

**A Comparative Study of Third Through Fifth Grade In-Person and Virtual Students on
English/Language Arts and Math Benchmark Grades in a Selected School District in
Upper East Tennessee**

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DEFENSE APPROVAL FORM

Milligan University Dissertation Defense Approval Form

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 Date of Defense: MARCH 17, 2022
 Dissertation Title: A COMPARATIVE STUDY OF THIRD THROUGH FIFTH GRADE IN-PERSON AND VIRTUAL STUDENTS ON ENGLISH LANGUAGE ARTS AND MATH BENCHMARK GRADES IN A SELECTED SCHOOL DISTRICT IN UPPER EAST TENNESSEE

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A signature below indicates committee members agree with the following:

1. Agreement the dissertation meets with the committee's approval.
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ABSTRACT

The purpose of this quantitative study was to compare the effects of a virtual learning model with an in-person learning model on English/Language Arts and Math benchmark scores. The students selected for this study were randomly selected from eight different elementary schools and an intermediate school from grades 3, 4, and 5. Eight hundred and ninety-four students were selected for the study. All the participants were enrolled in either virtual or in-person learning for the 2020-2021 school year. The participants were divided into two equal groups representing virtual and in-person learners. Data were analyzed from system-created benchmark test scores in Math and English/Language Arts for the 2020-2021 school year. The test scores analyzed were from second and third quarter benchmark tests. The first quarter benchmark was not administered due to COVID 19 closures. The two quarter benchmark scores for each participant were averaged for analysis. The results indicated that all virtual groups scored lower than in-person students in Math and English/Language Arts in each grade level and subject. However, fourth-grade virtual learning students scored significantly lower in English/Language Arts and Math than in-person students, and virtual learning students in fifth-grade Math scored significantly lower as well. The results suggest that it is difficult to duplicate the experiences that students have with in-person learning versus virtual learning. Future research is needed that analyzes a broader group of students and different types of schools' virtual programs.

Keywords: virtual learning, remote learning, in-person learning, asynchronous learning, synchronous learning

DEDICATION

This research study is dedicated to the many people in my life who have supported me through the years.

I owe much more than can be put into words to my mom, Emily Peterson. Without you, I would not be half the person I am today. I love and appreciate everything you have done for me especially in the past year. You continued to support and push me, even when I didn't believe in myself.

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CHAPTER 1

Introduction

With technological advances occurring at a rapid rate, change in education is occurring swiftly as well. From lessons being structured and differentiated with the use of technology to testing and progress monitoring happening with instantaneous results, technology has become a mainstay in all parts of the educational system. With these shifts in educational practices, opportunities have presented themselves that would not have been possible to implement in the past. In addition to these changes occurring within a brick-and-mortar in-person classroom, the advent of these technological advances has presented opportunities for students to learn in a virtual manner that rivals an in-person learning model. These technological advances have opened the door for many more opportunities to provide families with multiple choices in how their children attend school (Garcia, 2021; Lake, 2021; Molnar et al., 2019).

School choice and having the option to send children to different schools have been a topic of debate for decades. Each family wants to set their child up for success, so to do this, one must evaluate the most effective means of educating the students within a community. School choice allows these unconventional schools to provide a needed service to students whose families want their students to choose how they are educated and or for situations such as students in foster care who may need the flexibility to learn where and when it works best for each individual (Trinidad et al., 2020). Many also think that different students may have differing needs and strengths they would like for them to pursue rather than the curriculum that a traditional public school provides. According to Coffin and Cooper (2017), "Some have persuasively argued that parents need and deserve more control over their own children's education. For generations, parents have often considered the quality of local schools when

selecting where to live, which neighborhoods, or which suburb" (p. 108). By having multiple options for the way schools instruct their students, parents will choose the best means of educating their children. Virtual options allow parents to live in multiple locations and choose for their child to attend a school that may be out of zone should the only option be in-person schooling options. On the other hand, opponents of school choice feel that these schools take funding away from the public system with little oversight in how they spend their money and pick and choose which students they want to enroll in their school. These two reasons are a couple of the most common arguments against creating and implementing different types of schools.

This argument became more prevalent with the expanded opportunities of virtual school options that allowed parents to have choices beyond where a student lived in determining enrollment status. According to Molnar et al. (2019), "In 2017-18, 501 full-time virtual schools enrolled 297,712 students, and 300 blended schools enrolled 132,960" (p. 4). From the 2017 through the 2019 school year, virtual schools increased enrollment by around 34,600 students and blended schools increased by 19,500 (Molnar et al., 2021). As the flexibility and options have widened, virtual options have become a more feasible option for many families. This need was never more prevalent than after COVID-19 hit America, and many schools were forced to shut their doors and go to full-time virtual schooling due to stay-at-home orders and concern over the spreading of the virus.

Because of the necessity of providing learning opportunities for the students in America while they were at home, virtual options were the most readily available way to continue to reach and educate students since they were unable to attend school in-person for the foreseeable future March of 2020. While many challenges were present in trying to shift from traditional in-person

learning to virtual learning, educators worldwide worked tirelessly to make this shift possible. Born from necessity, the door was now opened in a way that demonstrated that virtual school options were more readily available than previously thought in many districts. While many virtual options existed because this was the safest manner of educating students during this time, the question remains, Are these virtual options as effective as in-person learning?

Since implementing virtual school options during the COVID-19 pandemic, districts across the country began looking to implement a virtual option permanently. According to responses from 379 districts in a national survey conducted by the RAND Corporation about how each district navigated the challenges presented by the COVID-19 pandemic, around twenty percent of the districts are working to investigate beginning a virtual school as a part of their district at the end of the COVID-19 pandemic (Garcia, 2021). Lake (2021) expanded on this report to state that many districts have seen that parents and students want to have the freedom to choose to continue with a virtual option even after returning to in-person learning because some students performed better and were more successful when able to work at their own pace and schedule. By having the freedom of a non-typical school day, older students were able to work more hours and continue with their schooling. Lake (2021) stated that another benefit of these atypical learning opportunities helps in situations where enrollment numbers may not meet the needed criteria for maintaining a class. Districts, especially rural districts, often must cut extra course offerings because they do not have the money to continue to pay a teacher for a small number of students in a class, so virtual options would help alleviate having to cut these programs.

While these are just a few of the advantages of offering a virtual option, virtual learning also has drawbacks. According to Saultz and Fusarelli (2017), many of the virtual options that

have popped up before 2020 have been led by for-profit providers presenting a problem should the organization place profit over what is best for its students. For example, North Carolina approved two online charter schools partnering with for-profit companies Pearson and K-12 Inc in establishing a four-year pilot for two online charter schools. These two schools negotiated contracts to receive more than \$14 million during the 2015-2016 school year to run virtual options from grades kindergarten through twelfth grade. One of the K-12 chief executive officers alone earned \$4 million in total compensation in 2014 (Saultz and Fusarelli, 2017).

Another concern identified with virtual schools is that they struggle with a lack of diversity among students enrolled in these courses. Many students who are enrolled in virtual schools are typically White/non-Hispanic (70%) as opposed to the enrollment of brick-and-mortar public schools with White students just making up 49.8% of the population. When comparing the free and reduced lunch numbers, you have only 33% of virtual students who qualify while 49.9% of traditional public-school students qualify (Miron and Gulosino, 2016).

Ultimately, to evaluate the most effective means of meeting the needs of America's students, virtual options need to be studied and evaluated so that students, families, and communities can determine the best options for meeting the needs of all learners in the most effective manner possible.

Statement of Problem

School choice has become a highly debated issue within the educational system in the United States of America since the first charter school law was passed in Minnesota in 1991 (Shen & Berger, 2011). The onset of school closings due to the COVID-19 pandemic in March of 2020 presented an opportunity for more options to be provided in a virtual setting throughout the educational system. With so much of the country providing virtual options to close out the

2019-2020 school year and throughout the 2020-2021 school year, many parents, educators, and community members can see the opportunities that arise from providing a virtual school option for families. There is much to be learned and evaluated in how these different virtual learning models affect student achievement and learning. One would expect that learning would occur with the proper instruction regardless of it being received in a virtual environment or an in-person environment, but this is not known. As many school districts continue to offer virtual learning options, the impact of the different learning models must be studied so that educators and parents can compare what will provide the best outcomes for the students within their care.

Purpose of the Study

The purpose of this quantitative study is to evaluate and compare the effects of a virtual learning environment versus an in-person learning environment on students' benchmark scores in English/Language Arts and Math so that educators and parents can determine the most effective methods of educating the children within their care.

Research Questions

To address the purpose of this study, six research questions were addressed.

1. Is there a significant difference between English/Language Arts composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?
2. Is there a significant difference between Math composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?

3. Is there a significant difference between English/Language Arts composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?
4. Is there a significant difference between Math composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?
5. Is there a significant difference between English/Language Arts composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?
6. Is there a significant difference between Math composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?

Significance of the Study

As a shift to virtual learning occurred due to the COVID-19 pandemic in March of 2020, many school systems moved towards offering virtual learning options for their students. While this was necessary during a time of stay-at-home orders and concern for the rapidly spreading coronavirus, it also presented new opportunities for districts where the leaders may have been hesitant to provide multiple learning opportunities. Many districts are planning to continue to offer virtual learning opportunities in the future, even when the pandemic is over and necessity is no longer the driving force behind this decision (Lake, 2021). The chosen district for this study is beginning a virtual academy in the 2021-2022 school year. Because this option will continue to be offered in this district, it is important to evaluate the effectiveness of this model and study how it impacts student learning and achievement. By studying the effects of different models of

learning, all stakeholders within the district can be given the opportunity to fully understand the most effective means of educating all students.

Definition of Terms

The following definition of terms is included to ensure understanding and uniformity throughout the study. Any terms not accompanied by a citation were developed by the researcher.

Benchmark Assessments: A benchmark test is a district-wide assessment designed to measure the achievement of standards taught in each quarter. They "...are designed to coordinate with state standards and assessments and are administered regularly—often quarterly—to gauge student progress" (Herman & Baker, 2005).

Virtual Learner: A student who is participating in an online classroom with the assistance of a computer or tablet from a location not at the school.

In-Person Learner: A student who is attending school in a traditional brick-and-mortar setting.

Asynchronous Learning: "Asynchronous learning is a student-centered teaching method widely used in online learning. Its basic premise is that learning can occur in different times and spaces particular to each learner..." (Finol, 2020).

Synchronous Learning: "Synchronous learning refers to all types of learning in which learner(s) and instructor(s) are in the same place, at the same time, for learning to take place. This includes in-person classes, live online meetings when the whole class or smaller groups get together" (Finol, 2020).

Limitations and Delimitations

Limitations of this research include the use of data from students who have been taught in different environments that may impact access to instructional assistance. For virtual students, this may consist of limited internet access or an interruption of service at various times. Because instruction may be impacted due to limited access, this may impact the results of students' benchmark scores that will not be accounted for within the study.

A delimitation of this study is the focus on grades 3-5. Grades 3, 4, and 5 were selected because the upper elementary grades allow for access to testing data to compare among the groups of students because younger grades do not use these tests within the chosen school district. These grades also reflect the foundational skills necessary for higher-level academics.

Organization of the Study

Chapter 1 contains the introduction, statement of the problem, the purpose of the study, the research questions, significance of the study, definition of terms, and the study limitations and delimitations. Chapter 2 presents the review of related literature and research that focuses on the pandemic that led to virtual learning, why virtual learning is becoming readily available, different virtual learning programs, and how the various learning programs affect student achievement. The methodology and procedures used to collect data are presented in Chapter 3. Chapter 4 provides results for the study findings and analysis of the findings. Finally, Chapter 5 includes a summary of the study and its findings, the conclusions drawn from the study, a discussion, and future study recommendations.

CHAPTER 2

LITERATURE REVIEW

Background

Student achievement has become the epitome of school success. While schools are continuously striving to improve educational experiences, the focus of these experiences has been the basis of school reform for decades (Lunenburg, 1998). Because of this push to further student achievement while improving the educational experience, technology has become a way to improve and impact instruction. With the technological advances being made minute by minute, many techniques and ways of instructing students have adapted to include the use of technology to improve the success of students' achievement. This was never more prevalent than when COVID-19 hit the United States in early 2020. According to an Education Week (2020) article, most states throughout the United States ordered or recommended that schools be closed for the remainder of the Spring 2020 semester to protect the health of students and educators in response to the spreading of COVID-19 ("Map: Coronavirus and School Closures in 2019-2020"). With this development, educators had to become innovative in their practices to reach as many students as possible to continue the learning process and maintain or advance student achievement while being separated from the brick-and-mortar classroom and in-person learning. This virtual model continued into the 2020-2021 school year as many families and communities were still concerned about the spread of COVID-19. According to Education Week (2021), most American states were offering some type of virtual option to their students ("Map: Where were schools required to be open for the 2020-21 school year?").

Following the implementation of an abundance of technological practices to provide instruction for students while separated from the typical in-person instructional experience, many

districts began making the move to implement and offer permanent virtual learning options even beyond the necessity of educating students remotely once the nation moves past the pandemic (Lake, 2021). Because of these opportunities presenting themselves during the response to the COVID pandemic, and the growing number of virtual options becoming available, it is crucial to evaluate the effectiveness of the different instructional practices seen within these programs to determine the most influential means of educating the students of today's world. Chapter 2 will provide a review of important and associated literature to study the history of distance education, to pinpoint the impact of school closures due to COVID-19 on distance learning, the benefits of virtual learning, and the disadvantages of virtual learning throughout the United States so that educators and families will have the tools necessary to make instructional decisions about the most effective means of educating students both virtually and in a traditional in-person model.

History of Distance Education

Distance education, also known as distance learning, remote learning, or virtual learning, is not a new concept for teachers; it has been implemented at various times and in many different forms for centuries. According to the National Center for Education Statistics (n.d.),

Distance education (DE) is education that uses one or more types of technology to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously.

The first instances of distance learning involved teachers creating activities and lessons that could be sent home and completed by the students independently and then returned to be graded for completion of the class in what was known as correspondence courses (Debter, 2014; Florida National University, 2019). According to Debter (2014), one of the first recorded

examples of this type of instruction being offered was in Boston in 1728 for a shorthand course. According to Debter (2014) and Florida National University (2019), the University of London became the first college to offer degrees using correspondence courses. Correspondence courses eventually became so popular and readily available that 100 years after the University of London began its correspondence program, Nelson Mandela was able to study law as a University of London student while being tried and serving his prison sentence in South Africa (McCarty, 2020). As technology has evolved, so have the offerings of education.

Numerous comparisons between the COVID-19 pandemic and the Spanish Flu pandemic of 1918 have occurred. One of those comparisons is how teachers continued to teach their students during both times. During COVID-19, online teaching became the dominant way students were being taught with the help of technology. Whether they attended a synchronous class via Zoom, Google Meet, or any other video conferencing platform, or were completing asynchronous activities provided by the schools or using online learning platforms such as Canvas, Google Classroom, etc., students were given multiple opportunities to further their education while being isolated at home and the use of technology-enabled this to happen more readily. Throughout the pandemic of the Spanish Flu of 1918, the telephone was in only about half of middle-class American households, but it was used sparingly as a tool for educational purposes to further remote learning (McCracken, 2020a, 2020b). Because the telephone was a relatively new invention and was not readily available in all households, it was a novel concept to use it in the manner in which some California students and teachers began to do so. It was such a novel idea, that newspapers began to cover this story and how this technology was enabling students to continue their learning even while being separated from their teachers and schools (McCracken, 2020a).

While this early use of technology-assisted some students in receiving instruction from a distance, the use of the phone did not spread across the country during this time because the technology was not advanced enough for the phone companies to handle the added demand with people being at home. Phone companies eventually urged customers to only use the phone for emergencies due to the lack of infrastructure necessary to meet the added demands within the phone system (McCracken, 2020a, 2020b).

Although the use of the telephone did not become widespread during this time, it provided a new opportunity for instructional practices to evolve for students in the future who were stuck at home during times of illness. Before the widespread use of the telephone, teachers had been tasked with traveling to the students' homes to provide the instruction necessary. This was hard to maintain as teachers spent much of the day traveling from house to house rather than instructing the students; students were lucky to receive instruction for up to two hours a week (McCracken, 2020a). According to McCracken (2020a), Iowa created the first program that utilized the phone service in distance learning. "The setup they used, assembled with help from local phone company volunteers, was the first example of a system that became known as teach-a-phone, school-to-home telephone, or simply the magic box" (McCracken, 2020).

With this new use of the telephone as a means of educating students stuck at home for various reasons spread across the country, new technologies were adapted to make this an even better option for distance learning (McCracken, 2020a). Business communications companies got involved to improve the technology so that eventually students learning remotely were given a device that allowed them to listen in on the classroom daily and even interact with their peers and teachers by using this device to speak through into the class without having the interruptions that the phone lines sometimes experienced (McCracken, 2020a). One of the major factors in the

spread of this type of remote instruction was the efficiency with which teachers could provide instruction, but also the effectiveness of the program. McCracken (2020a) referenced the following:

According to a 1961 study, 98 percent of students who used one achieved passing grades, vs. a national average of only 85 percent. The report's authors concluded that students who phoned into school might have had a deeper interest in their studies and more time to commit to them than their healthier, more carefree classmates. (para. 16)

The successful use of the telephone prompted educators to evaluate other forms of technology that could be used for distance learning. Radios and televisions became a popular way for lessons to be broadcast to multiple students (Debter, 2014; Pappas, 2015; Florida National University, 2019). Television became a popular way for students to take college courses without having to be on campus (Debter, 2014; Florida National University, 2019; Pappas, 2015). As discussed by Debter (2014) and Florida National University (2019), after a partnership between Chicago public television and the local Board of Education in 1956, over 15,000 students enrolled in these classes over the next five years.

In 1984, the "National Technological University established the first accredited 'virtual' university with financial support from companies like IBM, Motorola, and HP. It delivers academic courses to employees via TV" (Debter, 2014). Prior to this, the learning for students participating in distance education had been largely passive because they had not had an opportunity to work with their classmates. With the combination of television in the educational format and the advancement of broadband services the format used in this new virtual university enabled the students to be able to communicate and work with one another and their professors unlike in previous correspondence distance courses (Florida National University, 2019).

After integrating the use of the television into distance courses, it was inevitable that once computer use and the internet became more readily available, the use of computers would become mainstream within distance education courses. This began to take shape when the University of Phoenix became the first institution of higher education to offer both a bachelor's and master's degree online for the entire program (Florida National University, 2019). According to Florida National University (2019), the first fully accredited, web-based university, Jones International University, was founded in 1996. The addition of virtual programs added another pathway for students to participate in additional educational opportunities. It became a crucial part of the education system, especially in higher education programs that would allow classes to include large numbers of students and enabled more opportunities for students to attend higher education classes (Florida National University, 2019). "Distance learning had greatly developed by the 1990s through the use of satellite virtual classrooms, mobile telephones, videoconferencing, and the Internet" (Florida National University, 2019).

As the use of technology continued to strengthen the ability of students to have choices in how they attend school, the number of students participating in virtual programs began to skyrocket. "2003: According to the U.S. government, of the 41% of homeschoolers who take part in distance learning, 20% use television, video or radio, 19% use the Web and 15% take a correspondence course by mail" (Debter, 2014). As internet speeds continuously improved and the infrastructure grew, this inclusion of online-based programs continued to flourish and expand, especially in higher education. In 2006, it was noted that "89% of 4-year public colleges in the U.S. offer classes online, along with 60% of private institutions" (Debter, 2014; Florida National University, 2019).

Another expansion and growth opportunity of distance education included the offering of Massive Open Online Courses or MOOCs. These are courses offered by many universities, even some of the most elite like Harvard and MIT, that allow students to sign up for free, not for credit courses (Debter, 2014; Florida National University, 2019). By having these opportunities available without cost, it encourages students to enroll and experience online courses in their own time about topics they are interested in learning about. Over tens of thousands of students participate in some of the most popular MOOCs (Debter, 2014; Florida National University, 2019). Thus, creating more students invested in distance learning and choosing to participate and expand this mode of learning.

Throughout the years, the evolution of distance learning has occurred as the technology has advanced. In recent years, the implementation and use of online learning have become prevalent throughout the educational system even in the lowest grades with the addition of such learning management systems as Blackboard, Canvas, and Schoology. With many schools also integrating Google Classroom with these learning management systems, the opportunities have become endless for the implementation of technology even as a part of an in-person learning classroom (Edwards, 2020). With the speed that technology is adapting and changing, classrooms have evolved to include these programs within their courses and will continue to do so as the technology develops and changes.

The COVID 19 Pandemic's Impact on Distance Learning

The evolution of distance learning proved especially beneficial during the school closures caused by the spreading of COVID-19. After many of the nation's schools were closed in March of 2020, teachers had to evolve their instruction with the use of Learning Management Systems, video conferencing platforms, digital tools, and more (Edwards, 2020; McCracken, 2020a;

Prothero, 2021). The closures that occurred during the pandemic caused many schools and teachers to utilize the tools available for distance learning like they never had before. Just as the improvement of phone-company infrastructure came about as a result of expanded use of the telephone during the isolation of staying at home during the Spanish Flu of 1918, the technological opportunities that had become available for distance education were greatly impacted by the closures that occurred due to COVID-19 (McCracken, 2020a, 2020b; Prothero, 2021). While schools were warned in early February that they needed to begin preparing a plan to mitigate the spread of the SARS -CoV-2 strand, throughout the country most of the population was hoping this would not come to fruition as it was seen as a final resort option (Green, 2020; Ujifusa, 2020; Walsh, 2020). With the spread of the virus happening rapidly and the first possible cases showing up in a student in Washington state and a school employee in Oregon in late February 2020, the reality was that in order to protect the public and stall the spread of the virus, schools needed to close (Green, 2020; Ujifusa, 2020; Walsh, 2020). Many schools left their buildings thinking they would just be out for a short time, but unbeknownst to them, many would not return for the remainder of the 2019-2020 school year (Map: Coronavirus, 2020). The Center for Disease Control (CDC) provided guidance for the nation during this time concerning procedures and closures, but ultimately, it was left up to governors and those at the local level to make decisions about closures and procedures in the early stages of the COVID-19 pandemic (Green, 2020; Ujifusa, 2020).

A one-to-one (1:1) classroom is one in which every student has access to their own computing device (Varier et al., 2017). Many schools had already moved or had plans to move towards a 1:1 computing learning environment prior to the COVID-19 pandemic, but the closure of many schools forced the need for this type of infrastructure within classrooms into a necessary

component (Klein, 2021a; Lake, 2021). With the implementation of 1:1 computing devices in classrooms having grown tremendously over the past decade, different learning management systems, Google classroom, etc. were already being used as a digital tool in many classrooms across the United States (Edwards, 2020; Klein, 2021a; Powers & Musgrove, 2020). Because of the push to integrate these technological tools into classroom instruction, schools had purchased devices for students to use at school, but many schools did not send the devices home with the students (Lake, 2021). Thus, schools had to scramble to determine the most effective means possible to get these devices into the hands of the students who needed them to stay connected while schools were closed (Klein, 2021a; Lake, 2021). As families were tasked with staying isolated because of the contagious nature of COVID-19, many schools were striving to meet the need of their students and continue with learning as much as possible. Those districts that were not already 1:1 quickly purchased devices to meet the needs of their students (Klein, 2021a; Lake, 2021). According to a survey by EdWeek Research Center (Klein, 2021a), about two-thirds of high school teachers polled said there was a school device issued to each middle and high student, and 42 percent of elementary teachers reported a device issued to students prior to the pandemic closures. Following the pandemic closures, 90 percent of educators reported one device for middle/high school students and 84 percent reported the same for elementary students (Klein, 2021a

With this drastic shift of device availability, instructional practices shifted as well. As teachers quickly pivoted to online-only instruction, new practices and methods were implemented that strengthened the use of technology within the curriculum. Klein stated the following:

Teachers are also likely to shift their approach to instruction to incorporate the sudden windfall of new learning tools, which could put greater pressure on school districts to provide better professional development on how to effectively integrate the devices into learning. (Klein, 2021a, para. 9)

This shift in instructional practices due to immediate need during the closures due to COVID-19 will continue to influence educational practices and decision-making for the foreseeable future (Klein, 2021a; Lake, 2021). Now that everyone has experienced and seen the ability to offer virtual programs, districts will continue to evolve their programming due to the need and demand of families and students within their district who would like to further their education while having the choice of when and how they learn that distance education can provide

Benefits of Virtual Learning

Flexibility

The first major benefit identified in the option of a virtual learning environment is the flexibility it offers to students and their families (Arden, 2021; Florida National University, 2019; Klein, 2021b; Lake, 2021; Logeman, 2021; Mupinga, 2005; Pappas, 2015; Zandberg & Lewis, 2008). For those students who struggle with a traditional school day schedule, they find that they perform better in a virtual setting because they can move at their own pace through assignments where and when it fits their learning style best (Klein, 2021b; Logeman, 2021; Wexler, 2020). Other students report the flexibility of having time to work with teachers to understand additional concepts and ask questions that they may not have had time for in the constraints of a traditional classroom setting (Klein, 2021b; Wexler, 2020). In some students, the flexibility to work around a job or a schedule heavy with practices for elite athletes is imperative

in improving their educational experience (Lake, 2021; Lowe, 2017; Mupinga, 2005). In addition, another advantage of flexibility with the virtual learning option is with students who are in foster care because they do not have to worry about changing schools during any placement changes (Trinidad et al., 2020). By having the options to choose when and where schoolwork happens, a number of students have found they have more success under these circumstances with the flexibility to determine when and where they attend school and complete assignments (Arden, 2021; Florida National University, 2019; Lake, 2021; Logeman, 2021; Lowe, 2017; Mupinga, 2005; Pappas, 2015; Zandberg & Lewis, 2008).

Learning Styles

Students who struggle in a traditional classroom have found success in a virtual environment because they do not have to conform to one specific method of instruction or learning style (Klein, 2021b). Students who may have learning disabilities or attention problems can use multiple learning methods or take as many breaks as needed during their schoolwork (Arden, 2021; Klein, 2021b; Logeman, 2021; Mupinga, 2005). As opposed to needing breaks and more time to complete assignments, students who are more advanced or work at a quicker pace than their average peers can move at their own speed and identify additional areas of independent study to challenge them (Arden, 2021; Logeman, 2021; Mupinga, 2005). Students who struggle with the behaviors of other classmates also found that it was easier to focus and learn without the disruptions of the other students (Arden, 2021; Klein, 2021b; Logeman, 2021). Additionally, students who are introverted or shy feel more comfortable with a virtual learning environment because they can participate by submitting questions or answers digitally without facing the social anxiety that raising a hand and responding in a traditional classroom setting brings (Arden, 2021; Klein, 2021b).

Technological Skills

As seen with the school closures during the pandemic of COVID-19, an uptick of digital learning skills was seen both from teachers and students (Arden, 2021; Lake, 2021; Logeman, 2021; Mupinga, 2005). As more time is spent on digital learning platforms that distance education promotes, students become experts at using the technology that they may use one day in the workplace (Arden, 2021; Lake, 2021; Logeman, 2021; Mupinga, 2005). While learning academic content from a distance, students will hone their virtual skills in communication as well (Arden, 2021; Logeman, 2021). Since most jobs today involve sending emails, creating digital presentations, working collaboratively with coworkers at a distance, etc., these tasks will carry over for students as they move from school into the workforce (Arden 2021; Logeman, 2021).

Time Management

Because distance education involves independent study, students learn to manage their time effectively so that they do not get behind and miss instructional opportunities or assignments (Arden, 2021; Logeman, 2021). Time management is a skill that all humans struggle with, so having this opportunity to be guided in time management by parents in the home and teachers in smaller cohorts of students will essentially prove beneficial for these students as they move up in school and into the workforce (Arden, 2021; Klein, 2021b; Logeman, 2021).

Limitations of Virtual Learning

Equal Access

Access to dependable computing devices and reliable internet connections is crucial for distance education today. While most people have access to a smartphone and use it for their main connection to the internet, that cannot be the only device students have in order to complete

their education from a distance fully (Arden, 2021; Office for Civil Rights, 2021; Zandberg & Lewis, 2008). Without equitable access to the technology necessary for distance learning, students cannot choose to participate in a distance education classroom with success. According to a survey conducted by the US Census Bureau and five other agencies entitled the Household Pulse Survey, over 4.4 million households with students reported a lack of consistent access to a computer and 3.7 million households lacked internet access (USA Facts, 2020). This number shows an even greater discrepancy when broken down by socioeconomic status, urban versus rural locations, and race (Office for Civil Rights, 2021; USA Facts, 2020). With this discrepancy among students having the ability to access digital classrooms, the number of students who have the option to choose to participate in distance education is greatly impacted due to equal access to the technology necessary to complete the work.

Student Engagement

Many students who were isolated during the COVID-19 pandemic reported a feeling of isolation or disconnectedness from their teachers and peers, even when expected to log on for synchronous lessons. Chicago reported that over twice as many black students as white students lacked virtual participation at the beginning of school closures in March of 2020 (Office for Civil Rights, 2021). This was also proven true with a national survey proving that family contact with schools was almost twice as likely to drop in families of color (Office for Civil Rights, 2021). According to Bowles et al. (2018), “If students feel disconnected from school, their learning and even their health can suffer.” Based on the statistics for the number of students, specifically students of color, who were disengaged this is an important obstacle to overcome when looking towards distance learning. Without the means or want to stay engaged in distance education, a lack of diversity will continue should this not be addressed (Miron & Gulosino, 2016).

Student Achievement

According to Saultz and Fusarelli (2017), many of the virtual options that have popped up before 2020 have been led by for-profit providers which can present a problem should the organization place profit over what is best for its students. Raising student achievement is the ultimate goal of educational institutions especially since the implementation of No Child Left Behind determines school success with the success of student data on standardized tests. Because of this focus on student growth, schools are tasked with comparisons between scores to determine the success of the programming they offer. According to much of the research, virtual schools have typically been ineffective at improving student performance of traditional brick-and-mortar schools (Fusarelli, 2017). According to Fusarelli (2017), “The Walton Family Foundation commissioned three studies of virtual charter schools. The results were dismal: students enrolled in online charter schools demonstrated weaker growth in reading and math compared to their peers in traditional brick-and-mortar charter schools.” (para. 8)

Summary

As technology has evolved, educational shifts have occurred to include the use of such technologies to have the biggest impact on student learning (Debter, 2014; Florida National University, 2019). The inclusion of devices within classrooms grew exponentially as a push for classrooms to become 1:1 provided more availability of technology to teachers across America (Klein, 2021a). While a shift to virtual learning occurred due to the COVID-19 pandemic in March of 2020, many school systems have been presented with new opportunities to provide virtual learning opportunities. Many districts are planning to continue to offer virtual learning opportunities in the future, even when the pandemic is over and necessity is no longer the driving

force behind this decision (Lake, 2021). Because this option will be offered on a larger scale than before, we must evaluate how this model impacts student learning and achievement.

CHAPTER 3

RESEARCH DESIGN AND METHODS

Introduction

The purpose of this study was to compare students' performance in a virtual learning environment versus an in-person learning environment on students' benchmark scores in English/Language Arts and Math. This study used a quantitative causal-comparative design that sought to compare the benchmark averages in English/Language Arts and Math for students who had been participating in school virtually and students who had been participating with in-person learning for the 2020-2021 school year.

This chapter is designed to address the methods that were used in the completion of this study. The methodology includes the research questions and null hypotheses, population and sample, instrumentation, data collection, and data analysis.

Research Questions and Null Hypotheses

The following six important research questions guided the analysis of data for this study:

RQ1: Is there a significant difference between English/Language Arts composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?

H₀1: There is no significant difference in English/Language Arts composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks.

RQ2: Is there a significant difference between Math composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?

- H02:** There is no significant difference between Math composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks.
- RQ3:** Is there a significant difference between English/Language Arts composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?
- H03:** There is no significant difference between English/Language Arts composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks.
- RQ4:** Is there a significant difference between Math composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?
- H04:** There is no significant difference between Math composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks.
- RQ5:** Is there a significant difference between English/Language Arts composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?
- H05:** There is no significant difference between English/Language Arts composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks.

RQ6: Is there a significant difference between Math composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?

H₀6: There is no significant difference between Math composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks.

Population and Sample

The selected school district consists of 11 schools with an enrollment of approximately 8,000 students for the 2019-2020 school year. The selected school district is located in Upper East Tennessee and is represented by a range of demographic categories. Of the students who were enrolled in this district 67.9% were white, 15% were black/African American, 12.7% were Hispanic or Latino, 4% were Asian, and less than 1% were American Indian/Alaska Native or Native Hawaiian/Pacific Islander. According to the district information, 30.3% of the students were identified as economically disadvantaged, 12.8% were considered students with disabilities, 6.7% were English Language Learners, less than 1% were placed in foster care or were identified as homeless, and less than 1% were identified as being a member of a migrant or military family. The demographics of the selected school district are displayed in Tables 1 and 2 from the 2019-2020 school year.

The students selected for this proposed study were randomly selected from eight different elementary schools and an intermediate school. The participants of this study consisted of 894 students in grades 3, 4, and 5 who participated in either virtual learning or in-person learning for the 2020-2021 school year in the selected school district in Upper East Tennessee.

Archived student data were used for this study. The data used were from a system-created benchmark that is given at the end of the first three quarters in Math and English/Language Arts. During the 2020-2021 school year, there was no benchmark given during the first quarter due to days lost to COVID closures. Therefore, the average for each student consisted only of scores from the second quarter benchmark and the third quarter benchmarks. This research focused on upper elementary grades of English/Language Arts and Mathematics benchmark scores from grades 3, 4, and 5. Random selections of students who participated with in-person learning were selected to match the number of students who participated in virtual learning for the school year. Students with disabilities, English Language Learning students, and students with a 504 plan were omitted so as not to skew the data. In addition, students with incomplete data were eliminated. Random numbers were assigned to each participant's scores and an average score was computed based on their second and third quarter benchmark scores for both Math and English/Language Arts.

Table 1

Student Ethnicity in Select School District

| Ethnicity | Percent |
|----------------------------------|----------------|
| White | 67.9 |
| Black/African American | 15 |
| Hispanic or Latino | 12.7 |
| Asian | 4 |
| American Indian/Alaska Native | Less than 1 |
| Native Hawaiian/Pacific Islander | Less than 1 |

Table 2*Student Demographics in Select School District*

| Demographics | Percent |
|----------------------------|----------------|
| Economically Disadvantaged | 30.3 |
| Students with Disabilities | 12.8 |
| English/Language Learners | 6.7 |
| Foster Care | Less than 1 |
| Homeless | Less than 1 |
| Migrant | Less than 1 |
| Military | Less than 1 |

Instrumentation*Benchmark Assessments*

The benchmark assessments used in this study are created by the academic coaches for the selected school district. Each assessment is used to determine mastery of specified standards that were to be taught according to the pacing guide created by the teachers of the district during each quarter. These assessments are standards-based assessments that are administered across the system to grades 2-8 on the computer using the Illuminate Education platform.

Administration

Archived 2020-2021 system benchmark data for grades 3, 4, and 5 in English/Language Arts and Math were utilized in this study. Each teacher administered these assessments based on guidelines set forth by district personnel. Each assessment included a testing session that is meant to mimic state testing as closely as possible. Therefore, students are expected to work without any disruptions, without any assistance, and teachers are monitoring to ensure that students remain on task and focused. Students with accommodations were placed in small group

settings with a test administrator and proctor to assist with their testing session. While these sessions are meant to mimic the state assessment sessions, they do remain untimed. These benchmarks were standards-based assessments given in the online testing platform Illuminate for both English/Language Arts and Math at the end of the first three quarters of the school year. The English/Language Arts assessment was comprised of thirty total items that consisted of multiple-choice test items, evidence-based selected-response items, and multiple select items. The Math assessment included thirty total questions that consisted of multiple-choice items and multiple select items. Each question on each assessment was aligned with the state standards that were paced by the district to be taught in each corresponding quarter. Because the first quarter was disrupted due to beginning the year virtually in response to the COVID-19 pandemic, the district did not administer the first-quarter assessment, so the averages used for this study will just consist of the average of the second and third quarter assessments.

Scoring

Scoring of assessments is completed instantly given that the test is an assessment taken on the computer in the Illuminate testing portal. The items are created from a test bank of standards-based questions that mimic state assessment questions. The item types for both Math and English/Language Arts included thirty questions comprised of multiple choice and multiple select items. On the multiple select items, students could either get it right or wrong. There was no half credit given for one choice being correct. The English/Language Arts assessment also included evidence-based selected-response items. These part A and part B questions were treated as two separate questions, so it was possible for a student to get one part correct and miss the question for the corresponding question. The grading for this assessment is based on an absolute

grading scale out of 100. The school system sets mastery of this assessment at an average of 70% or higher; any score less than 70 is considered a failing score.

Data Collection and Procedures

Permission to conduct this study was obtained from the Institutional Review Board (IRB) at Milligan College. Before data collection, permission to conduct the study was obtained from the school district and the principals at each of the eight elementary schools and the intermediate school. Once permission was obtained by each administrator, a letter was sent by the researcher to the Supervisor of Educator Evaluation, Assessment, and Response to Intervention (RTI) requesting access to benchmark scores from the third-, fourth-, and fifth-grade students in the district. The Supervisor of Educator Evaluation, Assessment, and RTI, sent one file for each grade with students enrolled in the virtual program that listed only their scores for each assessment. Then a second file for each grade consisted of only the scores listed for in-person learning students. There were many more students enrolled in the in-person program than the virtual program, so the researcher used Excel to randomly select the scores used for the data from the in-person learning file. Quantitative analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 28.0.1. All research questions were analyzed using an independent sample t-Test. This compared the means of the two groups (virtual and in-person learners) to determine whether there was statistical evidence that the two means are significantly different. All data were analyzed using a .05 level of significance.

Data Analysis

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) 28.0.1 edition. The following research questions guided the analysis of data:

- RQ1:** An independent samples t-test was used to compare differences between English/Language Arts composite scores in third-graders who were learning virtually and the composite scores of third-graders who were learning in-person on benchmarks.
- RQ2:** An independent samples t-test was used to compare differences between Math composite scores in third-graders who were learning virtually and the composite scores of third-graders who were learning in-person on benchmarks.
- RQ3:** An independent samples t-test was used to compare differences between English/Language Arts composite scores in fourth-graders who were learning virtually and the composite scores of fourth-graders who were learning in-person on benchmarks.
- RQ4:** An independent samples t-test was used to compare differences between Math composite scores in fourth-graders who were learning virtually and the composite scores of fourth-graders who were learning in-person on benchmarks.
- RQ5:** An independent samples t-test was used to compare differences between English/Language Arts composite scores in fifth-graders who were learning virtually and the composite scores of fifth-graders who were learning in-person on benchmarks.
- RQ6:** An independent samples t-test was used to compare differences between Math composite scores in fifth-graders who were learning virtually and the composite scores of fifth-graders who were learning in-person on benchmarks.

All data were analyzed at a significance level of .05. Analysis results for all questions are included in chapter 4.

Summary

This chapter contained the methodology used in this quantitative research study. Following a brief introduction, the research questions (including null hypotheses) and the population and sample were discussed. Furthermore, the instrumentations used in this research study along with the processes for data collection and data analysis were presented.

CHAPTER 4

DATA ANALYSIS AND FINDINGS

Introduction

The purpose of this quantitative study was to compare students' performance in a virtual learning environment versus an in-person learning environment on students' benchmark scores in English/Language Arts and Mathematics. In this study, a quantitative causal-comparative design that sought to compare the benchmark averages in English/Language Arts and Mathematics for students who had been participating in school virtually and students who had been participating with in-person learning for the 2020-2021 school year was used. In this chapter, data were analyzed to answer six research questions. These data were collected from 898 students who were randomly selected from grades three, four, and five. Data collected included English/Language Arts and Mathematics. The analysis and findings are presented in this chapter.

Demographic Data

The population of this study consisted of students who attended eight different elementary schools and an intermediate school within a selected school district located in Upper East Tennessee. The participants of this study consisted of approximately 898 students who were randomly selected from grades three, four, and five who participated in either virtual learning or in-person learning for the 2020-2021 school year in the selected school district in Upper East Tennessee.

The selected school district which is located in Upper East Tennessee is represented by a range of demographic categories. Of the students who were enrolled in this district 67.9% were white, 15% were black/African American, 12.7% were Hispanic or Latino, 4% were Asian, and less than 1% were American Indian/Alaska Native or Native Hawaiian/Pacific Islander.

According to the district information, 30.3% of the students were identified as economically disadvantaged, 12.8% were considered students with disabilities, 6.7% were English Language Learners, less than 1% were placed in foster care or were identified as homeless, and less than 1% were identified as being a member of a migrant or military family.

The sample of students selected was chosen because they were enrolled in either in-person or virtual learning during the 2020-2021 school year for grades three, four, and five in the selected school district. Random selections of students who participated with in-person learning were selected to match the number of students who participated in virtual learning for the school year. Students with disabilities, English Language Learning students, and students with a 504 plan were omitted so as not to skew the data. In addition, students with incomplete data were eliminated.

Findings

Research Question 1:

RQ1: Is there a significant difference between English/Language Arts composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?

H01: There is no significant difference in English/Language Arts composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks.

An independent samples *t*-test was conducted comparing the composite scores on the English/Language Arts benchmark of third-grade students who attended school virtually with the scores of third-grade students who attended school in-person. Levene's test for equality of variances indicated that variances were not assumed equal. There was no significant difference between the two groups ($t(243.452) = (1.136, p = .257)$) found. The composite scores of third-grade students Math benchmarks enrolled in virtual learning were slightly lower, but not statistically significant ($M = 78.669, sd = 19.352$) than the scores of third-grade students who attended school in-person ($M = 81.020, sd = 14.133$). Based on the analysis, the null hypothesis is retained. The results are displayed in Table 3.

Table 3

Independent Samples t-test on English/Language Arts Benchmark Assessments for Third-Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> |
|--------------------|----------|-----------|-----------|----------|----------|
| Virtual Students | 78.669 | 19.352 | 243.452 | 1.136 | .257 |
| In-person Students | 81.020 | 14.133 | | | |

Note. $p < .05$

Research Question 2:

RQ2: Is there a significant difference between Math composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks?

H₀2: There is no significant difference between Math composite scores in third-graders who are learning virtually and the composite scores of third-graders who are learning in-person on benchmarks.

An independent samples *t*-test was conducted comparing the composite scores on the Math benchmark of third-grade students who attended school virtually with the scores of third-grade students who attended school in-person. Levene's test for equality of variances indicated that variances were assumed equal. There was no significant difference between the two groups ($t(266) = (1.126, p = .261)$) found. The composite scores of third-grade students on Math benchmarks who were enrolled in virtual learning were slightly lower, but not statistically significant ($M = 76.450, sd = 18.946$) than the scores of third-grade students who attended school in-person ($M = 78.857, sd = 15.928$). Based on the analysis, the null hypothesis is retained. The results are displayed in Table 4.

Table 4

Independent Samples t-test on Math Benchmark Assessments for Third- Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> |
|--------------------|----------|-----------|-----------|----------|----------|
| Virtual Students | 76.450 | 18.946 | 266 | 1.126 | .261 |
| In-person Students | 78.857 | 15.928 | | | |

Note. $p < .05$

Research Question 3:

RQ3: Is there a significant difference between English/Language Arts composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?

H03: There is no significant difference between English/Language Arts composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks.

An independent samples *t*-test comparing the composite scores on the English/Language Arts benchmark of fourth-grade students who attended school virtually with the scores of fourth-grade students who attended school in-person was conducted. Levene's test for equality of variances indicated that variances were assumed equal. There was a significant difference between the two groups ($t(294) = (1.996, p = .047)$) found. The composite scores of fourth-grade students enrolled in virtual learning on English/Language Arts benchmark assessments were significantly lower ($M = 78.547, sd = 15.369$) than the scores of fourth-grade students who attended school in-person ($M = 81.903, sd = 13.500$). The calculated effect size was .232. Based on the analysis, the null hypothesis is rejected. The results are displayed in Table 5.

Table 5

Independent Samples t-test on English/Language Arts Benchmark Assessments for Fourth-Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> | <i>ES</i> |
|--------------------|----------|-----------|-----------|----------|----------|-----------|
| Virtual Students | 78.547 | 15.369 | 294 | 1.996 | .047 | .232 |
| In-person Students | 81.903 | 13.500 | | | | |

Note. $p < .05$

Research Question 4:

RQ4: Is there a significant difference between Math composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks?

H₀4: There is no significant difference between Math composite scores in fourth-graders who are learning virtually and the composite scores of fourth-graders who are learning in-person on benchmarks.

An independent samples *t*-test comparing the composite scores on the Math benchmark of fourth-grade students who attended school virtually with the scores of fourth-grade students who attended school in-person was conducted. Levene's test for equality of variances indicated that variances were not assumed equal. There was a significant difference found between the two groups ($t(282.688) = (4.766, p = .001)$). The composite scores of fourth-grade students enrolled in virtual learning on Math benchmarks were statistically significantly lower ($M = 73.099, sd = 19.852$) than the scores of fourth-grade students who attended school in-person ($M = 83.140, sd = 16.209$). The calculated effect size was .554. Based on the analysis, the null hypothesis is rejected. The results are displayed in Table 6.

Table 6

Independent Samples t-test on Math Benchmark Assessments for Fourth-Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> | <i>ES</i> |
|--------------------|----------|-----------|-----------|----------|----------|-----------|
| Virtual Students | 73.099 | 19.852 | 282.688 | 4.766 | .001 | .554 |
| In-person Students | 83.140 | 16.209 | | | | |

Note. $p < .05$

Research Question 5:

RQ5: Is there a significant difference between English/Language Arts composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?

H₀5: There is no significant difference between English/Language Arts composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks.

An independent samples *t*-test was conducted comparing the composite scores on the English/Language Arts benchmark of fifth-grade students who attended school virtually with the scores of fifth-grade students who attended school in-person. Levene's test for equality of variances indicated that variances were not assumed equal. There was no significant difference between the two groups ($t(326.183) = (1.001, p = .318)$) was found. The composite scores of fifth-grade students on English/Language Arts benchmarks enrolled in virtual learning were slightly lower, but not statistically significant ($M = 71.223, sd = 16.937$) than the scores of fifth-grade students who attended school in-person ($M = 73.023, sd = 15.717$). Based on the analysis, the null hypothesis is retained. The results are displayed in Table 7.

Table 7

Independent Samples t-test on English/Language Arts Benchmark Assessments for Fifth-Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> |
|--------------------|----------|-----------|-----------|----------|----------|
| Virtual Students | 71.223 | 16.937 | 326.183 | 1.001 | .318 |
| In-person Students | 73.023 | 15.717 | | | |

Note. $p < .05$

Research Question 6:

RQ6: Is there a significant difference between Math composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks?

H₀6: There is no significant difference between Math composite scores in fifth-graders who are learning virtually and the composite scores of fifth-graders who are learning in-person on benchmarks.

An independent samples *t*-test comparing the composite scores on Math benchmark assessments of fifth-grade students who attended school virtually with the scores of fifth-grade students who attended school in-person was conducted. Levene's test for equality of variances indicated that variances were not assumed equal. A statistically significant difference between the two groups ($t(327.657) = (2.429, p = .016)$) was found. The composite scores of fifth-grade students on Math benchmarks enrolled in virtual learning were statistically significantly lower ($M = 75.594, sd = 18.194$) than the scores of fifth-grade students who attended school in-person ($M = 80.383, sd = 17.615$). The calculated effect size was .267. Based on the analysis, the null hypothesis is rejected. The results are displayed in Table 8.

Table 8

Independent Samples t-test on Math Benchmark Assessments for Fifth-Grade Virtual and In-Person Students

| Category | <i>M</i> | <i>SD</i> | <i>df</i> | <i>t</i> | <i>p</i> | <i>ES</i> |
|--------------------|----------|-----------|-----------|----------|----------|-----------|
| Virtual Students | 75.594 | 18.194 | 327.657 | 2.429 | .016 | .267 |
| In-person Students | 80.383 | 17.615 | | | | |

Note. $p < .05$

Summary

Chapter 4 contained an analysis of the data that were significant to the research study. Archived data were examined from students who were enrolled in virtual or in-person learning in the selected school district for grades third, fourth, and fifth from the 2020-2021 school year. Data from 894 students were studied. Six research questions and null hypotheses were addressed. Chapter 5 will summarize and describe the conclusions found within this research study. It will also discuss implications for the educational community and recommendations for further research.

CHAPTER 5

Summary of Findings, Discussions, Conclusions, and Recommendations

In the push to raise student academic achievement, educational programs have shifted to implement and include technological advances to support their effort. As educational practices are evolving to meet the needs of today's learners, opportunities have presented themselves that would not have been possible to implement in the past. While educators everywhere are striving to constantly maintain and improve their instruction, the use of technology has presented opportunities for students to learn in a virtual manner that rivals an in-person learning model. These technological advances have created opportunities that have changed the delivery of education and the ability of families to choose the way in which their child is educated (Garcia, 2021; Lake, 2021; Molnar et al., 2019).

Because of school closures that swept through America due to the COVID-19 pandemic, many districts had to quickly create alternative models of learning for the students within their communities. With the shift to virtual learning that occurred, many leaders within the educational community began to recognize the benefits that virtual classrooms present for students and their families. Now that the opportunity had presented itself, many districts want to continue to provide a virtual option permanently within their districts (Lake, 2021). With the growth of virtual options presenting themselves during the response to the COVID 19 pandemic, this study was conducted to compare the effectiveness of virtual programs and in-person learning programs to determine the most influential means of educating the students of today's world.

This chapter contains a summary of findings, discussions, and conclusions as well as recommendations for readers who may use the result of this research study to inform their school district's learning models. The purpose of this comparative research study was to compare the

students' performance in a virtual learning environment versus an in-person learning environment on students' benchmark scores in English/Language Arts and Math.

Summary of Findings

The statistical analysis reported in this research study was based on six research questions and six null hypotheses. When each research question was analyzed, the results showed there was a significant difference between the composite scores of fourth-grade students enrolled in virtual learning on English/Language Arts benchmark assessments when compared with the scores of fourth-grade students who attended school in-person. There was also a significant difference between composite scores of fourth-grade and fifth-grade students enrolled in virtual learning on Math benchmarks when compared to in-person learning students' scores. However, while all composite score averages were lower for virtual learning students, there was not a statistically significant difference between third-grade English/Language Arts and Math for students enrolled in virtual learning when compared with students enrolled in-person. Similarly, there was not a significant difference for the fifth-grade English/Language Arts students who were enrolled in virtual learning when compared with students enrolled in person.

Discussion of Findings

As the push for students' achievement and high stakes testing and accountability in school endures, it is ever more important that school districts recognize the best models to use when educating the students of today. Since the Covid 19 pandemic, districts have been tasked with the decision of determining the effectiveness of virtual learning options. Because state assessments determine the effectiveness of schools and teachers, educators, district administrators, and members of the community need to know the most effective means of educating all students so the decision-makers can have accurate and reliable information.

Negative Implications of Virtual Learning

While each of the research questions did not result in a statistically significant result, each result indicated a lower average from the virtual learning students than the in-person learning students. This supports the information presented by Fusarelli (2017), where virtual learning students were found to have weaker growth in reading and Math when compared to students who participated with in-person learning. Loeb (2020) also stipulated those students who participate in virtual learning have many more distractions than students who are enrolled in a brick-and-mortar program. This, in addition to not having the continuous support and encouragement of teachers such as in an in-person classroom setting, impacts the effectiveness of virtual learning.

With these ideas in mind, the advancement of the content as students progress into each new grade level could have played a possible role in the results of this study. Third-grade did not show a statistical difference in benchmark averages, but in fourth and fifth-grade Math there was a significant difference in benchmark averages between the students who participated virtually versus in-person. In previous research, students rated their online classes more challenging than their classmates who participated in a traditional classroom setting, so this could support the idea that as the content gets more challenging and builds upon previous skills such as in a Math class, the students may not have the support necessary to cement their understanding of the material as well as when a teacher is available such as with an in-person classroom (Ahn & McEachin, 2017; Heppen, et. al., 2017; Loeb, 2020)

Positive Implications of Virtual Learning

Based on this study, it appears that English/Language Arts is less likely to be affected in the learning model than in the area of Mathematics. While fourth-grade did show a statistically

significant difference between the benchmark averages of virtual learners compared to in-person learners, the spread of the averages was much less than any of the Math averages compared. This could be due to the idea that many students have built foundational literacy skills that allowed them to continue to build on these by reading, and that literacy skills are easier to grow than Math skills because students can build comprehension by participating in family activities in addition to reading books on their own. Math requires explicit instruction to learn the skills for each grade level but reading builds upon itself naturally while students are reading independently, working on other coursework, etc. Differentiating reading abilities is also something that could have been promoted to encourage students' growth in reading for virtual learners because teachers can send varying levels of books home with these students to encourage reading or recommend e-books of different levels and interests (Asim, et. al., 2020). Schedules can also be easier modified through virtual learning to fit the needs or wants of learners (Hennick, 2021).

Limitations of the Study

Results of this study are extremely important during this time of expanded learning options for students and could provide additional insights to districts throughout the country. While this research demonstrates significance in some areas of the comparative study, some limitations exist within the study.

First, the data were limited to one school district and the online programming created for this district may be different from virtual learning models in other regions of the country. This study was also limited by the type of data used because it allowed no input for student backgrounds to be included. Since it was archived testing data, it did not include any information that may explain the impact of student backgrounds on their learning environment. For example,

no other data were collected investigating the impacts of virtual learning on the students and their families or the family environments on the ability to provide educational assistance for virtual learners. According to Meckler and Natanson (2020), learning from home is best completed by students who have dedicated quiet study spaces, parents available at home to assist with any academics, and reliable internet. Ways in which this could have been included in the study to factor into the results of the assessments were in the use of surveys or interviews. This also hindered the research because there was no way of knowing if different demographics or socioeconomic statuses impacted the comparative study.

Conclusions

From this research study, the following conclusions were drawn. All groups of virtual learning students' scores in Math and English/Language Arts benchmarks were on average lower than the in-person learning students' scores in each grade level and subject. While all the data compared for virtual students were lower, only certain groups proved to be statistically significant. The results suggest that in Math it is more likely for virtual students to have a lower performance on test results than in-person learners. As supported by Meckler and Natanson (2020), "The national research finds Math losses are greater than reading losses." Some possible reasons this may be true are that parents are better equipped to assist with reading because reading builds on the basic foundational skills every year. Whereas, Math has new concepts introduced every year that require additional abilities for parents to understand and recall in order to instruct and assist their students with these skills (Meckler and Natanson, 2020). Because of this result, Math virtual programs should take this information into consideration and provide multiple opportunities to assess student understanding of concepts before moving to new content.

Recommendations for Practice

The findings and conclusions of this study have identified the following recommendations for the practice of virtual learning programs:

1. Research showed a statistically significant difference between virtual learning students in Math for fourth- and fifth-grade students and English/Language Arts in fourth-grade students. Since there was a discrepancy here between the two groups, it would be wise for administrators and district personnel to investigate best practices for engaging and maintaining achievement for virtual learners. After determining the most effective means of educating these students from a distance, professional development should be provided for the teachers instructing these students.
2. Professional learning communities should be created for each content area. District personnel should allow time for pacing and collaboration among all of the grade level teachers in each professional learning community to bring together all virtual and in-person instructors to ensure equitable instruction and that students are being instructed in the most effective means possible.

Recommendations for Further Study

1. Research is needed that analyzes testing results of virtual learners from additional districts and regions of the country so that the data is not just generalized for one location.
2. Research is needed that analyzes various types of schools, so that different methods and programs can be evaluated to determine the most effective method of instruction. How do results compare when looking at different virtual programs from public, private, and charter schools?

3. Research could be conducted using an action study within a virtual classroom and an in-person classroom. Using pre-and post-assessment data to compare the effectiveness between the virtual classroom and in-person classroom.
4. A mixed-method study could be conducted and added to the action research above to include interviews and surveys of virtual learners to determine which methods are the most effective and feedback as to the best tools and skills that enrich their learning in the virtual environment in addition to the quantitative assessment data used.

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APPENDICES

Appendix A: Milligan IRB Approval Letter

Date: May 28, 2021

From: The Institutional Review Board (IRB) at Milligan University

Re: *A Comparative Study of Third Through Fifth Grade In-Person and Virtual Students on English/Language Arts and Math Benchmark Grades in a Selected School District in Upper East Tennessee*

Submission type: Expedited Review (Final Approval)

Dear Amanda Peterson:

On behalf of the Milligan University Institutional Review Board (IRB), we are writing to inform you that your study, *A Comparative Study of Third Through Fifth Grade In-Person and Virtual Students on English/Language Arts and Math Benchmark Grades in a Selected School District in Upper East Tennessee*, has been approved as expedited. This approval also indicates that you have fulfilled the IRB requirements for Milligan University.

All research must be conducted in accordance with this approved submission, meaning that you will follow the research plan you have outlined here, use approved materials, and follow university policies.

Take special note of the following important aspects of your approval:

- Any changes made to your study require approval from the IRB Committee before they can be implemented as part of your study. Contact the IRB Committee at IRB@milligan.edu with your questions and/or proposed modifications.
- If there are any unanticipated problems or complaints from participants during your data collection, you must notify the Milligan University IRB Office within 24 hours of the data collection problem or complaint.
- Your Milligan IRB Approval Code is: MU2105281529

The Milligan University IRB Committee is pleased to congratulate you on the approval of your research proposal. Best wishes as you conduct your research! If you have any questions about your IRB Approval, please contact the IRB Office and copy your faculty advisor if appropriate on the communication.

On behalf of the IRB Committee,

Trini Rangel, Ph.D.
Chair, Institutional Review Board
Milligan University



Appendix B: Johnson City IRB Approval Letter

JOHNSON CITY SCHOOLS APPROVAL FORM FOR RESEARCH PROPOSALS

REQUESTOR'S NAME Amanda Peterson

TITLE OF RESEARCH PROPOSAL A Comparative Study of Third Through Fifth Grade In-Person and Virtual Students on ELA and Math Benchmark
 STEP 1: RESEARCH REVIEW OF CURRICULUM DIVISION Grades in a Selected School District in Upper East Tennessee

We temporarily withhold approval of your proposal until you address the questions we have raised about it in the attached letter. (Include this form with re-submission of your proposal.)

We conditionally approve your proposal and you may proceed with making contact with principal(s) of the appropriate school(s), but it is necessary for you to address the questions we have raised about your proposal in the attached letter.

We approve your proposal. Proceed with obtaining approval of the principal(s) of the appropriate school(s).

[Signature]
Signature, Curriculum Division Reviewer

5/19/21
Date

STEP 2: PRINCIPAL'S EVALUATION

I temporarily withhold approval of your proposed research being conducted in my school for reasons stated in the attached correspondence. (Include this form with the re-submission of your proposal.)

PRINCIPAL #1: _____ DATE: _____

PRINCIPAL #2 _____ DATE: _____

PRINCIPAL #3 _____ DATE: _____

I approve your proposal. Please forward this form to the Central Office for approval of the Superintendent.

PRINCIPAL #1 _____ DATE: _____

PRINCIPAL #2 _____ DATE: _____

PRINCIPAL #3 _____ DATE: _____

see attached emails

STEP 3: SUPERINTENDENT'S EVALUATION

I withhold approval of your proposed research being conducted in our schools for the reasons stated in the attached correspondence. I am forwarding a copy of your proposal, a copy of this form, and a copy of our correspondence to the Curriculum Division reviewer. They will communicate with you further.

I approve your proposal. Proceed with your research according to the conditions agreed upon in the preceding sections of this form and your research proposal.

[Signature]
Signature of Superintendent

05-27-21
Date

NOTE: The signed copy of this form should be returned to the Curriculum Division for their records. (Reference: Johnson City Board of Education Policy 4.210)