First- and Second-Grade Student Growth During and After the COVID-19 Pandemic

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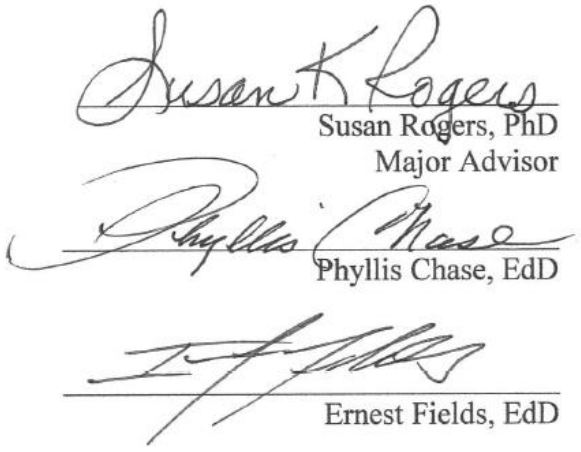

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Abstract

In the spring of 2020, school districts across the country closed their doors to stave away the spread of the COVID-19 virus. School was to continue but differently than most students and staff had ever experienced. Little research had been conducted about the effects on learning during and after COVID-19, and student growth was a topic of debate as educators developed new ways to reach students and engage them in the core curriculum. The purpose of this study was to determine the extent to which, if any, there is a difference in first- and second grade student achievement, as measured by the fall to spring growth on the i-Ready English language arts (ELA) and mathematics assessments during the 2020-2021, 2021-2022, and 2022-2023 school years. An additional purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA and mathematics assessments during the 2020-2021, 2021-2022, and 2022-2023 school years, are affected by student race. The independent variables were the school year the students were enrolled and race. Dependent variables included the ELA and mathematics achievement growth scores from fall to spring as measured by the i-Ready assessments. For both grade levels, the ELA and mathematics growth means for students enrolled in first and second grades during 2021-2022 and 2022-2023 was higher than the ELA and mathematics growth means for students enrolled in first and second grades during 2020-2021. Additionally, the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA and mathematics assessments, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years was not affected by student race. These findings can be used to help districts determine the need

for grade-level training in remote learning for staff. Further research that includes additional grade levels would provide a larger range of growth scores, help determine what grade levels are achieving at higher rates, and help with future professional development.

Dedication

This dissertation is dedicated to my family: my mom for always believing in me, supporting me, and pushing me to be better. My son, Conner, you are one of my reasons for doing what I do. Without your support and understanding, I would not be here right now. I love you so much!

Madison, this is for you. I have spent the last few years watching you grow into a beautiful, strong, amazing, and resilient young woman. You have overcome so much, and for that, I am proud to be your mom. I hope this shows you that no matter what, we can thrive. We are fighters. Never forget to set your sights high. I love you so much!

"Shoot for the moon. Even if you miss, you'll land among the stars."

-Norman Vincent Peale

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Chapter 1

Introduction

The COVID-19 pandemic disrupted traditional education and created challenges for schools nationwide. Schools had to close the brick-and-mortar buildings in the spring of 2020, affecting over 77 million students nationwide to help stop the spread of COVID-19 (Kuhfeld & Lewis, 2021). Schools did not resume full-time in the actual buildings until August 2021. Teachers were asked to continue instruction but on an unfamiliar online platform. Administrators and teachers were forced to create ways to educate children digitally without face-to-face contact. The impact on student achievement in mathematics and reading due to this disruption of learning was unknown (Curriculum Associates, 2022a).

Schools are places where students are educated and provided with other services, including food, a safe environment, comfort from the unknown, and therapeutic services in multi-faucets (Kuhfeld et al., 2020). Students also benefit from low to no-cost school services, including access to free or reduced meal prices, medical care, physical protection from domestic traumas, in-person counseling and various therapies including, but not limited to, physical, speech, and occupational (Curriculum Associates, 2022a). While students were not in brick-and-mortar schools during the pandemic, they not only missed instruction but also failed to receive the other supports that schools provide (Curriculum Associates, 2022b).

The public health, education, and economic damages inflicted by COVID-19 could exacerbate long-standing inequities disproportionately affecting Black, Latino, and Native-American students, English Learners, and students with disabilities (Kuhfeld et

al., 2020). After approximately 18 months of non-traditional, disrupted learning, students might have returned to school with gaps in reading skills and mathematics, as well as the stamina needed to sit in a traditional classroom for six or more hours a day, five days a week.

Hattie (2008) compiled a meta-analysis of effect sizes associated with various factors that are thought to be related to student achievement. Effect size measures the degree a factor affects student achievement. Hattie's study of effect size is widely recognized and used in educational research. As a measure of the influence of various teaching strategies and educational interventions, it helps to gauge the impact these practices have on student achievement.

Effect size is represented by a numerical value ranging from -1 to +1, with the average being around zero. Positive values indicate a positive impact on student achievement, while negative values signify the opposite (Hattie, 2008). Hattie explained that an effect size of 0.40 or more should be sought, as this represents a zone of desired effects, where improvement in learning outcomes is more likely to be substantial. According to Hattie (2008), the greater the effect size, the more effective the intervention or strategy is likely to be. By utilizing Hattie's effect size, "stakeholders can compare the effectiveness of various methods and make informed choices on how best to enhance student performance and overall educational success" (p. 210). Additionally, Hattie stated that breaks in student learning, such as summer, have a .08 effect on student achievement.

The most likely implication of school closures relates to equity. Students from well-established and resourced families fare much better at home learning than their counterparts from lower economic and social backgrounds (Hattie, 2020). Home

resources has a medium effect size (.51) (Hattie, 2020). Many factors come into play when looking at the effect of home learning, including parental educational expertise, parental availability, the need for specialized instruction, especially in special education, and the absence of social skills. Hattie (2020) purported that "the good news is that learning at home is related less to the family structure and more to the parents' skills at becoming schoolteachers" (p. 189). For example, parents are less likely to be skilled at or have knowledge of mathematics, science, and history at the level of a classroom teacher who attended school for this. There are several benefits to learning inside the school buildings versus at-home. School reduces the inequities of in-home resources, skills, and opportunities. Teachers have much deeper pedagogical content knowledge and are skilled at motivating and keeping students engaged (Hattie, 2020).

In classrooms across the country, teachers' worst fears were being realized. As students returned to school from distance learning, they were behind in skills they should have mastered during the gaps in traditional learning that COVID-19 caused (Mader, 2021). Teachers were spending time teaching missing skills to students when they should be working on that year's curriculum. Students in kindergarten, first, and second grade had their most formative years of education disrupted by the pandemic. Research has shown that when students are behind in reading by the end of first grade, they are likely to still be behind once they reach fourth grade. This trend makes learning much more difficult as students age (Mader, 2021).

Background

At the time of the current study, District M served over 5,600 students (District M, 2023). The city's boundaries encompass a large urban area in the Midwest. The

district is comprised of seven elementary schools, one middle school, and one high school. During the 2021-2022 school year, the racial make-up of district students reflected that of the community, which was 69% African American, 13% Hispanic, 9% White and 3% Asian, American Indian, or other minority backgrounds, including Native Hawaiian and Pacific Islander (District M, 2023). According to the Missouri Department of Elementary and Secondary Education Free and Reduced School Lunch Report, 100% of students in District M receive free and reduced-price lunch (DESE, 2023).

On May 5, 2021, Governor Mike Parsons issued a state workforce directive, instructing all state employees to return to a pre-COVID-19 work setting no later than May 17, 2021 (Parsons, 2021). This directive forced schools to return to pre-pandemic, traditional hours, five days a week. Many districts, including District M, were still utilizing a hybrid model where students were on an A/B schedule with students separated into two groups; one group attended Monday and Wednesday, and one group attended Tuesday and Thursday for in-person learning.

According to District M's director of curriculum and instruction (personal communication, June 12, 2023), different instructional methods were utilized during the 2020-2021, 2021-2022, and 2022-2023 school years; however, 1:1 technology, where each student had a device, was available to all students. During the 2020-2021 school year, students were virtual until April of 2021. From April 2021 until December 2022, they were on an A/B schedule 2 days a week with one day for teacher collaboration and planning. Beginning in December 2022, K-12 began in-person learning.

Statement of the Problem

During the pandemic in the spring of 2020, students were taken from their traditional school setting and moved into an unfamiliar setting where teachers provided instruction virtually, and learning took place online (Dorn et al., 2021). Students were expected to access platforms to which they had never been exposed and to become online learners overnight. Teachers were asked to take the curriculum they used in the classroom and make it available digitally for students as the pandemic forced schools across the nation to close. According to Dorn et al. (2021), many families struggled to balance working from home and becoming assistants to their children as they navigated online learning. School districts across the country were worried that students would fall behind due to inequities such as lack of access to technology, internet sources, and basic needs such as food and toiletry items that were difficult to find due to the pandemic (Dorn et al., 2021).

As educators have taken stock of the pandemic's impact on student learning, states and school districts have had the opportunity to help students catch up on unfinished learning from the pandemic and tackle long-standing historical inequities in education (Dorn et al., 2021). The pandemic widened preexisting achievement gaps, hitting historically disadvantaged students the hardest. In math, students in predominantly African-American schools ended the year with six months of unfinished learning, and students in low-income schools with seven months (Curriculum Associates, 2022b). As the 2020-2021 school year began, just 40% of K-12 students were in districts offering in-person instruction (Dorn et al., 2021). By the end of the 2020-2021 school year, more

than 98% of students had access to some form of in-person learning, including hybrid or traditional five days a week learning (Dorn et al., 2021).

District M was challenged to return students to the traditional classroom while following local and federal COVID-19 guidelines. While getting students back into the classroom, teachers and administrators alike were faced with the crippling effects of learning loss in the classroom. Students were away from in-person learning for an extended period, and quality education from home was not guaranteed. In some situations, students with economic disadvantages were unable to benefit from the same levels of adult supervision and at-home academic assistance as their white, higher-income peers (Auxier & Anderson, 2020). District M had to assess students and address the learning gaps created by distance learning. The gaps in student learning that occurred as students were at home and not learning in a traditional school setting are still unknown, and how to address these gaps in learning is still being studied and researched. There is still a lot to be learned about the effect of school closures on student achievement.

The COVID-19 pandemic created challenges and disruptions for schools nationwide and the students they served. Schools are working to identify gaps in students' education and where to begin to recuperate the time lost in learning (Kuhfeld, 2021). Assessments are reviewed and utilized to understand what students know and what skills they are missing. Educational leaders are responsible for making difficult decisions well into the 2022-2023 school year and beyond (Curriculum Associates, 2021). Students are behind academically due to lost learning time, and teachers are working to bridge the gaps in learning. The reality is that students were not given an opportunity to complete all the learning they would have in a typical school year. Many districts made assumptions about

what learning would look like as students returned, and predictions were made about learning loss; however, there was little research regarding pandemic learning loss or what growth students might make during a pandemic.

Purpose of the Study

With little research on the extended school closures of 2020 and their effect on student achievement, this research had four purposes. The first purpose of this study was to determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready English Language Arts (ELA) assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The second purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA assessment during the 2020-2021, 2021-2022, and 2022-2023 school years, is affected by student race. The third purpose of the study was to determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The fourth purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

Significance of the Study

The COVID-19 pandemic created challenges and disruptions for schools nationwide and the students they served. Schools are working to identify gaps in students' education and where to begin to recuperate the time lost in learning (Kuhfeld,

2021). Assessments are reviewed and utilized to understand what students know and what skills they are missing. Educational leaders are responsible for making difficult decisions well into the 2022-2023 school year and beyond (Curriculum Associates, 2021). Students were behind academically due to lost learning time, and teachers are working to bridge the gaps in learning. The reality is that students were not given an opportunity to complete all the learning they would have in a typical school year. The results of this study could help other urban school districts as they plan for possible school closures in the future and contribute to the body of literature related to student growth during and after the pandemic. Administrators could use this information to plan for future school closures and understand the long-term implications of such closures. The data from this study could be used to plan for the gaps in learning that occurred during the pandemic closures. One final use could be determining whether additional money from the school budget should go toward instructional materials for future school closures.

Delimitations

Delimitations are self-imposed boundaries set by the researcher on the purpose and scope of the study (Lunenburg & Irby, 2008). To limit the focus, specific boundaries were created for this study. First, the study was quantitative in its design. Secondly, the data retrieved were from one urban school district in the midwestern U.S. Third, the data collected was limited to i-Ready assessments in ELA and mathematics to monitor achievement. The sample included first- and second-grade students who were administered the fall and spring i-Ready assessments in ELA and mathematics during the 2020-2021, 2021-2022, and 2022-2023 school years.

Assumptions

When conducting research, there may be certain elements that the researcher must accept as operational for the purposes of the research (Lunenburg & Irby, 2008). In conducting this quantitative study, the following assumptions were made.

- i-Ready is a good indicator of student growth and achievement.
- The students completed the assessments to the best of their abilities.
- The student data for i-Ready assessments retrieved from the school district were accurate.
- The proctors followed the protocols for administering the assessments with fidelity.
- The assessment results are an accurate measurement of a student's ability.

Research Questions

The research questions (RQ) that guided this study were developed to determine if there was a significant difference in student achievement as measured by fall to spring growth on the i-Ready ELA and Mathematics assessments for first- and second-grade students and to determine if student race affected those differences. The RQs for this study are presented below.

RQ1

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

RQ2

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

RQ3

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

RQ4

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

Definition of Terms

To provide clarity and a common understanding throughout a study, Lunenburg and Irby (2008) stated, "You should define all key terms central to your study" (p. 118). The following definitions were provided to ensure consistency of understanding of these terms used in the study:

i-Ready

Curriculum Associates (2021) indicated that the i-Ready assessment provides teachers with the data needed to target instruction where needed. Its information is based

on industry-leading assessment design concepts and backed by extensive validity evidence. i-Ready's built-in growth model provides two complementary growth measures, or benchmarks, for understanding student growth in both ELA and Mathematics: typical growth and stretch growth. Typical growth is the average growth nationally for that certain grade level made in one school year. Stretch growth is provided for teachers for each student for goal-setting purposes. Both measures consider differences between students placed at different levels on their baseline diagnostic, usually their first diagnostic. Each measure represents annual growth in scale score points from the baseline to the end-of-year diagnostic.

Student Achievement

Curriculum Associates (2021) indicated that student achievement can be measured by student growth (ELA and mathematics) from fall to spring as measured by the i-Ready ELA and mathematics assessments. In this study, growth scores were calculated as the difference between the fall and spring i-Ready scores for first- and second-grade students enrolled in that school year.

Student Race

Race is a term used to describe a group of people who share physical characteristics, such as skin color and facial features. The whole group may also share similar social or cultural identities and ancestral backgrounds ("race" n.d.)**.** Students' race is reported during enrollment. Race choices for the study sample included African American, Caucasian, Hispanic, Asian, American Indian, or other minority backgrounds, including Native Hawaiian and Pacific Islander (District M, 2023).

Organization of the Study

This quantitative study is presented in five chapters. Chapter 1 included the background, purpose of the study, delimitations, assumptions, research questions, and definition of terms. In Chapter 2, a review of the literature is presented. Chapter 3 includes a description of the methodology used in this study, which includes the research design, selection of participants, instrumentation, data collection procedures, data analysis and hypothesis testing, and the limitations of the study. The findings of the study are presented in Chapter 4. Provided in Chapter 5 are the study summary, findings related to the literature, and the conclusions.

Chapter 2

Review of the Literature

Schools were forced to close in the spring of 2020 due to the COVID-19 pandemic and the need to control the spread of the virus. Students were asked to stay home and were expected to learn on a platform most of them had no experience using. Parents were forced to become teachers while working from home themselves. No one knew what the outcomes of such a long school closure would have on student achievement. One purpose of this study was to determine the extent there is a difference in first-grade and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA and Mathematics during the 2020-2021, 2021-2022, and 2022-2023 school years. Another purpose of the study was to determine if the difference in first grade and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA and Mathematics during the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

Chapter 2 is divided into three sections. In the first section, factors of learning loss due to school closures, including summer breaks and natural disasters. The second section includes stakeholder perceptions of pandemic learning loss from the extended school closures. Explored in the third section are the initial findings of pandemic learning loss.

Factors of Learning Loss Due to School Closures

School closures, such as summer breaks and natural disasters, can cause learning loss for K-12 students. This section provides a review of the effects of summer school closures as well as natural disaster school closures on student learning. School closures,

even for a short time, can cause negative consequences on skill development in children (Burgess & Sievertsen, 2020).

Summer

Breaks in student learning often occur yearly in most schools during the summer months of June, July and August, and students often experience some learning loss. While the length of summer vacation varies from district to district, most districts include at least a five-week break in instructional time. Cooper et al. (1996) conducted a meta-analysis about learning loss from summer breaks. A review of 39 studies showed that scores declined over summer break. The earliest reported study was conducted in 1906 by William White, who analyzed seven students' math computation scores from spring to fall; findings revealed that loss was found in speed, not accuracy. Many studies were conducted after that and are included in Cooper et al.'s meta-analysis. In most studies, researchers concluded that the effect of summer break had more of an impact on math than reading and was more focused on math computation. The study had no mediating effects for student gender or race, but the negative effects did increase with students' grade level (Cooper et al., 1996). Overall, Cooper et al. suggested that summer school programs should strongly focus on mathematics.

Alexander et al. (2007) began a study in 1982 where the same group of students in Baltimore were observed from first grade to age 22. In this decade-long study, the researchers observed that test scores from low-income students tended to drop between spring and fall, while scores from middle- and high-income students tended to remain the same in math and even show an improvement in reading. Alexander et al. also determined that differing summer experiences led to an explanation for the low-to-high

test score gap. Alexander et al. attributed this to the fact that higher-income families have easier access and means to attain other learning opportunities, such as attending camps and local museums during the summer break; in contrast, lower-income families often place their children in daycare during the summer since they must work.

Kuhfeld (2019) conducted numerous studies on learning loss and summer breaks. Data from over 3.4 million students from all 50 states who took the NWEA Measure of Academic Progress (MAP) Growth mathematics and reading assessments during the 2016-2017 and 2017-2018 school years were analyzed. Kuhfeld discovered that one of the strongest predictors for summer loss or gain was the size of gain the student had made during the previous school year, which meant the more students learn in the school year, the more they are at risk for "summer slide" or summer loss (Kuhfeld, 2019). Much research is available regarding this "summer slide" and its effect on student achievement.

According to Kuhfeld (2021), concerns about losing academic gains go back at least a century. Kuhfeld reviewed the research and pointed out several theories: research results using MAP Growth data indicate substantial losses from summer break in elementary mathematics and reading, and gaps between students who attend low-poverty schools versus those who attend high-poverty schools do not widen during the summer break. Kuhfeld indicated the need for more research regarding the relationships between learning loss and achievement gaps, as there is no clear determination that summer learning loss is associated with achievement gaps and the extent to which it occurs.

Kuhfeld and Lewis (2023) stated that long-standing concerns over learning loss and summer breaks are concentrated in high-poverty areas and that some students do not have access to summer enrichment programs. The researchers indicated that a large body

of research exists that explains learning loss and how it is a natural cognitive process to lose steps or material once learned without practice or reinforcement (Kuhfeld & Lewis, 2023). In this recent study of student test scores before and after summer break during the summers of 2019 and 2022, Kuhfeld and Lewis found little evidence to support the claim that learning loss is significantly higher in higher poverty areas. The study results provided evidence that learning loss over the summer break is real and does vary, but there is not enough research to show that it must be a major concern for educators (Kuhfeld & Lewis, 2023).

Natural Disasters

Natural disasters such as hurricanes, tsunamis, floods, and wildfires can cause schools to close unexpectedly. Schools could be closed temporarily or permanently, depending on the damage inflicted by these natural disasters. Hurricane Katrina, one of the worst hurricanes in decades, caused some schools in Louisiana to close permanently.

Hurricane Katrina, a devastating Category 5 storm, destroyed vast areas of the Gulf Coast of the United States in August 2005, significantly impacting the region's education system. The catastrophic event led to widespread, long-term school closures in the affected areas. In New Orleans, more than 100 public schools were closed, displacing around 64,000 students (Darling-Hammond, 2007). Many school buildings, facilities, and educational resources were severely damaged or destroyed, keeping students out of regular schooling in the months following the disaster.

The school closures due to hurricane Katrina negatively affected the academic process and social and emotional well-being of the students. According to Pane et al. (2006), displaced students exhibited lower test scores and higher rates of grade retention

than their non-displaced peers, even years after the storm. This study on displaced students and the impact the storm had on students led educators to see the importance of providing timely, educational support to students in the aftermath of natural disasters (Pane et al., 2006).

Weather-related disasters such as hurricanes, tsunamis, earthquakes, and flooding can impact up to 175 million students annually. The impact on school districts is huge; these weather-related closures comprise 93% of unplanned school closures (Miller & Hui, 2022). California has had more than its share of natural disasters (Miller & Hui, 2022). The researchers utilized a two-way "linear fixed effects regression to estimate the effects of short-term school closures (1-5 days) due to wildfires, earthquakes, and other natural hazard impacts" (Miller & Hui, 2022, p. 49). The researchers analyzed math and English assessments to better understand the educational impacts of these short-term closures. In this study, Miller and Hui analyzed data from 2002 to 2019 in California; during this time, 33,819 days were missed due to natural disasters. Most of the closures were due to wildfires (63%). Overall, Miller and Hui found that short-term school closures due to natural disasters had minimal impact on student achievement, and the highest levels of impact were in the Latino communities.

Napolitano (2023) discussed the learning loss from Hurricane Ian. Napolitano (2023) stated that "more than three months after a Category 4 hurricane destroyed their homes, devastated their shoreline, and shuttered their schools for weeks in Lee County, Florida, students are still not being educated in a permanent setting" (para. 1). The areas impacted served over 90,000 students in 100 schools. Due to mitigation efforts put into place ahead of the storm, from what the districts learned from COVID-19 closures, the

outcomes look hopeful. Parents interviewed state that “this most recent closure and relocation has been nowhere near as difficult as the pandemic-era shutdowns, during which children saw their grades tank when schools closed for months back in 2020 and 2021.” (para. 4). While most schools have returned to learning in buildings shared with neighboring districts, a few schools remained completely closed, and students are displaced all over the surrounding areas (Napolitano, 2023).

Stakeholder Perceptions of Pandemic Learning Loss

Some research has been conducted on staff (teachers specifically) and administrator perceptions of learning loss; however, most research has been focused on parents’ perceptions. Learning loss could have a negative impact on our economy as well as the labor market (Hanushek & Woessmann, 2020). When considering learning loss related to COVID-19 closures, the “gap” is typically defined as the difference between post-pandemic attainment and what would be expected had it not been for the pandemic (Newton, 2021). Goldhaber et al. (2022) predicted that if the current gaps in education due to learning loss and the pandemic were allowed to become permanent, it could have major impacts on future earnings and intergenerational mobility. In the following sections, the research related to teacher, school administrator, parent, and student perceptions of learning loss is discussed.

Teacher Perceptions

Blanchard et al. (2016) studied teachers in low-income, high-poverty schools to discern teachers’ perceptions of technology in the classroom. The study results revealed that low-income schools are much less likely to utilize technology in the classroom. The reason could be that low-income schools typically have limited access to resources and

very few professional development opportunities on the technology they do have (Blanchard et al., 2016).

In a study conducted before the pandemic, teachers surveyed had a positive view of distance learning versus in-class face-to-face learning (Zheng et al., 2020). Teachers stated that a student's motivation towards learning was not affected due to learning at home digitally or learning in the classroom. Of the teachers studied, 65% believed that learning at home had the same effect on a student's learning as being in person at school. In Zheng et al.'s (2020) study, teachers perceived a lack of professional development for distance learning, including data analysis and teaching strategies.

Cooper (2021) studied teachers' perceptions of e-learning during COVID-19 in low- and high-income schools. The survey was administered to 175 faculty members in two elementary, three middle, and two high schools in one school district. Many participants stated that they are more likely to use technology in their classes now due to the experience of e-learning during COVID-19 closures. Additionally, 47% of the participants stated that their views of technology had been positively impacted. Cooper also reported that 3% of those who reported from high-income school districts and 12% of low-income school districts noted the increased awareness of a lack of infrastructure to support the technology. One major finding from the study was that 28% of those surveyed from high-income school districts and 39% from low-income school districts stated that a student's unwillingness to participate hindered the student's ability to effectively conduct e-learning (Cooper, 2021).

Demir et al. (2022) examined the opinions of Turkish elementary and high school teachers about the learning loss from COVID-19 in May 2022. The researchers

interviewed 26 teachers to gain their perceptions of learning loss that took place over the 2020-2021 and 2021-2022 school years. The findings of the study indicated that students experienced not only academic learning loss but also loss of skills, health and safety, and equal education. Additionally, students suffered psychological and social losses. Teachers noted that there were significant losses in the subjects of mathematics, spelling, and reading. Teachers also revealed that in terms of skill development during COVID-19, students lost thinking skills, entrepreneurship skills, communication skills, self-control, and social participation (Demir et al., 2022). Furthermore, teachers reported students were experiencing an inability to control impulsive behavior, more so than pre-pandemic, lack of motivation, and often indifference towards certain academic subjects like mathematics. Demir et al. (2022) indicated that teachers reported concerns about screen addictions and the effects of long-term exposure on their students in the future.

Carroll (2022) sought to understand the impact of learning loss through the lens of teachers. Carroll surveyed 404 teachers in the United Kingdom and other countries, including China, Switzerland, and Qatar. Of the teachers surveyed, over 70% stated that their students had experienced some learning loss in reading and math. The difficulty is defining it as not all grades assessed the same. According to Carroll, one overarching theme teachers were concerned about was defining and addressing learning loss from pandemic-related closures, as many people have varying definitions and assessments (Carroll, 2022).

School Administrator Perceptions

Klosky et al. (2022) conducted a study in Georgia with administrators and essential working parents. The study included four public elementary schools

representing various geographical locations, including rural and urban. Individual interviews were conducted with principals and assistant principals from each school. Surveys were administered, and those who responded were also interviewed in person (Klosky et al., 2022). All administrator participants reported that children experienced learning losses as a result of distance learning due to COVID-19 school closures and working remotely. When making home visits, one administrator noticed that the environment was often noisy and chaotic. Administrators also noted measured academic declines compared to typical outcomes from previous years (Klosky et al., 2022).

Klosky et al. (2022) also reported that technology was an issue for administrators, and major barriers to virtual learning were the "lack of community internet/Wi-Fi access and the absence of digital devices. Due to supply shortages, some schools had difficulty securing enough Chromebooks for students to use at home" (Klosky et al., 2022, p. 8). One administrator also reported that kindergarten teachers were inexperienced at using virtual platforms with their students, and parents often could not help (Klosky et al., 2022).

Parent Perceptions

The harm from the pandemic goes beyond academics in some cases and has taken a toll on students' mental health. In May 2020, the Gallup Poll was issued, and according to the results, three out of 10 parents surveyed stated that their child was experiencing some sort of harm to their emotional or mental health (Calderon, 2020). Of the parents completing the survey, 45% cited separation anxiety due to missing teachers and other children as a major concern. Suicidal ideation and self-harm were on the rise during this time, and many cases went unreported due to a lack of services (Calderon, 2020).

Dorn et al. (2021) conducted a study in which 16,370 parents across every state were surveyed. Dorn et al. found that 35% were extremely concerned about their child's mental health, and 80% were concerned about their child's social and emotional well-being. While those concerns spanned across grade levels, it was slightly lower for elementary school parents (Dorn et al., 2021). Participating parents reported concerns of social withdrawal, self-isolation, lethargy, and irrational fears. Dorn et al. also noted that Black and Hispanic parents were 7-9% more likely than White parents to report higher levels of concern.

Parents often struggled to the extent their children did, especially essential workers (those who had to work outside of the home during nationwide shutdowns). Klosky et al. (2022) conducted a study in Georgia with administrators and essential working parents. The focus was kindergarten through third-grade students from urban and rural public schools. The qualitative exploratory study included demographic surveys, informant interviews, and focus groups. The parents who were interviewed had to have at least one child enrolled in kindergarten through third grade at one of the schools during the 2020-2021 school year. These parents also had to be at least Tier 2 essential workers during the shutdowns, meaning grocery store, food, and convenience store employees. Five major themes from both parents and administrators arose as the survey data were analyzed:

- students exhibited declines in learning when school was remote,
- students displayed declines in academic behavior related to remote learning,
- technology was a major barrier to remote learning due to reduced access and digital literacy,

- student learning and academic behavior improved upon transitioning to in-person learning, and
- remote schooling posed unique challenges for children and parents in certain populations. (Klosky et al., 2022, p. 210)

Student Perceptions

While this current study was focused on first and second-grade students, the results of a study about the perceptions of middle and high school students learning and learning loss during the pandemic provided some very insightful data. Youth Truth (2020), a national non-profit organization that gives students a voice in critical issues in education, looked at students' perceptions of the pandemic. The survey is a three-part series that shines a light on the experiences of students during the pandemic at three different points. The participants included more than half a million secondary students in 952 schools across 37 states; students were surveyed during three time periods: pre-pandemic, spring of 2020, and fall of 2021. The results of this study provided evidence about how the surveyed students perceived remote learning, the supports they received, and the experience through a student's eyes. The data from the second part of the spring 2020 survey comes from over 62,000 secondary students and 23,000 elementary students surveyed in a 15-minute online survey administered in both English and Spanish (Youth Truth, 2020). Of those students surveyed, 34% of them were enrolled in high-poverty schools, 32% of students surveyed identified as either Hispanic or Latino, and only 5% of students identified as Black. "The quantitative survey data were examined using descriptive statistics and a combination of independent *t* tests, chi-squares, and effect size testing" (Youth Truth, 2020).

Youth Truth (2020) found that 61% of students surveyed in the fall of 2020 perceived that they learned a lot each day, which varied across ethnic groups. This percentage was up over 20% from the spring of 2020 when students surveyed reported they learned a lot each day. According to Youth Truth (2020), of the students surveyed, self-identifying Black students traditionally indicated a lower percentage of learning than students self-identifying as Caucasian. In the same survey, students across ethnic groups reported that they learned more in person than when they were at home full-time and attending virtual school.

Students reported feeling depressed, stressed, and anxious and that these feelings became obstacles to their learning (Youth Truth, 2020). Of the students surveyed, 44% stated that distractions at home and family responsibilities were obstacles to their online learning. Additionally, 26% reported having no or limited access to the internet. On average, according to Youth Truth (2020), Black and Hispanic students indicated they had more obstacles to their learning versus White or Asian students surveyed.

The health and well-being of males completing the survey continued to rise as the pandemic progressed; however, the health and well-being of females tended to decline until they returned to in-person learning full-time. Overall, Youth Truth (2020) reported that students across Grades 6-12 reported that while participating in online learning from home, they indicated that adults were less available to support their mental health. Only 41% of students surveyed reported they felt that there was an adult from school who they could talk to about their concerns or feelings. Youth Truth (2020) also reported that during the fall of the 2020-2021 school year, only 49% of students said that an adult from school was willing to help them with a personal problem, down from 64% pre-COVID.

One final study finding from the spring of 2020 survey was that one in four high school seniors' postsecondary plans had changed since the start of the pandemic. A large population of seniors reported that they planned to enter the workforce post-graduation, up 6% from pre-pandemic. This report from Youth Truth (2020) offers a unique insight into the students who lived through the pandemic and attended school virtually from home and in-person at school.

In the fall of 2022, Youth Truth sent out their final survey to students regarding learning and belonging, teacher connection, mental health and returning to school after COVID-19. The survey was completed by 88,236 secondary school students. According to Youth Truth (2023), student perceptions of learning and belonging followed a similar pattern over time, increasing yearly. The 2022 survey results indicated that teachers' connectedness to students was at an all-time low with only 19% of students reporting that they feel like their teachers understand their lives outside of school.

Initial Findings Related to Pandemic Learning Loss

Students began returning to school in the fall of 2020, some in person, some continuing through distance learning, and some using a hybrid model. As students returned and teachers began assessing gaps in learning and looking at learning loss over the time away from school, they began to wonder how to address these gaps. According to the Office of Civil Rights report in 2021, in the spring of 2020, 15% of districts expected their elementary students to receive instruction for more than four hours per day during remote learning, while 85% allowed instructional time to dip well under the four hours per day. During the 2020-2021 school year, in-person instruction rose to 38% and was continually growing; in March 2021, nearly 88% of schools nationwide offered some

sort of in-person learning (U.S. Department of Education, Office of Civil Rights, OCR, 2021). On January 21, 2021, President Biden issued and executive order that supported reopening all schools as well as early childhood programs (Dickler, 2021). Ensuring all students received a high-quality education was a priority as schools began reopening full-time.

According to the National Center for Education Statistics (NCES, 2019), only one-third of all students in Grade 4 were proficient in reading and mathematics prior to the pandemic, with even fewer Black and Latino students meeting the proficiency standards. These inequities have been in place for more than 60 years when we began assessing our nation's students. Educators use the National Assessment of Educational Progress data to improve school programs and make educational adjustments as needed (NCES, 2019).

As we begin looking at assessment data and analyzing the cost of the pandemic, we use the term "unfinished learning" to capture the reality that students were not given the opportunity during the COVID-19 shutdowns to complete all the learning they would have in a typical year (Dorn et al., 2021). The pandemic not only caused students to miss essential learning but also caused some personal loss when a family member passed away from the virus. Many families and children lost caregivers, jobs, and income (Dorn et al., 2021). The pressure of learning at home, dealing with the loss of family, and seeing your parents or caregivers struggle to care for your family can take a toll on students of all ages. Many students also experienced social isolation, and mental health was not being taken care of for many students during the closures (Dorn et al., 2021).

Dorn et al. (2021) continued their research on the state of education after the pandemic. In the spring of 2021, utilizing i-Ready assessment data covering nearly 3 million students across all 50 states, the researchers found that students remained behind in both math and reading. Students assessed by Curriculum and Associates in predominantly Black schools continued to remain at least five months behind their same-aged peers in predominately White schools. The learning loss from the pandemic seems to be widening the already apparent achievement gap between Black and White students. Absenteeism among students since the pandemic is continuing to rise (Dorn et al., 2021). According to Dorn et al., the closures of districts have affected 9% of students, and quarantines and other disruptions affected 17% of students. School closures make teaching even more difficult as students miss more instruction while already behind academically.

Based on the research from prior school years and current research post-pandemic, if the trends continue, in a typical classroom of 30 students, three additional students will be two or more grades behind this year (Dorn et al., 2021). To address the learning loss, Dorn et al. (2021) recommended that disruptions to learning must cease, including school closures due to the pandemic. In Dorn et al.'s survey completed by parents through Curriculum and Associates in 2021, of all the students who chose to go fully in person in 2021 across the United States, in the two weeks the survey in the field, only 83% attended ten full school days.

Curriculum Associates (2021), creators of i-Ready, published an academic research brief in June 2021 analyzing academic achievement during COVID-19. This study used i-Ready diagnostic criterion-referenced grade-level placement data from over

nine million students across the U.S. from 2020-2021. According to the data analysis, fewer students were on grade level in reading that spring compared to historical averages; most were down by at least 5%, and first grade had the largest decline with a 13% drop in reading. There were also fewer students on grade level in math spring of 2021 compared to historical averages, with fourth grade having the sharpest decline at 16%. Disaggregating the data by demographic groups, fewer students in schools serving mostly Black or Latino students were on grade level compared to schools serving White students, with an almost 15% difference in decline in schools serving mostly Black students.

Curriculum Associates (2021) also examined whether elementary students were catching up from the pandemic and the learning loss during it. Looking at students in first grade who started the 2021 academic school year already behind, while more students placed on grade level that spring, it still shows a discrepancy in historical scores by 9%. This discrepancy is widening the already established learning gap at first grade (Curriculum Associates, 2021).

Dawson (2021) examined the differences in growth rates for students during the 2020-2021 school year as measured by the i-Ready diagnostic versus a group of students prior to COVID-19. Dawson only reported for Grades 2, 4, and 6 in reading and mathematics; the assessment was administered in the fall, winter, and spring. Data were collected from public school students who were administered the i-Ready on six consecutive testing occasions between fall 2016 and spring 2021; spring 2020 data was not collected as most schools were closed during that time, and assessments were not administered. Data were analyzed using a three-level, piecewise longitudinal growth

model representing the achievement change across multiple time periods (Dawson, 2021). According to Dawson (2021), "students in the COVID-19 group who reported testing in school showed slower weekly scale score gains during the early part of the 2020-2021 school year, but by the end of the school year, they were progressing at similar, if not faster, rates than pre-COVID-19 students during a similar time period" (p. 7). In factoring the weeks between assessments, the COVID-19 group originally showed a decrease of .13 scale score points per week between winter 2020 and fall 2020. These same students then grew at a rate of .05 points per week faster from winter 2021 to spring 2021, showing growth during a time when some students were hybrid, but most were returning to school. Students who were two or more grade levels below going into COVID-19 did not show much of an impact, positive or negative, on their scale scores. The students pre-COVID-19 compared to the COVID-19 group who were on grade level both made gains, but the COVID-19 group did not show as big of an increase as pre-pandemic (Dawson, 2021). The most profound analysis was that loss of school due to COVID-19 seemed to have a more pronounced impact on student scores in the fall of 2021 in math and reading.

While students of color have already faced pre-existing racial disparities and academic gaps, the pandemic hit this group disproportionately (Kidman et al., 2021). The loss of a parent due to COVID-19 was at a staggering 43,000 students impacted by February of 2021; those losses hit families of color even higher. Black students account for 20% of those who lost a parent; these losses are predicted to not only deepen racial inequities but also contribute to poor educational outcomes for these students. According to Kidman et al., the Black and Latino community faced a much higher risk of

contracting COVID-19 and becoming hospitalized due to the virus or death; this was attributed to a large proportion of front-line workers being either Black or Latino.

Addressing learning loss, or "unfinished learning," is recognized as a top priority in classrooms across the country as schools began full-time in person. "Congress allocated an unprecedented $190 billion to support schools through the Elementary and Secondary School Emergency Relief (ESSER) fund, with at least 20% of ESSER earmarked for addressing learning recovery" (Office of Elementary and Secondary Education, 2020, para. 20). Research began to emerge addressing academic performance during the pandemic and challenges as students returned to their brick-and-mortar buildings (Kuhfeld, 2021).

Jack et al. (2021) conducted a study in 12 states with different learning models. The researchers noticed declines in proficiency rates in districts that shifted to remote instruction in 2020, especially those serving larger shares of Black and Hispanic students and lower-income students. Jack et al. noted that districts with lower averages tended to have a higher share of Black students and offered less in-person learning. One validity concern of this study was that districts with less in-person learning were more affected by other aspects of the pandemic, including the possibility of higher COVID-19 rates. On average, Black male students were disproportionately behind academically than their White classmates. Students who were already behind fell even further behind during the disrupted learning time (Jack et al., 2021).

On January 21, 2021, President Biden issued an Executive Order that all schools return to in-person, full-time (OCR, 2021). The secretary for Civil Rights was tasked to deliver a report on the impacts of COVID-19 on students in elementary, secondary, and

higher education. In preparing the report-the Office for Civil Rights reviewed an array of publicly available sources that documented the impact of COVID-19 on American students. Several observations were noted throughout the report (OCR, 2021).

The secretary's report included evidence that the pandemic had a negative effect on student academic growth K-12, and widened pre-existing disparities, including those of African-American students and English Language Learners. The impact was deepened due to technology access and support for learning at home. OCR (2021) went on to state that students with disabilities not only had their education disrupted but also lacked the support and aids they were used to in the traditional classroom. One group included in the report that is often not talked about in educational reports is the LGBTQ+ community of students. During the pandemic, these students lost access to affirming student organizations, supportive peers, teachers, and staff. These students were at an increased risk for anxiety, stress, and isolation (OCR, 2021).

In a study conducted by Burris (2022), the effect of school closures on student reading and math growth scores was analyzed for Grades 3-6. The study was quantitative, and the differences in student growth from fall to spring as measured by aimswebPlus for students enrolled in Grades 3-6 prior to COVID-19 (2018-2019) and after the 2020 pandemic disruption (2020-2021) school years were analyzed. Burris also studied whether race, gender, and SES affected the differences in growth during those school years. The results of the study indicated a difference in students' reading and mathematics achievement growth between students enrolled in Grades 3-6 before the 2020 pandemic and those enrolled in Grades 3-6 after the pandemic disruption, but it was not consistent among grade levels. According to Burris, in both reading and mathematics,

students in Grades 4 and 6 had lower achievement growth after the 2020 pandemic as compared to students enrolled in Grades 4 and 6 before the pandemic. In contrast, the students in Grade 5 after the 2020 pandemic had higher achievement growth in mathematics than students enrolled in Grade 5 before the pandemic. The results of the study also determined that race did not influence differences in reading or math achievement growth (Burris, 2020).

Educators are looking at diving deeper into the data to better understand the current state of student learning and how this can help them address unfinished learning in the future (Curriculum Associates, 2022b). According to Curriculum Associates, students' performance in mathematics was more negatively impacted by the pandemic than reading. According to Curriculum Associates, elementary mathematics and ELA assessment averages are still not where they need to be compared to pre-pandemic averages. Students enrolled in Grades 1-3 saw the largest setback. Students enrolled in Grades 4 and 5 were nearing pre-pandemic averages. Prior to the pandemic, less than half the students enrolled in Grades 3-5 were on grade level in reading (Curriculum Associates, 2022b). As reported in the diagnostic results from spring 2022, i-Ready mathematics and ELA nationwide, the pandemic came at a time when educational inequities were already at an all-time high (Curriculum Associates, 2022b).

In a study conducted by Cook and Ross (2022) at Johns Hopkins University, i-Ready instruction was analyzed to determine the impact on student growth in five different Massachusetts school districts as measured by the Massachusetts Comprehensive Assessment System (MCAS). The researchers analyzed i-Ready assessment and usage data from the 2020-2021 school year, specifically focusing on

Grades 3-8. Approximately 11,000 students were a part of this study and were exposed to 30-45 minutes of i-Ready personalized instruction per subject per week.

Cook and Ross (2022) determined that statistically significant positive effects of i-Ready personalized instruction were observed for grades 4 and 8 in ELA. Elementary students in the study outscored those not exposed to i-Ready personalized instruction by more than seven points. Administered together, mathematics and ELA i-Ready instruction had significantly impacted students in Grades 3-8 across the board. The researchers also determined that assessment scores increased as student usage levels met or exceeded the recommended 30-45 minutes per week per subject (Cook & Ross, 2022).

Goldhaber et al. (2022) used testing data from over 2.1 million students in 10,000 schools to analyze the role of remote and hybrid instruction in widening the achievement gaps by race and school poverty. Goldhaber et al. discovered a higher incidence of remote schooling for Black and Hispanic students and for longer periods of time. Students in high-poverty schools stayed remote for an average of 5.5 weeks longer than low- and mid-poverty schools (Goldhaber et al., 2022). The researchers predict that if these achievement losses become permanent, there could be implications in the future, including future earnings, racial equity, and income equality, especially in states where remote instruction was more common than in-person learning.

Most schools saw staggering academic losses or declines during and after the pandemic, but a few districts across the country exceeded expectations. Curriculum Associates (2022a) synthesized research from schools that were exceeding expectations. When interviewed, principals at these schools agreed that six leadership practices helped

them see growth and high achievement among students. (Curriculum Associates, 2022a). The six leadership practices were:

- Cultivate educator mindsets that support student success.
- Create a culture of data.
- Prioritize meeting the needs of the whole child.
- Create a school environment that engages and inspires students.
- Enhance teacher practice with more resources and support.
- Strengthen connections with families. (Curriculum Associates, 2022a, p. 12).

Considering that leadership in schools has a .42 effect size Hattie (2020), it is worth looking at how leaders in these high- performing buildings managed to defy the odds and show growth and gains in mathematics and ELA assessments in comparison to other districts in similar situations (Curriculum Associates, 2022a).

In a study to understand the critical gaps in student learning and learning loss, Kuhfeld et al. (2022) conducted a series of analyses using a national sample of over 4.9 million U.S. students in Grades 3-8 who took MAP growth assessment administered three times a year. The data from this study was taken from NWEA's MAP Growth assessments archival data (2019-2020 school year) and the COVID-19 school year (2020-2021 school year). According to Kuhfeld et al., many school districts offered remote and hybrid learning during the 2020-2021 school year; therefore, many students were assessed under different circumstances than they would have been at school. On average, students in all Grades 3-8 showed positive gains in both reading and math for the 2020-2021 school year. In the period directly following the initial shock of school closures due to the pandemic, many students showed sizeable test score drops in math but a steady flat

growth in reading (Kuhfeld et al., 2022). As the 2020-2021 school year progressed, students started showing strong gains in math but minimal gains in reading. This portion of the data analyzed was from students who were either at home distance learning or learning in a hybrid model. While growth was still made by the end of the 2020-2021 school year in reading and math, it was still far from a typical school year growth of pre-pandemic school years (Kuhfeld et al., 2022). Students who were high achieving students prior to the pandemic were the same ones who were showing growth during the pandemic, and those who made minimal growth pre-pandemic were the ones who made little to no growth during the 2020-2021 school year according to the findings of (Kuhfeld et al., 2022).

One group of students who dropped through the cracks during COVID-19 disruptions and lack of community resources are the students with special needs (Belsha, 2023). Early intervention is provided to infants and toddlers with developmental delays or are likely to develop them due to a physical or medical condition. Children can also qualify for services if they are at risk of a delay due to premature birth or prenatal drug use. According to Belsha, at the end of the 2022-2023 school year, students with special needs were not receiving services or received a small portion of their minutes due to a lack of resources. Many students were not identified at an early age as they traditionally would have because of COVID-19 disruptions; many offices such as doctors, therapists and schools were closed, so the students were not able to get the early services they may have needed to see success by the time they entered kindergarten (Belsha, 2023). Daycares, which were also closed, are traditionally where students begin receiving services or are tested for special education concerns.

Friedman-Krauss and Barnett (2023) reported very concerning data. In 2020, 77,000 fewer toddlers received services than in previous years, a 16% decline. Children missed crucial supports as infants and toddlers and are now entering school even further behind. Schools across the country struggled to identify students with disabilities during the pandemic as children learned remotely and staff were not identifying students as they traditionally would have in the classroom. According to Friedman-Krauss and Barnett (2023), the COVID-19 pandemic significantly reduced young Missouri children's access to Early Childhood Special Education; Black children suffered the largest decrease in access. Data showed that Missouri had a larger decrease in Black and Native American students receiving services during the pandemic. These two groups are also the largest enrollment populations for Early Childhood Special Education and have been consecutively since 2018 (Friedman-Krauss & Barnett, 2023).

Lewis and Kuhfeld (2023) analyzed assessment scores from over 6.7 million U.S. public school students in Grades 3-8 and found that the students are making progress post-COVID-19 but at a slower rate than pre-COVID-19 data. The data used to determine these results were from the NWEA assessment administered to students K-12 in public school settings. The data analyzed revealed that students might need an average of four additional months to catch up in reading and four and a half additional months to catch up in math. Lewis and Kuhfeld calculated the difference in assessment scores between COVID-19 and pre-COVID-19 samples and divided it by the average monthly gains in the pre-COVID-19 sample. The researchers used this calculation to estimate the months required to catch up to pre-COVID-19 achievement levels. Reading scores have declined by grade, ranging from 1% to 19% for Grades 4-8, and math declined by 6%-15%

compared to pre-pandemic trends. Third grade saw gains of 4% in reading and 2% in math compared to the same pre-pandemic period (Lewis & Kuhfeld, 2023).

Drost (2023) researched school districts nationwide to see what worked during the pandemic for teaching students. Drost's findings indicated that districts that thrived during the pandemic focused on pedagogy first and technology integration second. Teachers were able to focus on teaching and integrating technology. These districts had a solid instructional framework, and teachers were able to provide effective lessons to students. Staff from the various districts also determined a clear pedagogical function, how a teacher wants a student to learn the material. Examples of this were brainstorming, self-assessment, research, and Marzano's Strategy, "I Do, You Do, were just a few." Drost found that as teachers were confidant in their pedagogical function, they could connect technology to the material, allowing teachers the autonomy to determine what technology they would use to deliver the material and assess it. These districts were successful because students knew what the teacher was trying to accomplish, so they were much more comfortable using the technology provided to them (Drost, 2023).

One final key finding in Drost's (2023) research was that formative assessments were much more effective during the pandemic in showing student growth. Teachers capitalized on monitoring student progress, providing feedback, and making necessary instructional adjustments. This practice succeeded in attaining student growth during the pandemic and allowed teachers to give their students what they had grown accustomed to during the in-person school year (Drost, 2023). These assessments gave students the confidence in their learning they needed as they were in an unknown precedent.

Research has emerged from Curriculum Associates (2023) on student learning in ELA and mathematics for the 2022-23 school year. Researchers have noted that students' ELA and mathematics achievement scores from the last two years fall short of pre-pandemic performance. One of the largest discrepancies is in ELA for Grades 1-3. Scores declined 8-11% from pre-pandemic scores; early elementary students had the largest declines. The percentage of students below grade level coming into the school year has increased by five to seven percentage points since students have returned to school post-pandemic; however, the scores of second-grade students increased, and the percentage of students returning to school below grade level in the 2022 school year declined.

Curriculum Associates (2023) reported that mathematics achievement results were worse than ELA results. Researchers discovered that fewer students were placed on grade level in Grades 1-8 across the board versus pre-pandemic placements. The largest discrepancies were in elementary, where 11-14% more students scored below grade level than in pre-pandemic school years. "These results are concerning as they illustrate a growing divide between students who start on and below grade level" (Curriculum Associates, 2023, p. 16).

Students' ELA and mathematics achievement from the two most recent school years (2021-2022 and 2022-2023) continues to fall short of pre-pandemic performance. Fewer students are finishing the school year able to demonstrate grade-level performance, and more students are striving to reach grade level. While there is a small glimmer of hope in early-elementary reading where Grades 1 and 2 showed a small increase in grade-level attainments from 2022 to 2023, for the most part, achievement levels at the end of 2022-2023 school year remain far below pre-pandemic levels.

In an exploratory study of elementary school students' reading performance scores before and after COVID-19, Goodman (2023) found that students in the research cohort scored significantly lower in reading performance than their 2018-2019 national norm group. This study added to the body of research looking at student performance and achievement growth pre- versus post-pandemic. Students from Goodman's study who returned to in-person instruction in August of 2020 made very small levels of progress in reading performance over time. While the findings of this study revealed small but statistically significant reading progress over time, the progress was not like the i-Ready's national reading norms from pre-COVID (Goodman, 2023).

Sisemore (2023) analyzed student achievement in reading among students enrolled in Grades K-5 for the school years 2021-2022 and 2022-2023. Sisemore utilized i-Ready diagnostic results to determine if there was an impact on student growth if they participated in i-Ready instruction versus those who did not participate in i-Ready instruction. The results of this study produced mixed findings. There was a statistically significant difference in reading growth between kindergarten and first-grade students who engaged in at least 30 minutes of i-Ready instruction weekly and those who did not during the 2021-2022 school year; however, there was only a difference in kindergarten reading growth during the 2022-2023 school year. There was no statistically significant difference in Grades 2-5. The study results indicated that i-Ready instruction had little to no impact on student reading achievement.

Summary

Chapter 2 included a synthesis of past and current research relating to learning loss from summer and natural disasters. The research provided insight into learning loss

regarding COVID-19 and extended school closures. The research provided is just the beginning, as there is still much to learn from the impact of COVID-19 on students and staff in relation to assessment scores and learning loss. Chapter 3 describes in detail the methodology utilized in this study.

Chapter 3

Methods

School districts are investigating to determine whether learning gaps exist due to the disruption caused by the COVID-19 pandemic, which serves as the justification for this study. The focus of this study was to determine if there is a difference in first- and second-grade student growth in reading and mathematics during the pandemic and the first two years following the pandemic. This chapter includes the research design, selection of participants, measurement, data collection procedures, data analysis and hypothesis testing, and limitations of the study.

Research Design

A quantitative casual-comparative research design guided this study. A casual-comparative design was most appropriate for this study because two or more comparison groups were used. According to Lunenburg and Irby (2008), in casual-comparative research, the independent variable is not manipulated because it has already occurred and cannot be controlled. The independent variables used in this study included the school year (2020-2021, 2021-2022 and 2022-2023) and the race of each student. The dependent variables in this study were student growth scores in ELA and mathematics.

Selection of Participants

The population for this study was first- and second-grade students enrolled in District M. Purposive sampling was utilized in this study. Lunenburg and Irby (2008) defined purposive sampling as “selecting a sample based on the researcher’s experience or knowledge of the group to be sampled” (p. 175). The participants in this study were students enrolled in Grades 1 and 2 in District M during the 2020-2021, 2021-2022, and

2022-2023 school years. Students with fall to spring i-Ready growth scores in ELA and mathematics were included in the sample.

Measurement

In District M, i-Ready is used to assess students' growth in ELA and mathematics in grades kindergarten through sixth grade. The i-Ready assessment is administered three times a year: fall, winter, and spring. For this study, growth from fall to spring was analyzed. Two instruments were used to collect student growth data for this study. Student growth scores from fall to spring on the i-Ready ELA assessments and student growth scores from fall to spring on the i-Ready mathematics assessments were collected. Students completed all the i-Ready assessments on a computer in their school building.

The i-Ready assessment shows how much growth is needed to reach grade-level proficiency and what students need to do next to get there (Curriculum Associates, 2021). The assessment provides goals to help students on the path toward proficiency or advanced proficiency levels. It assesses students where they are and lets you know what they need to learn. The assessment has been shown to be valid and reliable and was developed by experts in educational measurement, computer adaptive testing, mathematics, and English language arts common core. According to Curriculum Associates (2021), the assessment was independently audited for adherence to the common core standards by researchers at the University of Massachusetts and went through field testing on over 2 million students.

In a recent independent study according to Curriculum Associates (2021), i-Ready was found to have strong correlations in both mathematics and ELA in Grades 3-9 to the 2013 New York State Assessment, one of the first Common Core summative assessments

created. According to Curriculum Associates (2020), the correlations ranged from .77 to .85 across grades and subjects. Correlations are one of the most used and widely accepted forms of validity evidence; a strong correlation demonstrates that if a student scores high on one assessment, they will tend to score high on the other assessments, which means they are measuring similar things. Assessment correlations above .70 are considered strong by the National Center on Intensive Intervention; the i-Ready Diagnostic exceeded this benchmark in both subjects and across all grades. According to Curriculum Associates (2020), data was collected from approximately 23,000 students across 10 districts in Missouri. These districts were selected for participation in the study specifically to represent the state in terms of factors such as urbanicity, race/ethnicity, and socioeconomic status (using the National School Lunch Program as a proxy). The findings indicated a strong correlation between i-Ready Diagnostic scores and scores on the MAP administered during the 2017–2018 school year. For ELA, the average was .82; for mathematics, it was .84, with higher correlations in the lower grades. i-Ready is a well-researched program that meets the criteria for "evidence-based" as outlined by the Every Student Succeeds Act.

i-Ready ELA

According to Curriculum Associates (2021), the i-Ready ELA assessment is a computer-adaptive test that matches the difficulty of test questions to the proficiency level of each student. As students answer questions correctly, the question difficulty increases. As students answer questions incorrectly, the question difficulty decreases. The assessment adapts to find the precise proficiency level of each student.

The fall and spring assessments start each student at a difficulty level based on the student's chronological grade levels (Curriculum & Associates, 2021). Students answer questions correctly or incorrectly, the assessment adjusts up or down, with questions of varying difficulty, until the assessment reaches the level of difficulty that is "just right" for each student. For ELA, the skills assessed include phonological awareness, phonics, high-frequency words, vocabulary, and literature informational text comprehension. For each domain, there is a corresponding subdomain. For phonological awareness in Grades 1 and 2, the subdomains are rhyme recognition, syllable blending, segmenting, phoneme isolation, and phoneme deletion. In phonics, the subdomains are alphabetic knowledge, sound spellings, decoding and building multi-syllable words. Each assessment takes approximately 45 minutes to administer and can be broken down into multiple sittings (Curriculum & Associates, 2021). A five-hour training is required for teachers administering the assessment.

i-Ready Math

According to Curriculum Associates (2021), the i-Ready Mathematics assessment is a computer-adaptive test that matches the difficulty of test questions to the proficiency level of each student. As students answer questions correctly, they will get more difficult questions. As students answer questions incorrectly, they will get easier questions. The assessment adapts to find the precise proficiency level of each student.

The fall and spring assessments start each student at a difficulty level based on their chronological grade level. As students answer questions correctly or incorrectly, the assessment adjusts up or down, with questions of varying difficulty, until the assessment reaches the level of difficulty that is "just right" for each student. For mathematics, the

skills assessed include numbers and operations, algebra and algebraic thinking, measurement and data, and geometry. Each assessment takes approximately 45 minutes to administer and can be broken down into multiple sittings (Curriculum & Associates, 2021). Teachers administering the assessment must attend five hours of training.

Validity and Reliability of i-Ready

The i-Ready diagnostic serves several purposes. It is used to establish a metric for students that will allow an accurate measurement of student knowledge that can be measured over a period of time to gauge student performance and improvement Curriculum Associates (2023). When students in Grades K-12 complete the diagnostic assessment, the results are reported as scale scores.

According to Swain et al. (2020), several linking studies supported the strong external validity of the i-Ready Diagnostic. Not only did the i-Ready scores closely correlate with state assessments, but they also correlate closely with Lexiles and Quantiles state assessments. The findings of the linking studies support the strong external validity of the i-Ready Diagnostic. “These studies also provide evidence that the i-Ready Diagnostic content is highly consistent with what students across the United States are expected to learn” (Swain et al., 2020, p. 4).

Race

Student race was compiled from enrollment records contained in the student information system. The choice was selected during enrollment; the options were White, Black, Hispanic, Asian, two or more races or Other. For this study, Black, Hispanic, White, and Other are the race categories used. Other encompassed American Indian, Asian, Native Hawaiian, Other, and two or more races.

Data Collection Procedures

A proposal to conduct research was submitted to the director of professional development in District M on May 1, 2023. The district granted permission to collect data on June 12, 2023 (see Appendix A). The researcher requested approval to conduct the study from the Baker University Institutional Review Board (IRB) on August 9, 2023. Approval was granted on August 23, 2023 (see Appendix B). After the Baker University IRB committee approved the study, the director of professional development from District M was notified, and the data was sent to the researcher in an Excel file.

Data Analysis and Hypothesis Testing

Data from i-Ready ELA and math assessments were analyzed to address each research question in this study for ELA and mathematics individually for each grade. Each research question is presented with two hypotheses. Following each hypothesis is a data analysis paragraph.

RQ1

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

H1. There is a difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A two-factor analysis of variance (ANOVA) was conducted to test H1 and H3. The two categorical variables used to group the dependent variable, first-grade achievement, as measured by fall to spring i-Ready ELA growth score, were school year

(2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H1. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

H2. There is a difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A second two-factor ANOVA was conducted to test H2 and H4. The two categorical variables used to group the dependent variable, second-grade i-Ready ELA score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H2. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

RQ2

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

H3. The difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the first two-factor ANOVA was used to test H3. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

H4. The difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the second two-factor ANOVA was used to test H4. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

RQ3

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

H5. There is a difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A third two-factor ANOVA was conducted to test H5 and H7. The two categorical variables used to group the dependent variable, first-grade i-Ready Mathematics score, were school year (2020-2021, 2021-2022, 2022-2023) and student

race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H5. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

H6. There is a difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A fourth two-factor ANOVA was conducted to test H6 and H8. The two categorical variables used to group the dependent variable, second-grade i-Ready Mathematics score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H6. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

RQ4

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

H7. The difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the third two-factor ANOVA was used to test H7. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

H8. The difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the fourth two-factor ANOVA was used to test H8. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

Limitations

Limitations to any study may potentially impact the results. Lunenburg and Irby (2008) stated, "Limitations are factors that may have an effect on the interpretation of the findings or on the generalizability of the results" (p. 133). The researcher does not have control over the limitations; however, stating them explicitly may prevent misconceptions about the results of the study (Lunenburg & Irby, 2008). The limitations of this study include:

1. The experience levels of the teachers proctoring the assessments and students taking the i-Ready assessments may have impacted the students' scores.
2. Due to COVID-19 restrictions, the student assessment data from the 2019-2020 school year was unavailable.

Summary

This quantitative casual-comparative study was conducted to determine if there is a difference in student growth scores from fall to winter on the i-Ready assessment in ELA and mathematics for students enrolled in Grades 1 and 2. Covered in this chapter were the research design, participants, measurement, data collection procedures, data analysis and hypothesis testing, and the limitations. In Chapter 4, the results of the study are presented.

Chapter 4

Results

The first purpose of this study was to determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready English Language Arts (ELA) assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The second purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA assessment during the 2020-2021, 2021-2022, and 2022-2023 school years, is affected by student race. The third purpose of the study was to determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The fourth purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race. The descriptive statistics and the results of the hypothesis testing are included in this chapter.

Descriptive Statistics

In this section, a table is provided with changes to the original data collection. It includes the original numbers from the data for race and the changes made when races were combined and recoded. Table 1 includes the original eight categories parents could choose from when registering their child for school. The following races were combined and recoded as Other: American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, two or more races, and Other.

Table 1

Frequencies and Percentages for Original and Recoded Race Categories

Race	ELA		Mathematics	
	N	%	*N*	%
Original				
American Indian or Alaska Native	14	0.6	14	0.6
Asian	61	2.5	61	2.5
Black or African-American	1,555	63.5	1,539	63.4
Hispanic	348	14.2	351	14.5
Native Hawaiian or Other Pacific Islander	6	0.2	6	0.2
Two or more races	138	5.6	136	5.6
White	239	9.8	235	9.7
Other	87	3.6	87	3.6
Recoded				
Black	1,555	63.5	1,539	63.4
Hispanic	348	14.2	351	14.5
White	239	9.8	235	9.7
Other[a]	306	12.5	304	12.5

Note. [a]Other = American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, two or more races, and Other.

Table 2 includes the original number of students who were administered the i-Ready assessment in the fall by year, how many were administered the assessment in the spring of that year, and the difference between the two. District M has some transiency

among its student population. Therefore, it is not uncommon for students assessed in the fall to move and not be assessed in the spring.

Table 2

Frequencies for ELA and Mathematics Sample Data

	ELA			Mathematics		
Year by grade	Students	Scores	Missing	Students	Scores	Missing
2020-2021						
First grade	379	328	51	383	325	58
Second grade	380	330	50	378	320	58
2021-2022						
First grade	429	386	43	432	388	44
Second grade	422	381	41	414	373	41
2022-2023						
First grade	419	372	47	409	362	47
Second grade	419	377	42	413	370	43

Hypothesis Testing

The results of the hypothesis testing to address the four research questions addressed in the study are discussed in this section. Each question is followed by the corresponding hypotheses. Following each hypothesis, the corresponding analysis is included. Finally, the result of each analysis is explained.

RQ1

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

H1. There is a difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A two-factor analysis of variance (ANOVA) was conducted to test H1 and H3. The two categorical variables used to group the dependent variable, first-grade achievement, as measured by fall to spring i-Ready ELA growth score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H1. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F(2, 1074) = 27.679$, $p = .000$, $\eta^2 = .049$. See Table 3 for the means and standard deviations for this analysis. A follow up post hoc was conducted to determine which pairs of means were different. The Tukey's Honestly Significant Difference (HSD) post hoc was conducted at $\alpha = .05$. Two of the differences were significant. The ELA growth mean for students enrolled in first grade during 2021-2022 ($M = 38.18$) was higher than the ELA growth mean ($M = 8.38$) for students enrolled in

first grade during 2020-2021. The ELA growth mean for students enrolled in first grade during 2022-2023 (M = 36.44) was higher than the ELA growth mean (M = 8.38) for students enrolled in first grade during 2020-2021. H1 was supported. The effect size indicated a small effect.

Table 3

Descriptive Statistics for the Results of the Test for H1

Year	*M*	*SD*	*N*
2020-2021	8.38	55.06	328
2021-2022	38.18	33.49	386
2022-2023	36.44	30.18	372

H2. There is a difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A second two-factor ANOVA was conducted to test H2 and H4. The two categorical variables used to group the dependent variable, second-grade i-Ready ELA score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H2. The level of

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

The results of the analysis indicated a statistically significant difference between at least two of the means, $F(2, 1076) = 40.047$, $p = .000$, $\eta^2 = .069$. See Table 4 for the means and standard deviations for this analysis. A follow up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. Two of the differences were significant. The ELA growth mean for students enrolled in second grade during 2021-2022 ($M = 37.59$) was higher than the ELA growth mean ($M = 3.18$) for students enrolled in second grade during 2020-2021. The ELA growth mean for students enrolled in second grade during 2022-2023 ($M = 40.64$) was higher than the ELA growth mean ($M = 3.18$) for students enrolled in second grade during 2020-2021. H2 was supported. The effect size indicated a medium effect.

Table 4

Descriptive Statistics for the Results of the Test for H2

Year	*M*	*SD*	*N*
2020-2021	3.18	57.66	330
2021-2022	37.59	33.26	381
2022-2023	40.64	33.24	377

RQ2

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

H3. The difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the first two-factor ANOVA was used to test H3. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F(6, 1074) = 0.557$, $p = .765$. See Table 5 for the means and standard deviations for this analysis. A follow up post hoc was not needed. H3 was not supported.

Table 5

Descriptive Statistics for the Results of the Test for H3

Year	Race	*M*	*SD*	*N*
2020-2021	Black	6.51	52.86	218
	Hispanic	12.88	53.41	34
	White	13.47	46.99	32
	Other	10.50	71.55	44
2021-2022	Black	38.84	33.78	256
	Hispanic	38.19	30.97	57
	White	46.32	33.86	31
	Other	28.12	33.60	42
2022-2023	Black	36.46	30.22	220
	Hispanic	34.68	30.18	78
	White	40.89	36.08	35
	Other	35.87	24.38	39

H4. The difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the second two-factor ANOVA was used to test H4. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F(6, 1076) = 1.535$, $p = .163$. See Table 6

for the means and standard deviations for this analysis. A follow up post hoc was not needed. H4 was not supported.

Table 6

Descriptive Statistics for the Results of the Test for H4

Year	Race	*M*	*SD*	*N*
2020-2021	Black	-0.28	57.36	202
	Hispanic	19.61	35.94	33
	White	7.26	51.83	38
	Other	3.18	70.69	57
2021-2022	Black	39.39	34.52	251
	Hispanic	32.00	30.71	55
	White	41.55	33.23	33
	Other	31.10	27.69	42
2022-2023	Black	38.90	34.45	232
	Hispanic	46.17	32.53	64
	White	38.87	34.38	38
	Other	43.37	25.76	43

RQ3

To what extent is there a difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years?

H5. There is a difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A third two-factor ANOVA was conducted to test H5 and H7. The two categorical variables used to group the dependent variable, first-grade i-Ready Mathematics score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H5. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F(2, 1063) = 49.551$, $p = .000$, $\eta^2 = .085$. See Table 7 for the means and standard deviations for this analysis. A follow up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was conducted at $\alpha = .05$. Two of the differences were significant. The mathematics growth mean for students enrolled in first grade during 2021-2022 ($M = 26.73$) was higher than the mathematics growth mean ($M = 1.52$) for students enrolled in first grade during 2020-2021. The mathematics growth mean for students enrolled in first grade during 2022-2023 ($M = 24.91$) was higher than the mathematics growth mean ($M = 1.52$) for students enrolled in first grade during 2020-2021. H5 was supported. The effect size indicated a medium effect.

Table 7

Descriptive Statistics for the Results of the Test for H5

Year	*M*	*SD*	*N*
2020-2021	1.52	36.91	325
2021-2022	26.73	22.00	388
2022-2023	24.91	21.02	362

H6. There is a difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years.

A fourth two-factor ANOVA was conducted to test H6 and H8. The two categorical variables used to group the dependent variable, second-grade i-Ready Mathematics score, were school year (2020-2021, 2021-2022, 2022-2023) and student race (Black, Hispanic, White, Other). The results of the two-factor ANOVA can be used to test for differences in the means of a numerical variable among three or more groups, including a main effect for school year, a main effect for race, and a two-way interaction effect (School Year x Race). The main effect for school year was used to test H6. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated a statistically significant difference between at least two of the means, $F(2, 1051) = 78.853$, $p = .000$, $\eta^2 = .130$. See Table 8 for the means and standard deviations for this analysis. A follow up post hoc was conducted to determine which pairs of means were different. The Tukey's HSD post hoc was

conducted at $\alpha = .05$. Two of the differences were significant. The mathematics growth mean for students enrolled in second grade during 2021-2022 ($M = 21.65$) was higher than the mathematics growth mean ($M = 0.34$) for students enrolled in second grade during 2020-2021. The mathematics growth mean for students enrolled in second grade during 2022-2023 ($M = 25.87$) was higher than the mathematics growth mean ($M = 0.34$) for students enrolled in second grade during 2020-2021. H6 was supported. The effect size indicated a medium effect.

Table 8

Descriptive Statistics for the Results of the Test for H6

Year	*M*	*SD*	*N*
2020-2021	0.34	31.27	320
2021-2022	21.65	17.04	373
2022-2023	25.87	20.36	370

RQ4

To what extent is the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years affected by student race?

H7. The difference in first-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the third two-factor ANOVA was used to test H7. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F(6, 1063) = 0.783$, $p = .583$. See Table 9 for the means and standard deviations for this analysis. A follow up post hoc was not needed. H7 was not supported.

Table 9

Descriptive Statistics for the Results of the Test for H7

Year	Race	*M*	*SD*	*N*
2020-2021	Black	0.18	36.61	216
	Hispanic	9.60	37.92	35
	White	3.45	33.41	31
	Other	0.28	40.25	43
2021-2022	Black	25.45	22.16	258
	Hispanic	29.33	22.02	58
	White	36.58	24.62	31
	Other	23.71	16.59	41
2022-2023	Black	23.71	22.80	214
	Hispanic	26.92	16.10	78
	White	24.56	21.67	32
	Other	27.87	18.98	38

H8. The difference in second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race.

The interaction effect from the fourth two-factor ANOVA was used to test H8. The level of significance was set at .05. When appropriate, an effect size, as indexed by eta squared, is reported.

The results of the analysis indicated there was not a statistically significant difference between at least two of the means, $F(6, 1051) = 0.744$, $p = .614$. See Table 10 for the means and standard deviations for this analysis. A follow up post hoc was not needed. H8 was not supported.

Table 10

Descriptive Statistics for the Results of the Test for H8

Year	Race	*M*	*SD*	*N*
2020-2021	Black	0.45	32.06	195
	Hispanic	3.63	26.19	32
	White	-2.24	27.16	38
	Other	-0.15	34.22	55
2021-2022	Black	20.63	16.75	245
	Hispanic	23.69	15.36	55
	White	27.88	18.57	32
	Other	20.15	18.89	41
2022-2023	Black	24.30	19.66	227
	Hispanic	29.47	25.42	62
	White	25.39	21.56	38
	Other	29.37	13.00	43

Summary

The descriptive statistics related to the number of students by race and the number of students by grade level by year included in the study were presented in this chapter. Additionally, the results of the data analysis associated with the eight hypotheses were presented. Chapter 5 includes a summary of the study, the findings related to the literature, and the conclusions.

Chapter 5

Interpretation and Recommendations

The focus of this study was on whether there was a difference in student achievement during and after the COVID-19 pandemic for first and second-grade students. The study included the school years 2020-2021, 2021-2022, and 2022-2023. Additionally, the effect of race on these differences was explored. Chapter 5 is divided into three sections: study summary, findings related to the literature, and the conclusions.

Study Summary

The current study is presented as a summary in this section. It includes an overview of the problem and an exploration of the differences in student achievement in ELA and mathematics during and after the pandemic. The purpose statement and research questions, a review of the methodology, and the major findings are also presented in this section.

Overview of the Problem

In the spring of 2020, a national pandemic, COVID-19, created disruptions to traditional learning in schools nationwide. Schools were forced to close their doors to students, and districts were challenged to find new ways for students to learn from a distance. Districts were scrambling to find ways to provide remote education and learning opportunities when it was uncertain when schools would return to normal (Dorn et al., 2020). While school closures were not new, all the unknowns from the COVID-19 pandemic stressed teachers, students, families, and school districts. The challenge of creating rigorous leaning opportunities that would reach every child was a daunting task due to limited resources that included technology, an online curriculum accessible to all

students, and the fear of being sick and the repercussions of being sick still unknown (Dorn et al., 2020).

There was little to no research on prolonged school closures and its effects on student achievement in ELA and mathematics. Researchers such as Belsha (2023) predicted that the pandemic would significantly impact student learning during and after the pandemic, especially for students with special needs. Dorn et al. (2021) discovered that as students return to traditional classrooms, there are lingering impacts on student achievement from the pandemic, and we may not know the long-lasting effects for years to come.

District M is like many in its quest to understand the discrepancies in student achievement during and after the pandemic and to find solutions to help students get back on track. The gaps in achievement during and post-pandemic in ELA and mathematics were apparent, and the district was seeking ways to address those gaps and how to plan and be prepared for future school closures if necessary. Addressing the gaps in student achievement is a high priority for District M.

Purpose Statement and Research Questions

The first purpose of this study was to determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready English Language Arts (ELA) assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The second purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready ELA assessment during the 2020-2021, 2021-2022, and 2022-2023 school years, is affected by student race. The third purpose of the study was to

determine the extent there is a difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years. The fourth purpose of the study was to determine if the difference in first- and second-grade student achievement, as measured by the fall to spring growth in i-Ready Mathematics assessment during the 2020-2021, 2021-2022, and 2022-2023 school years is affected by student race. To address the purposes of this study, four research questions were posed, and eight hypotheses were tested.

Review of the Methodology

A quantitative casual-comparative research design was used in this study to determine the difference in student achievement during and post-pandemic. The participants in this study were students enrolled in Grades 1 and 2 in District M during the 2020-2021, 2021-2022, and 2022-2023 school years. Students with fall to spring i-Ready growth scores in ELA and mathematics were included in the sample. Two instruments were used to collect student growth data for this study. Student growth scores from fall to spring on the i-Ready ELA assessments and student growth scores from fall to spring on the i-Ready mathematics assessments were collected. Data from i-Ready ELA and math assessments were analyzed to address each research question in this study for each grade. To test the eight hypotheses, four two-factor ANOVAs were conducted.

Major Findings

In the current study, the extent to which there was a difference in student achievement for first- and second-grade students during and post-pandemic (across the school years 2020-2021, 2021-2022 and 2022-2023) as measured by i-Ready scores was

investigated. As was hypothesized, the results of the current study indicated a difference in growth during the pandemic and the post-pandemic years. There was a statistically significant difference in first- and second-grade students' achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years. For both grade levels, the ELA growth mean for students enrolled in first and second grades during 2021-2022 and 2022-2023 was higher than the ELA growth mean for students enrolled in first and second grades during 2020-2021. For both grade levels, the mathematics growth mean for students enrolled in first and second grades during 2021-2022 and 2022-2023 was higher than the mathematics growth mean for students enrolled in first and second grades during 2020-2021.

Additionally, the effect of students' race on the difference in growth for both first- and second-grade students and across the school years 2020-2021, 2021-2022, and 2022-2023 was studied. The difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready ELA assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years was not affected by student race. Likewise, the difference in first- and second-grade student achievement, as measured by the fall to spring growth on the i-Ready Mathematics assessment, among the students enrolled in the 2020-2021, 2021-2022, and 2022-2023 school years was not affected by student race.

Findings Related to the Literature

Findings from this study related to the literature on the extent of differences in ELA and mathematics growth for students in first and second grades across school years

2020-2021, 2021-2022, and 2022-2023 are discussed in this section. Some of the findings support and some contrast with the findings found in the research reviewed in Chapter 2. The amount of research regarding student growth for students during the COVID-19 pandemic was limited.

The results from this study show a statistically significant difference in student achievement growth for both first- and second-grade students between the school year 2020-2021 and the school years 2021-2022 and 2022-2023, as indicated by analysis of i-Ready assessment data. Dorn et al. (2021) found that students across all 50 states remained behind in both ELA and mathematics, which is supported by the current study. However, the results of the current study indicated that race did not affect the differences in growth, and Dorn et al. found that students in predominately Black schools remained at least five months behind their same aged white peers. Dorn's research focused on the "unfinished learning" gap and compared students' grade equivalent score assessment data and the grades in which they were currently enrolled.

The current study's findings supported the findings of Dawson (2021), who examined the differences in growth rates for students during the 2020-2021 school year as measured by the i-Ready diagnostic versus a group of students prior to COVID-19. Dawson reported for Grades 2, 4 and 6. He found that school closures had a negative effect on student growth and assessment scores in the fall of 2021; they declined as opposed to pre-COVID years. In this current study, the findings for comparing student growth were statistically significant for second-grade students in both ELA and mathematics as assessed by i-Ready.

In the current study, the effect of race on student assessment scores in ELA and mathematics achievement growth during the school years 2020-2021, 2021-2022, and 2022-2023 for both first- and second grade was analyzed and was determined to have no significant impact on student achievement. This finding contrasts with the results of a study by Lewis and Kuhfeld (2021). In their study, the data showed continued evidence of significant unfinished learning, and the gaps between the pre-pandemic and post-pandemic hit Hispanic and Black students the hardest. The largest declines were in third and fourth-grade reading, with an even larger dip in mathematics for both grades.

Jack et al. (2021) analyzed data from 12 states with different learning models; the results of the current study both supported and contrasted with the results. Jack et al. found that schools that shifted to remote learning showed a significant decline in proficiency rates. While in the current study, race did not affect the differences in achievement, race did in the Jack et al. study. Researchers found that schools serving a larger share of Black and Hispanic students fell disproportionately behind academically than their White classmates. Jack et al. also noted that districts with lower averages tended to have a higher share of black students and offered less in-person learning.

Burris (2022) analyzed student growth in reading and mathematics for students enrolled in Grades 3-6. While Burris explored student growth for different grade levels and utilized aimswebPlus to analyze student growth from fall to spring, the analysis yielded similar results to the current study. The current study supports the results found by Burris as both studies showed a difference in student growth from fall to spring, during and after the pandemic. The current study also analyzed the 2020-2021 school

year, which Burris (2022) did not. The results of both studies determined that race did not affect student growth for either year analyzed.

The current study supported the results found by Goodman (2023), who utilized i-Ready data as well but whose sample size was smaller than that of the current study. Goodman focused on one grade level but compared their growth post-pandemic to i-Ready's 2018-2019 national norm group. Goodman indicated that after students returned from being home for several months, they made growth in reading assessment scores, but not typical growth that they were making pre-pandemic. Goodman suggested using a larger data pool to look at other grade levels, and this current study analyzed first and second grade and produced similar findings.

Conclusions

This final section provides conclusions for the current study on student achievement and the impact of the COVID-19 pandemic on student ELA and mathematics scores during and after the pandemic. Implications for action and recommendations for future research are included. Closing remarks from the researcher are included as well.

Implications for Action

The findings from this study tell a story of the impact the COVID-19 pandemic had on student achievement. This research will add to the body of literature already in print. However, a few changes and additions could provide more insight into students' abilities to grow academically during school closures in the future. The findings from this study could help improve the way school districts prepare for future school closures.

The first thing districts may consider is adding additional professional development for teachers who will be instructing remote learning or hybrid learning. Focusing on training a subset of staff to implement distance learning, should we have to use this model again, who would be experts at student growth and how to reach every student during these home learning periods could help improve student achievement growth. Additional professional development on instructional strategies that yield high student growth would also be beneficial. Professional development on formative assessments and how to effectively monitor students, provide feedback, and make instructional adjustments as necessary would be beneficial as well.

Based on the results of this study, districts may consider comparing the data of a larger pool to see if there are any differences as the students are older or younger in achievement during the pandemic. Additionally, districts could analyze which learning strategies work best for which grade levels in a distance learning model. Focusing on high-yield strategies for ELA and mathematics in professional development could also benefit the students and staff. District administrators could help building administrators by allocating funds for math and ELA teachers to attend conferences on producing high student achievement in remote learning situations. They could also allocate funds to ensure all homes could access high-speed Wi-Fi hotspots if needed. Establishing a focus group of parents to gain input on what would be beneficial during future closings would be a good idea as well.

Recommendations for Future Research

The purpose of this study was to compare student achievement growth in ELA and mathematics during the 2020-2021, 2021-2022, and 2022-2023 school years for first-

and second grade students. After schools shut their doors in the spring of 2020 to slow the spread of COVID-19, districts were tasked with finding ways to educate students remotely while still achieving student growth and learning. There was not much research readily available as this was still a very new phenomenon. Recommendations for future research are available in this section.

In the current study, the growth of first- and second grade students in one district was analyzed. The first recommendation would be to look at cohorts of students K-6 and look for trends in data regarding student achievement during and after COVID-19. District M serves a large population of minority students who all receive free lunches. An additional future study analyzing various districts, including those serving rural and suburban areas, would also add to the research and could provide a much more in-depth analysis of the effect of race on the differences in student achievement.

Next, this study only included the 2020-2021 COVID school year. Additional analysis comparing pre-COVID years, the COVID year, and additional post-COVID years would give a larger snapshot of how students performed over time. The study could focus on traditional, remote learning, and back to traditional and if the effects of COVID-19 will have long-term effects on student achievement over time.

Finally, this researcher looked at three school years. A longitudinal study K-8 for students who began school during the 2020-2021 school year would provide insight to school districts on what repercussions there are for students who began school in a remote setting and not traditionally and how their growth is affected over time as they return to traditional school settings. One additional study could analyze data from a cohort of students and follow them from kindergarten to sixth grade.

Concluding Remarks

In the spring of 2020, many districts were forced to close their buildings and prepare to educate students through distance learning. No one knew the impact this would have on educators, students, student growth, or when school would return to normal. This disruption to traditional learning caused schools across the nation to begin analyzing and studying the impact learning has on students in a traditional in-person school setting versus those who are educated at home through distance learning. The focus on student achievement should continue to be monitored as school districts are back in person. District leaders need to prepare for future school closures so that students' needs can be met in a school building or learning from home.

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Appendices

Appendix A: District M Approval

From: [redacted]
Sent: Tuesday, August 8, 2023 5:16 PM
To: ERIN KLEIN <erin.klein@[redacted]org>
Cc: [redacted]
Subject: [EXTERNAL]Re: Dissertation data IRB confirmation email

Hi Erin,
Yes, this is confirmed - we will be able to provide you with the requested data. I apologize for the delay.
[redacted]

On Tue, Aug 8, 2023 at 2:41 PM ERIN KLEIN <erin.klein@[redacted]org> wrote:

> Good afternoon,
>
> Thank you both for meeting with me today.
>
> Per our conversation, this is the data collection that was approved:
>
> **The school year 2020-2021:**
>
> Grade (1st) / Fall mathematics iReady score/ Spring mathematics iReady score/ Race
> Grade (1st)/ Fall ELA iReady score/ Spring ELA iReady score/ Race
>
> Grade (2nd)/ Fall mathematics iReady score/ Spring mathematics iReady score/ Race
> Grade (2nd)/ Fall ELA iReady score/ Spring ELA iReady score/Race
>
> **The school year 2021-2022:**
>
> Grade (1st) / Fall mathematics iReady score/ Spring mathematics iReady score/ Race
> Grade (1st)/ Fall ELA iReady score/ Spring ELA iReady score/ Race
>
> Grade (2nd)/ Fall mathematics iReady score/ Spring mathematics iReady score/ Race
> Grade (2nd)/ Fall ELA iReady score/ Spring ELA iReady score/Race

The school year 2022-2023:

Grade (1st) / Fall mathematics iReady score/ Spring mathematics iReady score/ Race
Grade (1st)/ Fall ELA iReady score/ Spring ELA iReady score/ Race

Grade (2nd)/ Fall mathematics iReady score/ Spring mathematics iReady score/ Race
Grade (2nd)/ Fall ELA iReady score/ Spring ELA iReady score/Race

I have included my Baker University dissertation advisor in this email so that you can reply to this email as confirmation so I can input it into my IRB. I will confer with her to get a due date when I will need the data by.

Thank you again so much!

Sincerely,
Erin Klein

Appendix B: Baker IRB Approval

BAKER UNIVERSITY
Own Confidence

Baker University Institutional Review Board

August 23, 2023

Dear Erin Klein and Susan Rogers,

The Baker University IRB has reviewed your project application and approved this project under Exempt Status Review. As described, the project complies with all the requirements and policies established by the University for protection of human subjects in research. Unless renewed, approval lapses one year after approval date.

Please be aware of the following:

1. Any significant change in the research protocol as described should be reviewed by this Committee prior to altering the project.
2. Notify the IRB about any new investigators not named in original application.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents of the research activity.
4. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.
5. If the results of the research are used to prepare papers for publication or oral presentation at professional conferences, manuscripts or abstracts are requested for IRB as part of the project record.
6. If this project is not completed within a year, you must renew IRB approval.

If you have any questions, please contact me at skimball@bakeru.edu or 785.594.4563.

Sincerely,

Scott H. Kimball

Scott Kimball, PhD
Chair, Baker University IRB

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