a collaborative environment and common goals for learning. Teachers and counselors should incorporate check-ins with students and parents to monitor students' well-being and social and emotional progress and provide interventions based on each student's need

Recommendations for Further Research

As a result of this study, the researcher suggests further investigation into online learning in comparison to in-person learning.

- Conduct research to determine if there is a difference in outcome for students enrolled in local online programs where the teachers are employees of the local school districts as compared to students enrolled in for-profit programs such as K-12 online.
- Analyze data by additional grade levels such as grades K – two, middle grades, and high school to determine if there are significant differences in interim test scores in lower and upper grade levels between online and in-person learners.
- Analyze data by different subgroups such as ESL students and minority students to determine if there are significant difference in interim test scores of online and in-person learners.
- Analyze other data such as state mandated standardized tests to determine if there is a significant difference in online and in-person learning in literacy and math for general populations, students with disabilities, and low socio-economic students.
- Conduct interviews with stakeholders to determine the challenges of online learning from their perspectives.

Chapter Summary

The purpose of this comparative, quantitative study was to explore the relationship of interim test scores among remote and in-person learners, low-income students, and students with disabilities. In March 2020, a portion of students enrolled in a K -12 school in Northeast Tennessee moved into remote learning until the end of the school year in May 2020. In July

2020, the school district gave parents the option for their child to learn either online or in-person. While some chose to attend school in-person, giving reasons such as child-care, work obligations, or personal preference, others chose to continue to receive online learning due to health concerns brought on by the pandemic.

This study was conducted to determine the efficacy of online learning in comparison to in-person learning for students grades three – six separated into the following categories: general population, students with disabilities, and low-income students. Comparison of both mathematics and literacy interim third quarter checkpoints data were analyzed using SPSS software to conduct a series of independent t-tests. Data were analyzed at the 0.05 level of significance.

Jerome Bruner's Constructivist theory proposes that a student is capable of learning if the instruction is organized appropriately (McLeod, 2019). Additionally, according to Bruner (1961), a child's environment, especially his or her social environment, should include adults playing an active role in his or her learning. Bruner highlighted the social nature of learning and argues that students should have adult support when developing skills through a scaffolding process (Bruner, 1961).

Based on this study, academic and emotional support for students, teachers, and families could have been a factor that contributed to online literacy and math mean scores being approximately equal to the mean score of in-person learners with third grade literacy exceeding the mean score of in-person learners. Further research is needed to determine if the district leaders' support for students, teachers, and the community contributed the efficacy of online learning.

Little research has been conducted on the efficacy of online learning compared to in-person learning. This study adds to the body of research by analyzing data developed during the Covid-19 pandemic of online and in-person learners. Further analysis revealed that there is no significant difference in math grades three - six and literacy grades four – six. Further inquiry is needed to determine the reason third grade online learner's literacy mean scores significantly exceeded in-person learners in contrast to other grade-levels and content used in this study. Further research will allow the learning community to determine if there is a significant difference in online learning and in-person learning and the factors that affect online learners' performance compared to in-person.

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Site Operations Manager, Tennessee Department of Education, Johnson City, Tennessee, 2019

Program of Study Committee, Johnson City School District, Johnson City, Tennessee, 2019

Curriculum Council, Johnson City School District, Johnson City, Tennessee, 2016-2017

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