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COVID-19-mandated school closures: an exploration of student learning loss and the effects of a rapid shift in instructional modality

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COVID-19-MANDATED SCHOOL CLOSURES: AN EXPLORATION OF STUDENT LEARNING LOSS AND THE EFFECTS OF A RAPID SHIFT IN INSTRUCTIONAL MODALITY

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Approved by
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Approval of Dissertation

We, the faculty supervising the work of **Ryan Sherwood**, affirm that the dissertation, ***Covid-19 Mandated School Closures: An Exploration of Student Learning Loss and The Effects of A Rapid Shift in Instructional Modality***,meets the high academic standards for original scholarship and creative work established by the EdD Program in Leadership Studies and the College of Education and Professional Development. The work also conforms to the requirements and formatting guidelines of Marshall University. With our signatures, we approve the manuscript for publication.

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Dedication

To Autumn, who pushes me to seek and conquer each challenge, every day.

To Liam, who teaches me to search for the humor and laughter in every moment.

To my Sister, whose keen perception cuts through the layers of my sarcasm, revealing the profound depths of understanding and guiding me towards the pursuit of self-improvement.

To my Mother, whose wisdom has instilled in me the invaluable lessons of embracing the journey with unwavering trust, cultivating faith in the unseen, and directing my energies towards that which I can control.

And to my Dad, who has shown me what focus, hard work, and determination can help you accomplish. I will forever "Keep my head down and drive the ball". If I am not successful, I will push forward while "Rubbing some dirt on it".

To Autumn, Liam, Jenna, Mom, and Dad, this work is dedicated to each of you as a token of my love, gratitude, and appreciation. You have been my rock, my motivation, and my inspiration. Your presence in my life has made all the difference. May this dedication serve as a small gesture of my deep love and appreciation for each of you.

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Abstract

This study examined the effect of mandated school closures during the Covid-19 pandemic on student learning loss and the effects of a rapid shift in instructional modality. The research study focused on comparing the academic year results of 2021-2022 to the year of 2018-2019 in English language arts and mathematics assessments, specifically using the California Assessment of Student Performance and Progress (CAASPP) statewide assessment, within Modesto City Schools in California. The study sought to determine if there were disproportionate academic achievement deficits among various student attribute groups, including socioeconomic status (SES), sex, students with disabilities (SWD), and ethnicity.

By conducting a nonexperimental case study and utilizing secondary data analysis, the researcher accessed student assessment data from Performance Matters and employed the California Educator Reporting System (CERS) to extract relevant information. This study identified statistically significant gaps in student achievement outcomes for students with disabilities, students from lower socio-economic backgrounds, males in mathematics, and students in lower grade levels in ELA. These findings suggest that certain student groups may be more vulnerable to the negative effects of school closures and remote learning. The study also identified specific student characteristics, such as socio-economic status, disability status, and grade level, as predictors of academic achievement in both subjects. These findings emphasize the importance of addressing the achievement gaps that have emerged during the mandated school closures and providing targeted support to ensure equal opportunities for all students to succeed academically.

Chapter 1: Introduction

The COVID-19 pandemic has altered the course of history in ways that researchers have yet to fully study. One of the most critical decisions that will have unforeseen and lasting effects on primary and secondary students has been the closure of schools and the adaptation to distance learning. In 2020, the Center for Disease Control and the California Department of Education rapidly decided to close schools without the opportunity to plan and prepare adequate alternatives to education. School districts worldwide had to make the difficult decision to shut their doors without a promise of reopening due to the global pandemic. For many urban and rural school districts, providing equitable access to instruction and instructional materials proved to be an overwhelming task (Lieberman, 2021). Teachers, administrators, students, families, and support staff scrambled for over a year to modify instruction to reach the most at-risk student populations (Haderlein et al., 2021). Throughout the year, unforeseen obstacles presented themselves, some of which are still an issue at the time of this study.

In 2022, schools reopened with new health and safety requirements, but not all students returned to in-person learning. Many school districts are still required to offer full opportunities for distance learning (Haderlein et al., 2021). Nationwide, school districts were already facing a teacher shortage, and this continued requirement has placed more demand than ever on school districts to recruit highly qualified teachers (U.S. Department of Education, 2022). To decrease class sizes, the department of education created a demand to increase the number of highly qualified teachers (Zyngier, 2014). As teacher preparation programs have continued to try and fill the teacher shortages, the corresponding pressure on teachers to close the achievement gap has continued to increase (Carver-Thomas et al., 2022). Teachers have faced the constant challenge of designing lessons to increase the number of students who demonstrate proficiency

in English language arts and mathematics (Jennings & Sohn, 2014). Additionally, teachers regularly face increased class sizes, decreased instructional minutes, decreased student/parent support and respect, increased legal pressures for equitable instructional practices, and increased focus on teaching to meet state standards (Rauf, 2021).

For students, school closures offered a risk of trauma and the inability to focus on learning due to the unpredictable nature of their home lives. Some students were prevented from engaging with teachers altogether for over a year, and research on learning loss during prolonged absences from school suggests that their academic performance may have suffered significantly (Abuhammad, 2020). As such, students have experienced an increased loss of learning for over a year (Abuhammad, 2020). This study focuses on analyzing student assessment data before and after the school closures imposed by the COVID-19 global pandemic to examine changes, if any, in students' academic performance in English language arts and mathematics. The results of this study will enhance educators' understanding of learning loss in general and help them develop appropriate interventions to mitigate the effect of unforeseen and catastrophic circumstances that interrupt schooling.

Background

Educators are familiar with traditional learning gaps that develop over extended periods, such as summer and winter breaks (Kuhfeld & Tarasawa, 2021). However, the extended school closures resulting from federal and state mandates during the COVID-19 global pandemic have likely caused profound disruption and trauma to students. Although research on the outcomes is just beginning (Clark et al., 2020), it is clear that the effect of the pandemic on student learning has been significant. Most studies have relied on existing research to understand the effect of learning loss in general, which has been categorized into three strands.

Device and Internet Access Issues

The sudden shift to distance learning during the COVID-19 pandemic has created unexpected challenges for students and educators. According to UNESCO (2021), school closures have affected more than 1.6 billion learners worldwide, exacerbating existing inequities and highlighting the need for equitable access to educational resources. Biancarosa and Griffiths (2020) note that digital tools and technology can help improve access to education, particularly for students in low-income and underserved communities. However, Fuchs et al. (2020) point out that the pandemic has also highlighted the digital divide between regions and communities with differing levels of access to technology and internet connectivity. The Learning Accelerator (2021) emphasizes the importance of addressing the access gap, particularly for students from low-income households and rural communities who may lack the necessary resources for distance learning. The National Education Association (2021) reports that closing the digital divide is essential for ensuring that all students have access to high-quality education. Despite efforts by school districts and nonprofit organizations such as Education Superhighway to provide devices and internet access to students in need, millions of students and families continue to struggle with inadequate internet and device connectivity at home (Lieberman, 2021; Richards et al., 2021). Addressing these device and internet access issues remains a crucial aspect of ensuring equitable access to education during and after the pandemic.

Questionable Benefits of Interventions focused on Sustained Attendance

The COVID-19 pandemic resulted in mandated school closures that disrupted learning for students across the globe. In response, educators have researched instructional practices, schedules, and strategies to determine their effect on student academic performance. One intervention that has been considered is the incorporation of a year-round schedule to reduce the

effects of extended breaks and maximize sustained attendance over a year. Smith (2011) examined the academic achievement results of year-round schools and found that the modified schedule had positive effects on academic achievement for students from lower socioeconomic status and those with special needs. These results suggest that sustained attendance can offset the loss of learning that occurs during extended breaks. However, the modified schedule had detrimental effects on the academic growth of English learners, which requires further study to determine the cause. Additionally, Ohio State University (2007) found minimal growth among student groups in academic achievement when attending a year-round program versus a traditional 9-month school.

The available research suggests that year-round schooling may not be the most effective intervention for addressing learning loss caused by COVID-19-related school closures. Nevertheless, interventions focused on sustained attendance have been shown to have positive effects on student academic achievement. Allensworth and Easton (2007) found that attendance is a critical factor in academic success and increasing instructional time can help improve student performance. Kuhfeld and Tarasawa (2020) emphasizes the importance of summer learning programs in preventing summer learning loss, particularly for low-income students. These interventions can help offset the loss of learning that occurs during extended breaks and may be more effective than a year-round schedule. Based on this research, sustained attendance interventions should be considered when addressing learning loss caused by prolonged school closures.

Detrimental Effects of Extended Breaks from School

Kuhfeld and Tarasawa (2020) reviewed the adverse effects of summer breaks on student achievement and learning loss by comparing them to the 15-month school closures during the

COVID-19 pandemic. Previous studies aimed to measure learning loss over specific time periods for student placement (Kuhfeld & Tarasawa, 2020). The review found that current projections suggest students will return to school with only seventy percent of what was learned in reading during the previous year and approximately fifty percent of learned math skills. These findings are supported by other studies, including a report by the Rand Corporation (Kuhfeld et al., 2020) projecting significant learning losses due to COVID-19 school closures, particularly for low-income students and students of color. The Northwest Evaluation Association (2020) found that students in grades 3-8 showed lower academic achievement in both math and reading when they returned to school in fall 2020 compared to previous years. Chen, Dorn, Sarakatsannis, and Wiesinger's (2021) report projected that the average K-12 student in the US could lose between 5 and 9 months of learning by the end of the 2020-2021 school year due to COVID-19 school closures. These studies emphasize that the COVID-19 pandemic has had a significant effect on student learning and that traditional approaches to measuring learning loss may not be sufficient in this unique context (Wang et al., 2020).

Problem

The problem to be addressed by this study is that educators have not established whether the traditional results of learning loss and its' relationship to student demographic groups holds true in the transition to a virtual learning environment. With the unexpected transition to virtual learning due to the Covid-19 global pandemic, educators were faced with an unprecedented challenge that has not been experienced in education previously. The rapid transition to a virtual instruction model has never been conducted and the effects of this transition have not been studied previously. Thus, the results of this study will allow the researcher to determine the extent, if any, were indicative of variance in student assessment results when compared to

traditional demographic effects of learning environment in a non-traditional school setting. This is a problem because the lack of research about students' learning losses has prevented school districts from planning specific and targeted interventions that could potentially mitigate learning loss. Although a thorough understanding of the outcomes would require a systematic and longitudinal study, researchers must begin by exploring currently available data to identify and address learning losses as expeditiously as possible.

Understanding student learning loss is essential for a school district to adequately design, implement, and evaluate appropriate interventions for their students to support any learning gaps that potentially developed or expanded as a result of the COVID-19 global pandemic. As school districts continue to return to in-person instruction, interventions will need to be grounded in current and accurate data to address the loss of student learning (Wyse et al., 2020). Unless school districts have accurate and relevant assessment data that can be situated within the singular context of their circumstances, the challenge to make informed, data-driven decisions will not be met.

Purpose

The purpose of this study if to determine to what extent, if any, the mandated school closures during the Covid-19 pandemic created disproportionate academic achievement deficits among various student attribute groups including socioeconomic status (SES), Sex, Students with disabilities (SWD), and Ethnicity within Modesto City schools. This nonexperimental study will be conducted via a case study in Modesto City Schools in the San Joaquin Central Valley of California during the 2021–2022 academic year. The focus of the study will be on comparing the 2021–2022 academic year results to ELA and mathematics assessment results from the 2018–2019 academic year considering changes in instructional modality and selected demographic

attributes to discern which, if any, variables may be characterized as predictive in relationship to academic performance.

Research Questions

To determine the extent to which changes in instructional modality have affected student academic growth in selected subject areas, this study will examine the following questions:

- Research Question 1: To what extent did changes in instructional modality affect students' English language arts (ELA) scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?
- Research Question 2: To what extent did changes in instructional modality affect students' mathematics scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?
- Research Question 3: Is there a relationship between demographic attributes (i.e., age, socio-economic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Research Question 4: Is there a relationship between demographic attributes (i.e., age, socio-economic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Research Question 5: Is school level (i.e., elementary or secondary) predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

- Research Question 6: Is school level (i.e., elementary or secondary) predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

Methods

With 2020-2021 being the first full year of educational assessment on state assessment platforms since the Covid-19 school shut down, education professionals and researchers will be able to thoroughly analyze pre- and post-school closure assessments to determine the overall effect among student groups. The California Assessment of Student Performance and Progress (CAASPP) measures annual growth in English language arts and mathematics of third through eighth grade and 11th-grade students. This study will aim to analyze various student populations to review the various effects or lack thereof through the results obtained through the CAASPP.

Participants

The population for this nonexperimental, descriptive study will be comprised of current sixth, seventh, eighth, and 11th grade students enrolled in Modesto city schools in California who successfully completed both math and English language arts assessments on the California Assessment of Student Performance and Progress (CAASPP) for the 2018–2019 and 2021–2022 school years. Students who did not complete both assessments for each school year will not be included in this study.

Method

This study will be conducted as a secondary data analysis and analyzed using multiple regression. The multiple regression analysis is the best model for this data set given its continuous dependent variable (i.e., test scores) and multiple dichotomous independent variables (i.e., SES, sex, Students with Disabilities, and/or ethnicity). The platform used for data extraction

will be Performance Matters by PowerSchool, a platform used by Modesto City Schools for grading practices, attendance tracking, and student performance evaluation. Modesto City Schools have expanded access to PowerSchool to incorporate assessment data and evaluation tools. Approval for ethical student data access will be sought through the Modesto City Schools institutional review board's (IRB) review process prior to accessing students' records.

Performance Matters will be used to identify students who have completed both assessment areas in each of 2018–2019 and 2021–2022 academic years, eliminating any students who were not enrolled with the school district during the years of study. Identified students will be sorted by current grade level and assigned a random number dependent on the number of qualified participants. These data will be organized via both the students' overall scores and their earned achievement levels, and presented to reflect either growth, stasis, or regression between the two assessment periods. Following the initial evaluation of scores, selected demographic attributes (i.e., SES, sex, students with disabilities, and ethnicity) will be examined to determine any potential relationships with exam scores. Relationships that may be present in the findings include score increases or decreases dependent upon reported sex, race, and socioeconomic status. The prepared results from these findings will be shared and presented to the Modesto City Schools board of education.

Limitations

A primary limitation of this study is acquiring access to students' records that meet the qualifications to be considered for data analysis. This limitation is significant due to the number of students who move between and among schools and school districts as family needs change. For a student's records to qualify for this analysis, the student needs to have documented CAASPP scores from the 2018–2019 and 2021–2022 academic school years. The student must

also have completed the entire assessment for both categories of study, mathematics, and English language arts, in both academic years to be considered for analysis. It is important to note, although the study should provide an accurate analysis of the district in which the study is carried out, the results will not be generalizable to other districts. Districts with similar demographic profiles will find the study's results more significant than school districts that have a different student demographic. This study will provide districts with a meaningful understanding of the effects of school closures on this population and school populations with similar demographics.

Significance

The findings of this study will have significant implications for education professionals, particularly those in school districts that experienced prolonged academic effects due to COVID-19 related school closures. The study will address a gap in the current literature by examining the effects of the sudden and widespread transition to alternative instructional delivery systems during the pandemic. Educators can use the findings to better understand the academic deficiencies that can accrue as a result of rapid and unexpected circumstances of mandated school closures.

The study will provide a clear representation of the academic deficits in English language arts and mathematics in Modesto City Schools. These results will enable educators to determine if there needs to be a greater focus in ELA or math intervention or if both need to be addressed. Additionally, information about each student population subgroup will allow educators to determine if student subgroups need to be addressed individually, such as significant learning gaps in English Language Learners.

Educational leaders can utilize this data to evaluate current instructional programs and supports, and to determine if they are effectively addressing the needs of the affected student

groups. Once the scope of results is narrowed down to a specific affected focus group, educators can use this information to review their individual educational programs, interventions, and curriculum to determine if they are effectively supporting these target groups. If educators determine that the current plans for student achievement are not effective, then discussions can occur to address these needs among the board of education and educational leaders of each district. It is important to note that the findings of this study may not be generalizable to other districts, as districts with different student demographics may experience different academic effects due to school closures. However, the study will provide valuable insights and understanding of the effects of school closures on this population and school populations with similar demographics. The study will also contribute to the body of research on the effects of the COVID-19 pandemic on student academic development and can inform future research on the topic.

Chapter 2: Review of Literature

This chapter provides a summary of literature relevant to the present study. The review is divided into five sections. Section 1 describes how the COVID-19 global pandemic has affected distance learning for students with limited device and internet access. Section 2 presents a review of the issue of student absenteeism and its effect on academic growth and achievement. Section 3 highlights the challenges of student engagement in distance learning and its effect on learning outcomes. Section 4 emphasizes the detrimental effects of extended breaks from school and their role in student learning. Section 5 reviews established relationships between student achievement and student demographics in the traditional in-person instructional modality.

The literature review presented in this chapter aims to support the problem statement presented in chapter one by providing a comprehensive understanding of the challenges that students have faced during the COVID-19 global pandemic and how these challenges may have affected their academic achievement. By addressing the key issues related to distance learning, absenteeism, engagement, extended breaks, and student demographics, this literature review supports the need for further investigation into the potential disproportionate academic achievement deficits among various student attribute groups as a result of the pandemic-related school closures.

Student Challenges During Distance Learning

A successful transition to distance learning required significant infrastructure and technology upgrades for school districts nationwide. School districts worked tirelessly to upgrade internet access, provide student devices, and offer internet solutions to families that could not afford internet in the home (Starr et al., 2022). In addition to providing students with access to the internet and devices, school districts also needed to provide access to the same tools for their

teachers and staff (Rauf, 2021). During the transition to distance learning, Irwin et al. (2021) studied issues with access to technology and the internet due to the COVID-19 global pandemic. Irwin et. al found that only 88% of students had some access to the internet in their home before 2019 (Irwin et al., 2021). Families with lower incomes had lower rates of access to the internet and their primary access was through a smartphone, which lacked the capabilities to use applications like wor.d processing and other learning platforms considered essential for distance learning (Irwin et al., 2021).

The literature review showed that parents held significant concerns about their students falling behind due to the transition to distance learning. Education Trust-West in partnership with the Global Strategy Group (2021) reviewed parents' perspectives of the transition to distance learning in the Los Angeles, California region. The results of this study identified major concerns from participating families, including not having enough devices in the home and a lack of reliable high-speed internet (Education Trust-West, 2021). Of the parents surveyed, only 41% of families had one device in the home that they needed to use to work remotely, preventing their children from attending school virtually. Additionally, 37% of the families surveyed said their child's school offered them technology devices in response to the COVID-19 global pandemic and distance learning (Education Trust-West, 2021). Another significant concern highlighted by Education Trust-West was a student's ability to access reliable, high-speed internet. This concern was considered another top barrier for parents surveyed, with 29% of families reporting that if they were not provided internet access, their child was likely to not participate in distance learning (Education Trust-West, 2021). Of the parents studied, only 20% reported that their school district had made the offer to provide them with access to free internet services. The National Center for Education Statistics (NCES, 2021) also reviewed statistics on internet and

device access at home. The NCES has shown significant concern across the nation for students transitioning in and out of distance learning. In 2019, the National Assessment of Educational Progress, conducted by NCES, found that across all public schools, 81% of fourth grade students and 88% of eighth grade students reported having access to a device and internet in the home. The lowest state responses averaged 70% for fourth grade students in New Mexico and 81% of eighth grade students in Oklahoma (NCES, 2021). NCES (2021) has continued to conduct ongoing home surveys of device and internet access in the home. Since the initial survey, the number of families reporting access has continued to increase, but the issue has remained a concern for educators nationwide as some students have still been stranded without access to the internet and devices in the home (NCES, 2021). As of the survey conducted between March 17, 2021, and March 29, 2021, NCES (2021) reported that the national average of families with access to a computer for educational purposes has increased to 94%, and those with internet access have also increased to 94%. Although this increase is a significant improvement, approximately 6%, or 3.3 million, students in the United States still do not have regular access to a device or internet essential for learning in the distance learning platform (Bayern et al., 2020).

Likewise, Bayern et al. (2020) noted 40% of their respondents reported increased network connectivity issues that could not be resolved and thus prevented students from accessing regular distance learning applications. On April 27, 2020, the Federal Communications Commission (FCC), in partnership with the Department of Education, announced $16 billion in funding for remote learning. The purpose of these funds was to support states in purchasing technology equipment, hardware, software, and connectivity to support students in learning remotely (FCC, 2020). Although this funding was a significant contribution to supporting the

expansion of technology in education, the amount of stress placed on the standing infrastructure was exacerbated (Bayern et al., 2020). Even with this wave of investments into educational technology, the FCC (2020) reported an estimated 10 million students remained without internet connectivity in rural regions. Thus, there is still a significant need for continued investment in technology infrastructure to support distance learning in underserved areas, especially in rural regions.

Absenteeism and Achievement

Since the adoption of No Child Left Behind (NCLB) in 2002, school districts nationwide have redirected their attention to ensuring student achievement. As part of NCLB, schools were accountable for ensuring, monitoring, and reporting student progress in reading, math, and graduation rates (Bauer, 2018). In 2015, NCLB was revoked and replaced with Every Student Succeeds Act (ESSA). In addition to assessment-based accountability, ESSA required states to monitor a calculation of student success or school quality. Chronic absenteeism appeared to be a valuable measurement for predicting school quality and student success among the recommended categories (Tulsa, 2021).

Regular attendance at school is a main factor in determining success in school. Not only can regular attendance help students gain academic advantages over their absent peers, but it can also help to further strengthen patterns of professional obligations required for success in life after school (NCES, 2009). Chronic absenteeism, or students who miss 10% or more of a school year, has been a frequent concern for school districts nationwide (California Department of Education, 2020). According to the California Department of Education (2020), during the 2018–2019 school year, more than 12% of kindergarten through 12th grade public school students were considered chronically absent, and this increased to 25% for at-risk populations

like homeless youth. A study conducted by the California Department of Education and School Innovations and Achievement (2021) found that these percentages continued to increase nationwide. The chronic absenteeism average in California increased from 11.2% in October 2019, to 18% in October 2020, to 27.4% in October 2021.

Research by Chang and Romero (2008) demonstrated just how dire addressing the issue of absenteeism in younger children was due to their stunted academic achievement resulting from missing excess school days. Kindergarten students considered chronically absent have shown lower levels of achievement in math, reading, and general knowledge (Chang & Romero, 2008). During these foundational years of education, students develop essential skills necessary for later success in school. Characteristics such as seeing attendance as significant for educational promotion help prepare younger students for success and development of connectedness to the school environment. The feeling of belonging and connection to the school through regular established relationships allows a student to create a desire to attend more frequently (Great Schools Staff, 2011). Frequent absences also negatively affect all learners when teachers must redirect their attention to students who are further behind than students with regular attendance. These instances of redirection remove opportunities for others to progress in the curriculum and slow the learning process. It is essential to address chronic absences for younger students because these habits continue to form and progress as the student moves into middle and high school, and their likelihood of graduating high school is significantly reduced if these attendance patterns continue (NCES, 2009). Additionally, research has shown that students have missed essential instruction when they have not received regular instruction from their teachers (Chang & Romero, 2008).

Although educators projected that returning to in-person instruction would help to correct the high levels of student absenteeism, schools have continued to experience higher than normal levels of absent students due to the COVID-19 pandemic. Boutzoukas et al. (2022) reported that teachers once again had to learn to adapt to their new environment with students coming and going from class as COVID-19 positives became frequent. The COVID-19 pandemic has exacerbated familial resources, and families have had to prioritize basic needs over their student's attendance. A study conducted by Zubrick (2014) examined the attendance patterns of students and reviewed the academic growth trajectories of students in comparison to their attendance rates. Zubrick (2014) determined that in all subgroups of students, strong evidence showed every day of attendance in school mattered and contributed toward a child's learning. Additionally, Zubrick (2014) posed that not only did the absences directly correlate to student achievement in future years, but there was also a connection between student achievement and authorized versus unauthorized absences. Zubrick showed that students with unauthorized absences showed a direct correlation with lower achievement scores overall (Zubrick, 2014). Klein et al. (2022) shared the same conclusion as Zubrick in determining that not every absence has an equivalent effect on decreased student achievement. Klein et al. (2022) offered that high-risk absences due to family dynamics may have more significant effects on a student's long-term well-being and mental health, which also harm a student's ability to perform academically.

Decreased Engagement and Loss of Learning

Throughout the school closures related to the COVID-19 global pandemic, school districts faced challenges in tracking student attendance, class engagement, and participation. Accurate attendance tracking became a steep challenge for schools due to the rapid transition to working remotely. School districts relied much more on parents to independently report

attendance through email and voicemails as school offices tackled the challenge of assisting office staff in communicating with families from home and on personal phone lines and devices. In addition to communication challenges with school offices, teachers reported continuously decreasing participation and student engagement in the virtual classroom (Alice, 2021). Mrs. Montgomery-Gentry, a California teacher, reported in an interview with Alice (2021) that in her high school economics classroom, only eight students out of twenty-seven students logged into the class and would turn on their cameras. Of those students, most would have the cameras pointing towards the ceiling. Most of her interactions with students involved her speaking to the class and asking for a response in the chatroom because when she asked for student responses, there would be silence. A student in Mrs. Montgomery-Gentry's class, Daniel Lupian Ceja, reported the entire experience in distance learning caused him to lose his motivation and drive, making the classwork seem empty (Alice, 2021).

School districts faced a challenge in holding students accountable for participating in school during the pandemic. The challenge increased when the definition of attendance was modified by California Governor Gavin Newsom. The new expectations prepared by the California Department of Education (2021) reported that students were marked present for attendance if they engaged with the class in any way including: (a) logging into the virtual learning platform, (b) communicating with their teacher through virtual learning, or (c) submitting asynchronous work. CBS Sacramento (Watts, 2021) found similar results when analyzing northern California schools. Watts (2021) shared that not only did students struggle to participate in the learning provided virtually by schools, but also more students failed. Of the schools surveyed, one third of the students had failed at least one class during the 2019–2020 school year, and more than 40% had earned at least one D or F during the grading period.

Research conducted by Domina et al. (2021) identified which students were more prone to disengaging from distance learning and thus had a more significant loss of learning due to the transition to distance learning. The study surveyed parents in large school districts to evaluate effective tools and strategies that were used to engage their students. This study was used as a predictive measure to try and better identify students that may have been more prone to learning loss over breaks such as the school closures during the COVID-19 global pandemic. Domina et al. (2021) offered three potential targets to address as schools look to address student engagement in distance learning: (a) household access to materials and technology, (b) school programs and instructional strategies, and (c) family social connection to the school and student peers. Significantly, Domina et al. (2021) found that when each of these categories was addressed independently, the predictive nature that a student regularly engaged in daily virtual instruction was increased.

The pandemic caused decreased engagement and loss of learning for many students in virtual learning environments. The removal of face-to-face interaction established a sense of fluidity in the learning opportunities and allowed students simple opportunities to disengage. Furthermore, students struggled with accessing learning lessons and classwork, and it was easier for them to avoid learning opportunities altogether. Teacher expectations for engagement and participation did not change as they made the transition to virtual learning. Therefore, teachers needed to be cognizant of student learning styles and modify their expectations of engaged learning in the virtual setting (Morin, n.d.).

The study conducted by Domina et al. (2021) provides valuable insight into the factors that contribute to student engagement and learning loss during distance learning. By surveying parents in large school districts, the study identified three potential targets for schools to address

in order to improve student engagement: household access to materials and technology, school programs and instructional strategies, and family social connection to the school and student peers. According to Domina et al. (2021), addressing each of these categories independently increases the predictive nature that a student will regularly engage in daily virtual instruction. This highlights the importance of addressing not only the technological and instructional aspects of distance learning, but also the social and emotional connections that students have with their school and peers. By taking a comprehensive approach to addressing student engagement during distance learning, schools may be better equipped to prevent learning loss and support student success in the virtual classroom.

Detrimental Effects of Extended Breaks from School

During the COVID-19 global pandemic, millions of students missed significant amounts of direct instruction during the transition to distance learning and the return to in-person learning. Students missed opportunities to learn for an extended time due to various reasons, such as limited access to technology, family issues, disconnectedness from peers, and frustrations with the instructional method (Needham, 2020). Studies have analyzed the overall effects of students having extended breaks from school to determine how much learned information was lost over extended gaps in education.

For instance, Kuhfeld et al. (2019) reviewed the Northwest Evaluation Association (NWEA) MAP Growth reading and mathematics assessments from the 2016–2017 and 2017–2018 school years to explain the process of learning loss over extended breaks. The study included over 3.4 million students from all 50 states in kindergarten to eighth grade. These assessments were administered in the fall and spring to measure student progress during the school year and summer months. Kuhfeld et al. (2019) found that between 70% to 78% of

kindergarten through fifth-grade students experienced learning loss in mathematics and 62% to 73% of students in reading. Notably, students experienced the most significant drop during the summer between fifth and sixth grade, with 84% of students experiencing a drop in mathematics.

Similarly, Quinn and Polikoff (2017) studied the assessments in mathematics and reading of over 500,000 students in Grades 2 through 9. The study found that on average, students' achievement scores declined over summer vacation by one month's worth of the school year learning (Quinn & Polikoff, 2022). Like Kuhfeld et al. (2019), Quinn and Polikoff (2017) also determined that there was a sharper decline in learning loss in mathematics than in reading.

Atteberry and McEachin's (2021) study used a wide data array from the Northwest Evaluation Association to evaluate summer learning loss. They found that over a 5-year evaluation, the average student lost between 17% and 28% of their school-year gains in English language arts. In mathematics, the findings were more significant, with the average student losing 25% to 34% of the school year during the 3-month summer break. Additionally, of the students that exhibited learning loss, 52% of students showed loss of learning for 5 consecutive years, resulting in an overall annual learning loss of 39% in English language arts (Atteberry & McEachin, 2021). Atteberry and McEachin's findings were similar in mathematics, suggesting a concerning conclusion that learning losses seemed to accumulate among the same students, and over time, they could have a detrimental effect on the student's overall ability to achieve academically.

Overall, these learning loss trends demonstrate a significant concern for the academic achievement of students who exhibit consistent learning loss during the summer months. Furthermore, the same student groups seem to show a repetitive nature of loss over months when schools are not open, and they are not actively engaged in learning. Further research is needed to

determine if these same student groups were actively participating in virtual learning sessions offered during distance learning. As such, one key trend has emerged as I reviewed the literature on student learning loss and extended breaks: the more time students have been removed from traditional schooling, the more they have lost and need to recoup through interventions.

Expected Outcomes in the Traditional Instructional Setting

Covid-19 and the mandated school closures forced public education systems to transition without warning into a digital instructional modality at a scale that has never been done before. In the traditional school setting, studies have been conducted to identify potential relationships between student demographics and the role they have on student achievement. Spencer et al. (2001) determined that as students mature and begin understanding their developmental ethnic identity, the student's development may begin to help or harm the student's growth in the school setting. Spencer et al. (2021) found that these components are significant in a student's educational success because if not well developed, there will be a negative effect on school engagement and academic self-efficacy. Like Spencer et al. Wakefield and Hudley (2007) studied the effects of self-identity and its overall effect on student growth. Wakefield and Hudley (2007) observed that youth who develop a strong sense of self-identity regardless of ethnicity were positively correlated with the strong academic performance. Yasui et. al (2004) agreed with these determinations by comparing a group of high-risk Caucasian and African American students to grade level peers that were academically successful. Yasui et. al (2004) found that the at-risk students struggled in the academic setting and were more negatively affected by negative stereotypes than the students that performed proficiently in the academic setting. Ethnic identity and academic achievement among minority groups was further reviewed by Worrell (2007). Worrell (2007) found contrasting results between minority students and Caucasian students. In

the study, Worrell (2007) found that high levels of ethnic identity were significant in predicting the success of students that identified as African American, Asian American or Hispanic. In comparison, Worrell (2007) found that identifying with their ethnic group was insignificant for Caucasian students and played no connection to be a predictor in the academic setting.

Additional factors that have been considered to contribute to student academic deficiencies are student gender and parent socio-economic status. Slaughter (2007) studied the reading achievement scores in two Texas school districts to determine if gender, ethnicity and/or parent income levels play a significant role in achievement of the students. Slaughter (2007) found that the parent income level was indicative and predictive in nature to a student's success at school. This relationship is significant for all students due to the continued widespread income gap that has developed throughout the country. Slaughter (2007) also found that ethnicity was not a contributing factor in the results of the study, however, gender did demonstrate a significant relationship and predictor of success in these Texas schools. The results of this study showed that not only were female students reading scores higher, but the female students were also found to be from more affluent families which may have had an unintended effect on the results of the study.

The role of gender in academic achievement, particularly in mathematics and English language arts, has been a subject of extensive research. Traditional findings reveal that males tend to outperform females in mathematics, while females have a stronger performance in English language arts. This pattern is supported by both empirical data and theoretical explanations. Hyde and Mertz (2009) analyzed data from international assessments, suggesting that, on average, males tend to perform better than females in mathematics. This was further confirmed by Else-Quest, Hyde, and Linn (2010) in their cross-cultural meta-analysis. Consistent

with these findings, Spelke (2005) provided evidence indicating that while both genders exhibit similar innate abilities in mathematics, males tend to perform better in mathematics tests. Hyde et al. (2008) furthered this evidence, revealing that while females performed comparably to males in elementary and middle school mathematics, males outperformed females in high school.

Reilly and Neumann (2013) discussed gender differences in spatial ability, a skill related to mathematics performance, and explored the potential implications of these differences for gender gaps in STEM fields. Ceci, Williams, and Barnett (2009) similarly observed that males outnumber females in the highest scoring range of high-level mathematics performance. Furthermore, Penner (2008) discussed the influence of socio-cultural attitudes towards gender roles, arguing they can significantly influence the differences in mathematics performance between males and females.

In contrast, Hyde and Mertz (2009), Else-Quest et al. (2010), and Reilly and Neumann (2013) suggested that females tend to perform better than males in English language arts. This observation was supported by a report from the National Assessment of Educational Progress (2019), which revealed that female students in the United States outperformed males in reading assessments across all age groups. Morgan, Farkas, Hillemeier, and Maczuga (2016) further revealed in their longitudinal study that girls were more proficient in reading than boys as early as kindergarten and that this advantage persisted through elementary and high school. Conclusively, the literature suggests that gender differences exist in academic achievement in mathematics and English language arts, shaped by a combination of cognitive abilities, socio-cultural influences, and individual motivation and values.

Abbott and Joireman (2001) conducted further research to examine the role of ethnicity and socio-economic status in predicting student achievement. They concluded that ethnicity should not be considered an influential factor. Rather, there is an overshadowed connection between ethnicity and income, which is the overall contributing factor to predicting student achievement. According to Abbott and Joireman, non-Caucasian students are overwhelmingly the majority of students found within poverty or with low incomes. This idea is supported by Camara and Schmidt's (1999) study, where they analyzed student performance data for the College Board to identify factors that significantly affect a student's ability to score highly on standardized exams. Camara and Schmidt utilized data provided by the National Assessment of Educational Progress (NAEP). From this study, the researchers found that both ethnicity and parental financial standing significantly predicted the student's ability to perform at the proficient level on the exam. The study found that nearly 50% of white students and 40% of Asian American students scored in the proficient range in comparison to 21% of African American and 30% of Hispanic students (Camara & Schmidt, 1999). In support of the conclusion by Abbott and Joireman, Camara and Schmidt (1999) recommended that financial status and education level of the parents play a large role in predicting student achievement. The researchers utilized SAT scores to evaluate student proficiency. As a result, they found that Caucasian students outperformed all other ethnicities within the same socio-economic grouping as their peers. This result was also mirrored in the category for parental education level. Camara and Schmidt (1999) concluded that students' higher levels of socio-economic standing far outperform students from lower socio-economic standings. Thus, like Abbott and Joireman, this study concluded that the higher percentage of students from lower socio-economic groups who

also identify as non-Caucasian in ethnicity have lower achievement levels than their Caucasian peers.

Summary

The review of the literature indicates a significant need for additional research into the long-term academic deficits resulting from COVID-19-related school closures. While historical research has identified predictable relationships between student demographics and academic achievement in traditional instructional settings, there is some disagreement among researchers regarding the predictive relationship between ethnicity and student achievement. Furthermore, it remains unclear if these trends hold true in the context of prolonged distance learning resulting from school closures. Given the unpredictable nature of the closures, the results of student assessments may not follow predictable patterns seen in previous studies.

The literature review identified several factors contributing to potential learning loss among students, including lack of engagement or participation in distance learning, limited access to technology or the internet, chronic absenteeism, and continued absences after returning to in-person instruction. While research is ongoing, it is becoming clearer that the COVID-19 pandemic has had a significant effect on student academic achievement. As such, it will be important for educational leaders to use the data and conclusions obtained from future studies to develop and implement appropriate interventions and curriculum that address the specific needs of affected students.

Chapter 3: Methods

As students have resumed their first full academic year of relative normalcy since the COVID-19 global pandemic began, school district administration and staff have continued to struggle with adjusting to constantly changing guidance from the Center for Disease Control (CDC) and regional departments of health (Stone & Huang, 2022). With updated guidelines from the CDC, children have been eligible to return to school much sooner after exposure to a COVID-19 positive individual (Center for Disease Control and Prevention, 2021). Additionally, increased funding for expanded COVID-19 testing at schools in California will allow students with symptoms to receive a COVID-19 test and, if negative, return to the classroom for learning within the same day, thus minimizing the loss of instructional minutes (California Department of Public Health, 2022). However, students who are COVID-19 positive may still lose up to 10 days of instruction before they are eligible to return to the classroom for direct instruction (Center for Disease Control and Prevention, 2021). As students continue to test positive for COVID-19, their potential loss of learning and decrease in received instructional minutes continues to increase.

The continued loss of instructional minutes due to COVID-19 exposure and infection further exacerbates the student learning loss that occurred as a result of the mandated school closures (U.S Department of Education, 2022). As school districts work tirelessly to make up for what was lost during the school closures, students continue to miss school due to COVID-19. For this reason, it is important for educators to understand just how far students regressed during the extended school closures (Kuhfeld et al., 2022). Kuhfeld et al. (2022) point out that although we are analyzing the effects of school closures during the 2019-2020 school year, students continue to experience missed instruction due to this virus, and this will be an ongoing battle for school

districts for years to come. Completion of this study will offer educators a better understanding of what and who should be prioritized in terms of intervention development. Kuhfeld et al. (2022) began evaluating the functionality of interventions to begin addressing the learning gaps that are becoming apparent in the classroom. Additionally, the measures will allow educators to have a newly established baseline for student analysis. Further research will allow educators to use this research to determine whether growth was made.

This chapter includes a plan for conducting the current study regarding whether the mandated school closures due to the COVID-19 global pandemic have had a significant effect on student learning loss. The following research design is composed of the following sections: research questions, research design, sample/population, data collection, and data analysis.

Research Questions

With approval, I will conduct this research using the Performance Matters data system developed by the Modesto City Schools Information and Educational Technology Services (IETS). Performance Matters will be used with permission from Modesto City Schools leadership to extract student assessment information on the following research questions:

- Research Question 1: To what extent did changes in instructional modality affect students' English language arts (ELA) scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?
- Research Question 2: To what extent did changes in instructional modality affect students' mathematics scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?

- Research Question 3: Is there a relationship between demographic attributes (i.e., age, socio-economic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Research Question 4: Is there a relationship between demographic attributes (i.e., age, socio-economic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Research Question 5: Is school level (i.e., elementary or secondary) predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Research Question 6: Is school level (i.e., elementary or secondary) predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

Research Design

This study will utilize a nonexperimental, descriptive secondary analysis to examine the effect of long-term school absences on student performance in English Language Arts (ELA) and Mathematics. Secondary data analysis is the most appropriate approach for this research as the available state testing data are the most relevant available testing data since the school closures. Additionally, these data have been validated by the California Department of Education and Modesto City Schools district prior to access for this study, adding an additional level of security and trust in the outcome (Crossman, 2019). Regression analysis will be utilized as an appropriate

tool for this study to determine which student attributes (variables) demonstrate significance in their effect on student achievement deficits (Gallo, 2022).

In this case study, the researcher will review the statewide testing statistics obtained through student achievement measures on the CAASPP during the 2018–2019 and 2021–2022 academic years. Prior research has established that frequent absenteeism is a high-frequency indicator that students will likely experience decreased academic achievement over time (Center for Research in Education and Social Policy, 2018; Chang & Romero, 2008; Ford, 2019). However, research has yet to offer a quantifiable measure of California student achievement from statewide assessments before and after the mandated school closures due to the pandemic.

The goal of this study is to better understand the potentially detrimental effects of school closures without an appropriately prepared contingency plan for learning. The research process has been designed to be as generalizable as possible. The obtained data will be analyzed using descriptive statistics and presented in both a written and visual format. Individual students with incomplete measures will be excluded from the analysis to ensure accurate measures of the data sets. This exclusion will ensure the accuracy of results by analyzing only the scores of students who could fully complete the English language arts and mathematics portions of the assessment during the studied academic years.

Sample/Population

Due to the number of students educators have identified as educationally delayed (Turner, 2022), it is necessary to continue to target and analyze the learning loss that resulted from the school closures related to the COVID-19 global pandemic. Using the population of approximately 10,500 qualifying target students, the researcher will expand what is known about the effects of learning loss during school closures in the Modesto City School district. The

researcher has chosen the sixth, seventh, eighth, and 11th grade student population to provide a more robust understanding of the adverse effects of school closures on elementary and secondary school students. Additionally, the target population offers consistent assessment data from the CAASPP obtained during the 2018–2019 and 2021–2022 academic years. The gap in school years was due to the mandated school closures. During the 2019-2020 school year, the state of California did not hold statewide assessments. Additionally, the 2020-2021 school year yielded minimal data, as testing was optional and held virtually. Many students did not participate in this assessment due to poor attendance or technical challenges that occur because the state testing operating systems were not fully tested for remote assessments.

Data Collection

After acquiring approval from Marshall University's and Modesto City Schools institutional review boards, the researcher will be granted access to all student assessment data in Performance Matters. The secondary data analysis will begin with Performance Matters using the provided district login credentials. Performance Matters is an assessment score database that communicates directly with the California Educator Reporting System (CERS). CERS is a platform created by the California Department of Education as a resource for educators to access and export assessment data for their student population. Modesto City Schools regularly exports CERS data to ensure accurate assessment data are available for frequently changing school enrollments. The initial data analysis will begin by selecting the appropriate report titled Baseball Card Report within Performance Matters. The State Test Results folder will be selected. The subfolder titled SBAC – ELA/Literacy and SBAC – Math will be selected. To ensure accuracy in extracting the assessment data, evaluating one subject matter at a time is essential. For this secondary analysis, each data set will be studied individually. ELA will be extracted

first, followed by mathematics. Under the SBAC-ELA/Literacy folder, the academic years of 2018–2019 and 2021–2022 will be selected. Next, the grade levels of interest and month of assessment will be selected. Each student that completed the assessment in both 2018–2019 and 2021–2022 will be displayed with their overall scale scores in a side-by-side comparative view. At this point, students without scores for both academic periods in both ELA/literacy and mathematics will be filtered out and removed from the overall analysis. Prior to extraction and anonymization of the data, student filters will be applied to include SES, sex, Students with disabilities, and ethnicity. The filters are essential to the data analysis process to determine whether there are any differences that exist among the effects of the school closures on student achievement. These data will be extracted into Microsoft Excel for analysis and exported to the current version of SPSS. The previous steps will be repeated for the mathematics comparison. Data extraction will remove all identifiable student information to ensure anonymity and protect student privacy.

After organizing the Excel spreadsheet, an analysis will be conducted to evaluate assessment measures pre-and post-COVID-19. The data will be sorted by student to show how each student performed before and after the Covid-19 global pandemic related school closures. The data will be presented individually as well as in the identified student attribute groups (i.e., SES, sex, race, and ethnicity). The analysis will conclude by determining whether there are any significant relationships between the dependent variables of student assessment scores and selected student attributes.

Data Analysis

The data will be obtained with permission from the researcher's school district and examined using a multiple regression analysis. The multiple regression analysis is the best model

for this data set given its continuous dependent variable (i.e., test scores) and multiple dichotomous independent variables (i.e., SES, sex, Students with Disabilities, and/or ethnicity) (Jordan, 2021). Additionally, the Kolmogorov-Smirnov Test of Normality will be used to test for normality of the distribution of the dependent variable (Field, 2013).

An advantage of using secondary data analysis is the trust in reliable data (Cheng & Phillips, 2014). Since the utilized data sets will be obtained from the California Department of Education assessment database and extracted by Modesto City Schools into a private database for long term storage, there is a high level of confidence in the validation of the used assessment data (Ruggiano & Perry, 2019).

The data from the instrument items regarding the six research questions will be analyzed using a descriptive method. The purpose behind the incorporation of descriptive methods is to provide a better understanding of which student attributes, if any influenced academic deficiencies stemming from the COVID-19 related school closures (Dudovskiy, n.d.). The point-biserial correlation test will also be conducted to examine the relationship between the dependent variable and the dichotomous independent variables (Field, 2013). Paired-samples t-tests will be used to determine if there are significant differences between the pre- and post-COVID-19 scores (Girden, 1992). Incorporating these statistical tests will help provide a more comprehensive analysis of the data and strengthen the conclusions drawn from the study.

Chapter 4: Findings

Mandated school closures due to the COVID-19 global pandemic created numerous disruptions to the learning process for millions of students worldwide (Starr et al., 2022). Modesto City Schools was one of many school districts around the world that felt the burden of offering students support to help offset the lost time in the classroom.

The findings of this study will provide educators with knowledge regarding the potential prolonged academic effects of the COVID-19 global pandemic-related school closures on students' academic development in reading, writing, and math. The researcher aimed to understand if the mandated school closures during the COVID-19 global pandemic created disproportionate academic achievement deficits among various student attribute groups, including socioeconomic status (SES), gender, English learner status, students with disabilities (SWD), and ethnicity in Modesto City Schools. This study aimed to answer the following questions about the effects of COVID-19 mandated school closures on various student demographic groups and academic achievement:

- To what extent did changes in instructional modality affect students' English language arts (ELA) scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?
- To what extent did changes in instructional modality affect students' mathematics scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?
- Is there a relationship between demographic attributes (i.e., age, socio-economic status, gender, students with disabilities, and ethnicity) that were predictive of

changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

- Is there a relationship between demographic attributes (i.e., age, socio-economic status, gender, students with disabilities, and ethnicity) that were predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Is school level (i.e., elementary or secondary) predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?
- Is school level (i.e., elementary or secondary) predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

Sample and Demographics

Modesto City Schools consists of 36 public K–12 school sites, comprising 22 elementary school sites, 5 junior high school sites, and 9 high schools. In total, Modesto City Schools supports over 30,000 students from kindergarten through 12th grade. For this study, students from every school site were included from the sixth, seventh, eighth, and 11th-grade student populations. The only excluding factor was incomplete or missing testing records from the 2018–2019 or 2021–2022 school years. This dataset was separated into two individual studies by academic assessment area: mathematics and English language arts. The study of mathematics achievement analyzed 6501 students with complete assessment records. The study of English language arts achievement analyzed 6485 students with complete assessment records.

One student record was removed from the overall dataset due to missing demographic information. Thus, the mathematics-specific dataset included complete demographic records for

6501 students. Table 1 shows the grade level characteristics of the 6501 students analyzed for mathematical differences in achievement from the 2018–2019 and 2021–2022 academic years.

Table 1. *Grade Level Code*

Code	*n*	%
Elementary (0)	3537	54.4
Secondary (1)	2964	45.6

Table 2 shows the demographic characteristics of the 6501 students who were analyzed for differences in mathematical achievement between the 2018–2019 and 2021–2022 academic years.

Table 2. *Ethnicity Code*

Code	*n*	%
African American (0)	146	2.2
American Indian (1)	17	0.3
Asian (2)	350	5.4
Caucasian (3)	1133	17.4
Hawaiian/PI (4)	36	0.6
Hispanic (5)	4289	66.0
Multi-Racial (6)	530	8.2

Table 3 displays the demographic characteristics of the 6501 students who were analyzed for differences in mathematical achievement between the 2018–2019 and 2021–2022 academic years, specifically showing the number of students with and without disabilities.

Table 3. *Students with Disabilities Code*

Code	*n*	%
Students w/out disability (0)	5777	88.8
Students w/disability (1)	724	11.1

Table 4 displays the demographic characteristics of the 6501 students who were analyzed for differences in mathematical achievement between the 2018–2019 and 2021–2022 academic years, specifically showing the number of students classified as English language learners.

Table 4. *English Language Learner Code*

Code	*n*	%
Not an English learner (0)	5182	79.7
English learner (1)	1319	20.3

Table 5 displays the demographic characteristics of the 6501 students who were analyzed for differences in mathematical achievement between the 2018–2019 and 2021–2022 academic years, specifically showing the number of students classified as socioeconomically disadvantaged.

Table 5. *Economically Disadvantaged Code*

Code	*n*	%
Not socioeconomically disadvantaged (0)	2470	38.0
Socioeconomically disadvantaged (1)	4031	62.0

Table 6 displays the demographic characteristics of the 6501 students who were analyzed for differences in mathematical achievement between the 2018–2019 and 2021–2022 academic years, specifically showing the number of students classified by identified gender.

Table 6. *Gender Code*

Code	*n*	%
Male (0)	3334	51.3
Female (1)	3156	48.5
No gender (2)	11	0.2

Table 7 displays the grade level characteristics of the 6485 students who were analyzed for differences in English Language Arts achievement between the 2018–2019 and 2021–2022 academic years.

Table 7. *Grade Level*

Code	*n*	%
Elementary (0)	3520	54.3
Secondary (1)	2965	45.7

Table 8 displays the demographic characteristics of the 6485 students who were analyzed for differences in English language arts achievement between the 2018–2019 and 2021–2022 academic years.

Table 8. *Ethnicity Code*

Code	*n*	%
African American (0)	146	2.3
American Indian (1)	17	0.3
Asian (2)	349	5.4
Caucasian (3)	1128	17.4
Hawaiian/PI (4)	37	0.6
Hispanic (5)	4281	66.0
Multi-Racial (6)	527	8.1

Table 9 displays the demographic characteristics of the 6485 students who were analyzed for differences in English Language Arts achievement between the 2018–2019 and 2021–2022 academic years, specifically highlighting the number of students with and without disabilities.

Table 9. *Students w/Disability Code*

Code	*n*	%
Students w/out disability (0)	5754	88.7
Students w/disability (1)	732	11.3

Table 10 displays the demographic characteristics of the 6485 students analyzed for differences in English Language Arts achievement between the 2018–2019 and 2021–2022 academic years, specifically the number of students classified as English language learners.

Table 10. *English Learner Code*

Code	*n*	%
Not an English learner (0)	5198	80.1
English learner (1)	1288	19.9

Table 11 shows the student demographic characteristics displaying the number of students who are classified as socioeconomically disadvantaged among the 6485 students who were analyzed for English language arts differences in achievement from the 2018–2019 and 2021–2022 academic years.

Table 11. *Economically Disadvantaged Code*

Code	*n*	%
Not socioeconomically disadvantaged (0)	2469	38.1
Socioeconomically disadvantaged (1)	4017	61.9

Table 12 shows the student demographic characteristics displaying the number of students classified by gender among the 6485 students who were analyzed for differences in English language arts achievement between the 2018–2019 and 2021–2022 academic years.

Table 12. *Gender Code*

Code	*n*	%
Male (0)	3322	51.2
Female (1)	3153	48.6

Statistical Test Selection

The researcher used four statistical tests to answer the research questions in this study. To answer each of the research questions, the researcher used a combination of tests including multiple regression, paired sample *t*-tests, point-biserial correlation, Independent t-tests and Kolmogorov-Smirnov's test of normality.

Variables

The dataset included independent dichotomous variables such as grade level (i.e., elementary and secondary), disability status, English learner status, and economically disadvantaged status. In addition, ethnicity and gender were included as nominal independent variables. The dependent continuous variables were the students' achievement measures in English Language Arts and Mathematics on the CAASPP from the 2018–2019 and 2021–2022 academic years. All variables were coded as either dichotomous or nominal, and Tables 1–12 show the coding used in parentheses next to the name of each individual variable.

Results

Results from the indicated statistical analyses are organized and presented by research question in the following sections. It is significant to note that for the 2021/2022 assessment years, the California Department of Education administered a shortened version of its standard assessment (Fensterwald, 2021). This modification aimed to ease students back into the process of state assessments, given that required assessments had not taken place since the 2018/2019

school year (Fensterwald, 2021). Further information on this modification will be reviewed as part of the findings in the following chapter.

Research Question 1

The closure of schools' overall effect on student academic achievement in the 2021–2022 academic school year was examined in the first research question. Three separate tests were conducted to test whether the change in instructional modality affected all students. To determine the effect on English Language Arts Scale scores between 2018–2019 and 2021–2022, a multiple regression was performed to obtain the mean averages and standard deviation of student performance. The mean score showed a significant increase from 2478.82 in 2018–2019 to 2523.58 in 2021–2022. However, the standard deviation also increased from 117.633 to 120.101, indicating greater variability in the scores in 2021–2022 compared to 2018–2019. The demographic variables analyzed remained consistent across both years, and their means did not change significantly, indicating similar performance in English language arts across all demographic groups. See Table 13 and 14 for these results.

Table 13. *Overall Student Achievement 2018–2019 in English Language Arts*

Code	*M*	*SD*	*n*
State/local by subject SBAC - ELA/Literacy Scale Score 2018–2019	2478.82	117.633	6485
Grade level code	.46	.498	6485
Ethnicity code	4.44	1.250	6485
Student with disability code	.11	.316	6485
English language learner code	.20	.399	6485
Gender code	.49	.503	6485
Economically disadvantaged code	.62	.486	6485

Table 14. *Overall Student Achievement 2021–2022 in English Language Arts*

Code	*M*	*SD*	*n*
State/local by subject SBAC - ELA/Literacy Scale Score 2021–2022	2523.58	120.101	6485
Grade level code	.46	.498	6485
Ethnicity code	4.44	1.250	6485
Student with disability code	.11	.316	6485
English language learner code	.20	.399	6485
Gender code	.49	.503	6485
Economically disadvantaged code	.62	.486	6485

The researcher conducted an ANOVA test and considered the model summaries to further understand the overall effect on student's achievement. The ANOVA test was essential for this study to determine whether there were significant differences in achievement scores among different groups of students. Specifically, the ANOVA test was used to analyze the differences in achievement scores between students with disabilities and those without, between students from different socio-economic backgrounds, between male and female students, and between students in different grade levels. In this study, ANOVA was appropriate because the research questions involved comparing means across multiple groups, such as comparing the means of achievement scores between students with disabilities and those without. The ANOVA test allowed for the identification of significant differences in achievement scores among different groups of students, which was important for identifying the groups that experienced disproportionate effects on their academic achievement during the school closures. This information was critical in making appropriate recommendations for addressing the widening gap in student achievement.

The ANOVA results for English language arts (ELA) Scale Score for both the 2018–2019 and 2021–2022 assessment years indicate that the regression model with demographic

variables was statistically significant. In the 2018–2019 assessment year, the regression model accounted for 51.2% of the variance in ELA Scale Score, while in the 2021–2022 assessment year, it accounted for 35.7% of the variance.

The model summary for the 2018–2019 assessment year showed that the regression model with demographic variables had a positive correlation with ELA Scale Score, with an *R* value of .716 and an R^2 value of .512. The adjusted R^2 value was also .512, indicating that the model's explanatory power was not significantly improved by adding additional predictors. The standard error of the estimate was 82.177, which suggests the average distance between observed and predicted ELA Scale Scores was relatively low.

For the 2021–2022 assessment year, the model summary showed that the regression model had an *R* value of .597 and an R^2 value of .357, indicating the model accounted for 35.7% of the variance in ELA Scale score. The adjusted R^2 value was also .356, indicating the model's explanatory power was not significantly improved by adding additional predictors. The standard error of the estimate was 96.359, which means the average distance between observed and predicted ELA Scale Scores was higher than in the 2018–2019 assessment year.

Overall, these findings suggest although the demographic variables included in the regression model are related to ELA Scale score in both assessment years, they may be less important in explaining overall student performance in 2021–2022 than they were in 2018–2019. Additionally, the lower R-squared value and higher standard error of the estimate in 2021–2022 suggest that there may have been a significant change in student performance between the two years. These findings are presented in Table 15–18.

Table 15. *Model Summary*[b]

Model	*R*	R^2	Adjusted R^2	*SE* of estimate	Durbin-Watson
1	.716[a]	.512	.512	82.177	1.962

Note. a. Predictors: (Constant), ED Code, Gender code, SWD code, Ethnicity code, grade level code, EL code

b. Dependent variable: State/local by Subject SBAC - ELA/Literacy Scale Score 2018–2019

Table 16. ANOVA[a]

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	45975932.632	6	7662655.439	1134.692	< .001[b]
	Residual	43746386.658	6478	6753.070		
	Total	89722319.291	6484			

Note. a. Dependent bariable: State/local by subject SBAC - ELA/Literacy Scale Score 2018–2019

b. Predictors: (Constant), ED code, Gender code, SWD code, Ethnicity code, Grade level code, EL code

Table 17. *Model Summary*[b]

Model	*R*	R^2	Adjusted R^2	*SE* of the Estimate	Durbin-Watson
1	.597[a]	.357	.356	96.359	1.930

Note. a. Predictors: (constant), ED code, Gender code, SWD code, Ethnicity code, Grade level code, EL code

b. Dependent variable: State/local by subject SBAC - ELA/Literacy Scale Score 2021–2022

Table 18. *ANOVA*[a]

Model		Sum of squares	*df*	Mean square	*F*	Sig.
1	Regression	33379032.407	6	5563172.068	599.158	<.001[b]
	Residual	60148129.894	6478	9284.985		
	Total	93527162.302	6484			

Note. a. Dependent variable: State/local by subject SBAC - ELA/Literacy Scale Score 2021–2022

b. Predictors: (constant), ED code, Gender code, SWD code, Ethnicity code, Grade level code, EL code

A paired samples *t*-test was conducted to compare the mean scores of English Language Arts achievement between 2 academic years. The paired samples t-test was necessary for this study to examine the differences in student achievement scores in English language arts and mathematics before and after the school closures. This statistical analysis was appropriate because it allowed for a comparison of the means of two related groups, in this case, the same group of students' scores before and after the school closures. By comparing the means of these two related groups, the paired samples t-test allowed the researcher to determine whether there was a statistically significant difference in student achievement scores before and after the school closures. The paired samples t-test was appropriate for this study because it minimized the effects of individual differences among students, such as demographic characteristics, by comparing the scores of the same group of students. This allowed for a more accurate comparison of student achievement scores before and after the school closures.

To determine whether the mean difference of the student achievement scores was statistically significant, the researcher conducted a paired-samples t-test. To use this test, four assumptions had to be met (Laerd 2015):

- There is a continuous dependent variable.
- There is an independent variable that is categorical with two related groups.
- There should be no significant outliers in the difference between the two related groups.
- The distribution of the differences in the dependent variable between the two related groups should be approximately normally distributed.

Because all these assumptions were either met or did not apply, the researcher proceeded to use IBM SPSS® Statistics Version 29 to run the analyses. Results from the paired-samples t-test found the mean difference between the scores was 44.7536, with a 95% confidence interval ranging from 42.7408–46.7664. The 5% trimmed mean was 46.2531 and the median was 48.0000. The variance was 6836.920 and the standard deviation was 82.68567. The range of scores was 747.00, with a minimum score of -370.00 and a maximum score of 377.00. The interquartile range was 106.00. The skewness of the distribution was negative, indicating a slight leftward shift, with a value of -.307. The kurtosis was positive, indicating a relatively peaked distribution, with a value of .630. Overall, the results suggest that there was a significant difference in the mean scores of English language arts achievement between the 2 academic years, with the scores in the 2nd year being higher on average than the scores in the 1st year. These results are presented in Table 19.

Table 19. *Paired Samples – English Language Arts difference in mean scores*

			Statistic	*SE*
Difference	Mean		44.7536	1.02677
	95% Confidence Interval for Mean	Lower Bound	42.7408	
		Upper Bound	46.7664	
	5% Trimmed Mean		46.2531	
	Median		48.0000	
	Variance		6836.920	
	Std. Deviation		82.68567	
	Minimum		-370.00	
	Maximum		377.00	
	Range		747.00	
	Interquartile Range		106.00	
	Skewness		-.307	.030
	Kurtosis		.630	.061

The researcher conducted an additional Kolmogorov-Smirnova test to evaluate the statistical distribution of achievement scores. The results of the analysis indicate that for both the academic years 2018–2019 and 2021–2022, the distribution of English language arts scores significantly deviated from a normal distribution (Kolmogorov-Smirnov test; 2018–2019: D = 0.032, df = 6485, p < .001; 2021–2022: D = 0.025, df = 6485, p < .001). Although the Kolmogorov-Smirnov statistic values were small, suggesting that the deviation from normality was not substantial, the large sample size of 6485 can still render small deviations significant. The results are presented in Table 20.

Table 20. Test of Normality – English Language Arts

	Kolmogorov-Smirnov[a]		
Scale	Statistic	*df*	Sig.
SBAC - ELA/Literacy Scale Score 2018–2019	.032	6485	<.001
SBAC - ELA/Literacy Scale Score 2021–2022	.025	6485	<.001

Research Question 2

The second research question examined the effect of the closure of schools on student academic achievement in mathematics, in the assessment conducted during the 2021–2022 academic year. To determine whether all students were affected by the change in instructional modality, descriptive statistics were obtained from the multiple regression analysis.

The researcher performed a multiple regression analysis to obtain the mean and standard deviation of student performance and determine the effect on SBAC Math Scale scores for the 2018–2019 and 2021–2022 academic years. To use this test, eight assumptions must be met (Laerd, 2015):

- There is one continuous dependent variable.
- There are two or more independent variables which are either continuous or categorical.
- There is independence of observations (i.e., independence of residuals).
- There is a linear relationship between the dependent variable and each of the independent variables and the dependent variables and the independent variables collectively.
- The data need to show homoscedasticity of residuals (equal error variances).
- The data must not show multicollinearity.
- There should be no significant outliers, high leverage points or highly influential points.
- Residuals need to be checked to ensure they are approximately normally distributed.

Because all these assumptions were either met or did not apply, the researcher proceeded to use IBM SPSS® Statistics Version 29 to run the analyses. Results from the multiple regressions led to an analysis that revealed a slight increase in the mean score from 2469.39 in 2018–2019 to 2479.98 in 2021–2022. However, the standard deviation increased from 116.498 to 120.164, indicating more variability in the scores in 2021–2022 than in 2018–2019. The study

also examined demographic variables, such as grade level, ethnicity, students with disabilities (SWD), English language (EL), gender, and economically disadvantaged (ED) codes, across both years. The means of these variables did not show significant changes, suggesting that all demographic groups performed similarly in Math across both years. Table 21 and 22 present the results.

Table 21. *Overall Student Achievement 2018–2019 in Mathematics*

Code	*M*	*SD*	*n*
State/local by subject SBAC – Math Scale score 2018–2019	2469.39	116.498	6501
Grade level code	.46	.498	6501
Ethnicity code	4.44	1.250	6501
SWD code	.11	.315	6501
EL code	.20	.402	6501
Gender code	.49	.503	6501
ED code	.62	.485	6501

Table 22. Overall Student Achievement 2021–2022 in Mathematics

Code	*M*	*SD*	*n*
State/local by subject SBAC – Math Scale score 2021–2022	2479.98	120.164	6501
Grade level code	.46	.498	6501
Ethnicity code	4.44	1.250	6501
SWD code	.11	.315	6501
EL code	.20	.402	6501
Gender code	.49	.503	6501
ED code	.62	.485	6501

The researcher conducted an ANOVA test and considered the model summaries to further understand the overall effect on student's achievement. The ANOVA results for the Mathematics Scale Score for both the 2018–2019 and 2021–2022 assessment years indicate that the regression model with demographic variables was statistically significant. In the 2018–2019

assessment year, the regression model accounted for 42.5% of the variance in Mathematics Scale Score, and in the 2021–2022 assessment year, it accounted for 23.6% of the variance.

The model summary for the 2018–2019 assessment year showed that the regression model with demographic variables had a positive correlation with Mathematics Scale Score, with an R value of .652 and an R^2 value of .425. The adjusted R^2 value was also .424, indicating that the model's explanatory power was not significantly improved by adding additional predictors. The standard error of the estimate was 88.417, which suggests that the average distance between observed and predicted Mathematics Scale Scores was relatively low.

For the 2021–2022 assessment year, the model summary showed the regression model had an R value of .486 and an R^2 value of .236, indicating that the model accounted for 23.6% of the variance in Mathematics Scale Score. The adjusted R^2 value was also .236, indicating that the model's explanatory power was not significantly improved by adding additional predictors. The standard error of the estimate was 105.064, which means that the average distance between observed and predicted Mathematics Scale Scores was higher than in the 2018–2019 assessment year.

These findings suggest although the demographic variables included in the regression model were related to Mathematics Scale Score in both assessment years, they may be less important in explaining overall student performance in 2021–2022 than they were in 2018–2019. Additionally, the lower R^2 value and higher standard error of the estimate in 2021–2022 suggest that there may have been a significant change in student performance between the two years.

The results for Mathematics Scale Score indicate the regression model with demographic variables was statistically significant in both assessment years. However, the lower R^2 value and higher standard error of the estimate in 2021–2022 suggest that the model's explanatory power

may have decreased, indicating a possible change in student performance between the two years. These results are presented in Tables 23–26.

Table 23. *Model Summary*[b]

Model	*R*	R^2	Adjusted R^2	*SE* of estimate	Durbin-Watson
1	.652[a]	.425	.424	88.417	1.932

Note. a. Predictors: (Constant), ED Code, Gender Code, SWD Code, Ethnicity Code, Grade Level Code, EL Code

b. Dependent Variable: State/Local by Subject SBAC – Math Scale Score 2018- 2019

Table 24. *ANOVA*[a]

Model		Sum of squares	*df*	Mean square	*F*	Sig.
1	Regression	37449208.138	6	6241534.690	798.403	<.001[b]
	Residual	50767033.132	6494	7817.529		
	Total	88216241.270	6500			

Note. a. Dependent Variable: State/Local by Subject SBAC – Math Scale Score 2018–2019

b. Predictors: (Constant), ED Code, Gender Code, SWD Code, Ethnicity Code, Grade Level Code, EL Code

Table 25. *Model Summary*[b]

Model	*R*	R^2	Adjusted R^2	*SE* of estimate	Durbin-Watson
1	.486[a]	.236	.236	105.064	1.948

Note. a. Predictors: (Constant), ED Code, Gender Code, SWD Code, Ethnicity Code, Grade Level Code, EL Code

b. Dependent Variable: State/Local by Subject SBAC – Math Scale Score 2021–2022

Table 26. *ANOVA*[a]

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	22172725.871	6	3695454.312	334.781	<.001[b]
	Residual	71683590.092	6494	11038.434		
	Total	93856315.963	6500			

Note. a. Dependent Variable: State/Local by Subject SBAC – Math Scale Score 2021–2022

b. Predictors: (Constant), ED Code, Gender Code, SWD Code, Ethnicity Code, Grade Level Code, EL Code

The results of the paired samples t-test for SBAC-Math Achievement Level showed a statistically significant difference ($t = 10.2518$, $p < 0.001$) between the academic years 2018–2019 and 2021–2022. The mean difference was 10.5818 with a standard error of 1.03253. The researcher can be 95% confident the true population mean difference falls within the range of 8.5577–12.6059, as indicated by the 95% confidence interval for the mean difference. The variance was 6930.886, and the standard deviation was 83.25194, while the minimum and maximum differences were -436.00 and 313.00, respectively, leading to a range of 749.00. The interquartile range was 110.00. The data had a slight negative skewness of -0.327 and a moderate positive kurtosis of 0.557.

These results suggest a notable improvement in math achievement levels in 2021–2022 compared to 2018–2019, with a mean difference of 10.5818. The 5% trimmed mean and median values were higher than the mean difference, indicating that some extreme values pulled the mean downwards. Across demographic variables such as grade level, ethnicity, SWD, EL, gender, and ED codes, there were no significant changes in means, suggesting that students across all demographic groups performed similarly in math across both years. The results are presented in Table 27.

Table 27. *Paired Samples – Mathematics*

			Statistic	*SE*
DIFFERENCE	Mean		10.5818	1.03253
	95% Confidence Interval for Mean	Lower Bound	8.5577	
		Upper Bound	12.6059	
	5% Trimmed Mean		12.1886	
	Median		14.0000	
	Variance		6930.886	
	Std. Deviation		83.25194	
	Minimum		-436.00	
	Maximum		313.00	
	Range		749.00	

The researcher conducted a Kolmogorov-Smirnova test to evaluate the statistical distribution of achievement scores. The results indicate that the distribution of math scores for both years was significantly different from a normal distribution, $p < .001$. The Kolmogorov-Smirnov statistic values for 2018–2019 and 2021–2022 were 0.048 and 0.028, respectively, which suggests the deviation from normality was relatively small. However, due to the large sample size of 6501, even small deviations from normality can be statistically significant. The results of the Kolmogorov-Smirnova test are presented in Table 28.

Table 28. *Test of Normality – Mathematics*

	Kolmogorov-Smirnov[a]		
Test	Statistic	*df*	Sig.
SBAC – Math Scale Score 2018–2019	.048	6501	<.001
SBAC – Math Scale Score 2021–2022	.028	6501	<.001

Research Question 3

The third research question examined whether there is a relationship between demographic attributes (e.g., age, socioeconomic status, gender, students with disabilities, and ethnicity) that predict changes in students' English language arts scores. Two statistical tests

were conducted to determine the overall effect of school closures on each demographic group and to identify any predictive characteristics for student achievement.

The researcher investigated the relationship between demographic variables and academic achievement among students in the United States. To accomplish this, the researcher examined the correlations between English language arts scale scores and demographic variables, including ethnicity, English language proficiency, gender, and socioeconomic status. Two years of data were analyzed: 2018–2019 and 2021–2022.

In 2018–2019, the results showed that ethnicity (r = -.175), EL code (r = -.309), gender code (r = -.480), and ED code (r = -.322) were negatively associated with English language arts scale scores. These findings indicate students from disadvantaged backgrounds, including those with limited English proficiency, low socioeconomic status, and specific ethnicities or genders, tended to perform worse on the English language arts portion of the SBAC assessment.

When comparing the results from 2018–2019 to 2021–2022, the researcher found the correlations were generally similar in direction and magnitude. Specifically, ethnicity (r = -.168), EL code (r = -.341), and ED code (r = -.303) had negative correlations. The correlation with gender code maintained similar with a positive correlation to a slightly higher positive correlation (r = .135 in 2021–2022 versus r = .113 in 2018–2019). The results are presented in Table 29 and 30.

Table 29. *Multiple Regression - Correlations*

		State/local by subject SBAC - ELA/ Literacy Scale score 2018–2019	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
Pearson correlation	State/local by subject SBAC – ELA/ Literacy Scale score 2018–2019	1.000	.549	-.175	-.309	-.480	.113	-.322
	Grade level code	.549	1.000	-.121	-.031	-.235	.014	-.215
	Ethnicity code	-.175	-.121	1.000	.011	.179	.009	.170
	SWD code	-.309	-.031	.011	1.000	.180	-.098	.074
	EL code	-.480	-.235	.179	.180	1.000	-.034	.218
	Gender code	.113	.014	.009	-.098	-.034	1.000	.008
	ED code	-.322	-.215	.170	.074	-.480	.113	-.322

Table 30. *Multiple Regression - Correlations*

		State/local by subject SBAC - ELA/Literacy Scale score 2021–2022	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
Pearson correlation	State/local by subject SBAC – ELA/Literacy Scale score 2021–2022	1.00	.323	-.168	-.341	-.439	.135	-.303
	Grade level code	.323	1.000	-.121	-.031	-.235	.014	-.215
	Ethnicity code	-.168	-.121	1.000	.011	.179	.009	.170
	SWD code	-.341	-.031	.011	1.00	.180	-.098	.074
	EL code	-.439	-.235	.179	.180	1.00	-.034	.218
	Gender code	.135	.014	.009	-.098	-.034	1.00	.008
	ED code	-.303	-.215	.170	.074	.218	.008	1.00

The researcher conducted a point-biserial correlation analysis to better understand the relationships between student demographics and achievement scores. The analysis showed the relationship between SBAC-English Language Arts Scale Scores and various demographic factors for the academic years 2018–2019 and 2021–2022. In both years, the correlations between SBAC-English Language Arts Scale Scores and the ethnicity code, SWD code, EL code and ED code were negative, and the correlation strengths were also weak but significant at the 0.01 level (2-tailed). However, the correlation strengths between SBAC-English Language Arts Scale Scores and these demographic factors were weaker in 2021–2022 than in 2018–2019. The positive correlation between SBAC-English Language Arts Scale Scores and Gender code remained relatively stable across the 2 years (slight increase in 2021/2022), with weak but significant positive correlations at the 0.01 level (2-tailed).

The data suggest the factors affecting English language arts achievement may have changed between the 2 academic years. The results of the biserial correlation analysis indicate demographic factors such as ethnicity, SWD, and EL may have had a weaker effect on English language arts achievement in 2021–2022 compared to 2018–2019. The results are presented in Tables 31 and 32.

Table 31. *Biserial Correlation ELA – 2018–2019*

		SBAC - ELA/ Literacy Scale Score 2018–2019	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
SBAC - ELA/Literacy Scale Score 2018–2019	Pearson correlation	1	.549**	-.175**	-.309**	-.480**	.113**	-.322**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001
	n	6485	6485	6485	6485	6485	6485	6485

Note. **. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 32. *Biserial Correlation ELA – 2021–2022*

		SBAC - ELA/ Literacy Scale score 2021–2022	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
SBAC - ELA/Literacy Scale score 2021–2022	Pearson correlation	1	.323**	-.168**	-.341**	-.439**	.135**	-.303**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	<.001	<.001

In English language arts, a statistically significant gender disparity emerged over the two academic years examined. In the 2018-2019 academic year, female students (M = 2492.04, SD = 118.35) significantly outperformed their male counterparts (M = 2466.03, SD = 115.36) on the State/Local by Subject SBAC - ELA/Literacy Scale Score, t(6472) = -8.953, p < .001, d = -.22. This trend persisted into the 2021-2022 academic year, wherein female students (M = 2539.96, SD = 117.12) again scored significantly higher than male students (M = 2507.86, SD = 120.78), t(6472) = -10.847, p < .001, d = -.27. These results suggest that female students consistently

performed better in ELA than male students across these two academic years. These results are presented in Table 33 and 34.

Table 33. *Independent t-tests – ELA 2018–2019*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – ELA Scale Score 2018–2019	0	3322	2466.03	115.365	2.002
	1	3152	2492.04	118.350	2.108

Table 34. *Independent t-tests – ELA 2021-2022*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – ELA Scale Score 2021-2022	0	3322	2507.86	120.777	2.095
	1	3152	2539.96	117.124	2.086

Research Question 4

The fourth research question examined if there was a relationship between demographic attributes (i.e., age, socioeconomic status, gender, students with disabilities, and ethnicity) that were predictive of changes in students' mathematics scores. Three statistical tests were run to determine the overall effect of school closures on each demographic group to determine if any characteristics were predictive in nature for student achievement.

The Pearson correlation coefficients revealed ethnicity showed a statistically significant correlation with math scores in both years, with a coefficient of .455 in 2018–2019 and .199 in 2021–2022. The data indicate students from certain ethnic groups performed better in math than others in both years, although the differences were not large.

The data also revealed a negative correlation between math scores and EL status and SWD status in both years, indicating students who were English learners or had disabilities tended to perform lower in math than those who were not. In 2018–2019, the coefficient for EL status was -.334 and for SWD status was -.183, while in 2021–2022, the coefficients were -.298 and -.148, respectively.

Gender did not show a significant correlation with math scores in either year, with coefficients of .028 in 2018–2019 and .011 in 2021–2022. However, ED status showed a moderate negative correlation with math scores in both years, with coefficients of -.336 in 2018–2019 and -.277 in 2021–2022. This indicates students from economically disadvantaged backgrounds tended to perform lower in math than those who were not.

The data showed certain demographic factors had an effect on math scores, with ethnicity, EL status, SWD status, and ED status showing a statistically significant correlation with math scores in both 2018–2019 and 2021–2022. The results are presented in Table 35 and 36.

Table 35. *Multiple Regression – Correlations*

		State/Local by Subject SBAC – Math Scale Score 2018–2019	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
Pearson correlation	State/Local by Subject SBAC – Math Scale Score 2018–2019	1.000	.455	-.183	-.334	-.429	.028	-.336
	Grade level code	.455	1.000	-.123	-.027	-.238	.014	-.218
	Ethnicity code	-.183	-.123	1.000	.009	.182	.012	.168
	SWD code	-.334	-.027	.009	1.000	.168	-.094	.074
	EL code	-.429	-.238	.182	.168	1.000	-.038	.221
	Gender code	.028	.014	.012	-.094	-.038	1.000	.011
	ED code	-.336	-.218	.168	.074	.221	.011	1.000

Table 36. *Multiple Regression – Correlations*

		State/Local by Subject SBAC – Math Scale Score 2021–2022	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
Pearson correlation	State/Local by Subject SBAC – Math Scale Score 2021–2022	1.000	.199	-.148	-.298	-.359	.011	-.277
	Grade level code	.199	1.000	-.123	-.027	-.238	.014	-.218
	Ethnicity code	-.148	-.123	1.000	.009	.182	.012	.168
	SWD code	-.298	-.027	.009	1.000	.168	-.094	.074
	EL code	-.359	-.238	.182	.168	1.000	-.038	.221
	Gender code	.011	.014	.012	-.094	-.038	1.000	.011
	ED code	-.277	-.218	.168	.074	.221	.011	1.000

The researcher conducted a point-biserial correlation to better understand the relationships between student demographics and the achievement scores. The biserial correlation analysis showed the relationship between SBAC-Math Scale Scores and various demographic factors for the academic years 2018–2019 and 2021–2022. The point biserial correlation was necessary for this study to determine the relationship between a binary variable (such as disability status or gender) and a continuous variable (such as achievement scores). It allowed the researcher to examine the strength and direction of the relationship between these variables, and to determine if the relationship was statistically significant. This type of correlation is particularly useful in educational research, as it allows for the examination of the relationship between categorical and continuous variables, which is often relevant in studies of student achievement. To use this test, six assumptions must be met (Laerd, 2017):

- There is a continuous dependent variable.
- The independent variable is dichotomous.
- The two variables are paired.
- There should be no significant outliers in the two groups of dichotomous variables in terms of the continuous variable.
- There is homogeneity of variances.
- The continuous variable should be approximately normally distributed for each group of the dichotomous variable.

Because all these assumptions were either met or did not apply, the researcher proceeded to use IBM SPSS® Statistics Version 29 to run the analyses. By using the point biserial correlation, the researcher was able to gain a better understanding of the effect of certain student characteristics on academic achievement, and to make more informed recommendations for

addressing disparities in achievement outcomes. In 2018–2019, the results indicated significant negative correlations between math scores and ethnicity, EL status, SWD status and ED status, while there were positive correlations between math scores and grade level and gender. The correlation coefficients ranged from .028* to .455**. However, in 2021–2022, the correlation coefficients decreased for all demographic variables, ranging from .011 to .199**, and all correlations remained significant at the 0.01 level (2-tailed). This suggests demographic variables had a weaker association with math scores in 2021–2022 than in 2018–2019. The results are presented in Table 37 and 38.

Table 37. *Biserial Correlation – Math 2018–2019*

		SBAC – Math Scale Score 2018–2019	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
SBAC – Math Scale Score 2018–2019	Pearson correlation	1	.455**	-.183**	-.334**	-.429**	.028*	-.336**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	.023	<.001
	n	6501	6501	6501	6501	6501	6501	6501

Note. **. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 38. *Biserial Correlation – Math 2021–2022*

		SBAC – Math Scale Score 2021–2022	Grade level code	Ethnicity code	SWD code	EL code	Gender code	ED code
SBAC – Math Scale Score 2021–2022	Pearson correlation	1	.199**	-.148**	-.298**	-.359**	.011	-.277**
	Sig. (2-tailed)		<.001	<.001	<.001	<.001	.370	<.001
	n	6501	6501	6501	6501	6501	6501	6501

Note. **. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Performance trends in mathematics differed slightly from those observed in ELA. In the 2018-2019 academic year, female students (M = 2472.24, SD = 115.07) exhibited statistically significantly higher scores on the State/Local by Subject SBAC - Math Scale Score compared to male students (M = 2466.44, SD = 117.58), t(6488) = -2.007, p = .045, d = -.05. However, in the 2021-2022 academic year, the gender gap in mathematics scores was not statistically significant. In this year, female students (M = 2481.21, SD = 116.52) scored slightly higher than male students (M = 2478.73, SD = 123.59), but this difference was not statistically significant, t(6488) = -.831, p = .406, d = -.02. Therefore, while female students outperformed male students in Mathematics in the 2018-2019 academic year, the gender difference was not significant in the 2021-2022 school year. These results are presented in Table 39 and 40.

Table 39. *Independent t-tests – Mathematic 2018-2019*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – Mathematics Scale Score 2018-2019	0	3334	2466.44	117.578	2.036
	1	3156	2472.24	115.069	2.048

Table 40. *Independent t-tests – Mathematic 2021-2022*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – Mathematics Scale Score 2021-2022	0	3334	2478.73	123.593	2.140
	1	3156	2481.21	116.525	2.074

Research Question 5

The fifth research question examined whether there was a relationship between demographic attributes (i.e., grade level) that were predictive of changes in students' English language arts scores. Two statistical tests were run to determine the overall effect of school closures on each grade level group to determine if any characteristics were predictive in nature for student achievement.

The multiple regression analysis was conducted to examine the relationship between ELA achievement levels and grade level in 2 separate years: 2018–2019 and 2021–2022. The results revealed a significant relationship between ELA scores and grade level. In both assessment years, grade level was a statistically significant predictor of ELA scores. For the 2018–2019 assessment year, the beta coefficient for grade level was .221, indicating for every increase in grade level, there was a corresponding increase of .221 in the ELA score. Similarly,

for the 2021–2022 assessment year, the beta coefficient for grade level was .180, indicating for every increase in grade level, there was a corresponding increase of .180 in the ELA score.

In 2018–2019, the R^2 value for the regression model with demographic variables was .512, suggesting that the model explained 51.2% of the variance in ELA scores. The adjusted R^2 value was also .512, indicating that the model's explanatory power was not significantly improved by adding additional predictors. However, in the 2021–2022 assessment year, the R^2 value for the regression model was .357, suggesting that the model explained 35.7% of the variance in ELA scores. The adjusted R^2 value was also .356, indicating that the model's explanatory power was not significantly improved by adding additional predictors.

Overall, the results suggest grade level was an important predictor of ELA scores for both assessment years, with a stronger relationship in 2018–2019. In 2021–2022, the relationship between grade level and ELA scores may have weakened, as indicated by the lower R^2 value. Nonetheless, the beta coefficient for grade level remained positive and statistically significant in both assessment years, highlighting the importance of considering grade level in predicting ELA scores. These results are presented in Tables 13–18.

The researcher conducted a point-biserial analysis to examine the effect of grade level on achievement scores in ELA during the 2018–2019 and 2021–2022 assessment periods. The results showed a significant positive correlation between scale scores and grade level in both years (r = .549** and r = .323**, respectively). These findings indicate students in higher grade levels tended to have higher scale scores in the SBAC-English language arts assessment. However, the correlation coefficient in 2021–2022 was lower than that of 2018–2019, suggesting a weaker association between grade level code and scale scores in the more recent assessment. The results are presented in Table 31 and 32.

An independent t-test was also conducted to delve deeper into the relationship between elementary and secondary students' ELA achievement scores across the two assessment years. In the 2018-2019 assessment year, elementary students had a mean score of 2419.53 (SD = 95.616), while secondary students had a significantly higher mean score of 2549.21 (SD = 101.414). This trend was consistent in the 2021-2022 assessment year, with elementary students achieving a mean score of 2488.02 (SD = 104.709) and secondary students again outperforming with a mean score of 2565.79 (SD = 123.504).

The t-test results showed a significant difference in ELA scores between the two groups, with secondary students scoring higher on average in both assessment years. Interestingly, the mean difference between the two groups decreased from 129.68 points in the 2018-2019 assessment year to 77.77 points in the 2021-2022 assessment year. This narrowing gap suggests that while secondary students consistently performed better, elementary students may have made gains over time, which could have been influenced by a variety of factors, such as the shortened length of the assessments due to pandemic-related modifications.

Overall, these findings provide further evidence that grade level plays a significant role in ELA achievement scores, with secondary students generally performing better than elementary students. However, the evolving nature of this relationship over time warrants further investigation. Future research could monitor these trends as educational systems continue to adapt and recover from the effects of the pandemic. These results are presented below in table 41 and 42.

Table 41. *Independent t-tests – English language arts 2018-2019*

	Grade Level Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – English language arts Scale Score 2018-2019	0	3520	2419.53	95.616	1.612
	1	2965	2549.21	101.414	1.862

Table 42. *Independent t-tests – English Language Arts 2021-2022*

	Grade Level Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – English language arts Scale Score 2021-2022	0	3520	2488.02	104.709	1.765
	1	2965	2565.79	123.504	2.268

Research Question 6

The sixth research question examined if there was a relationship between demographic attributes (i.e., grade level) that were predictive of changes in students' mathematics scores. Two statistical tests were run to determine the overall effect of school closures on each grade level group to determine if any characteristics were predictive in nature for student achievement.

The multiple regression analysis was conducted to investigate the relationship between grade level and mathematics scores for the years 2018–2019 and 2021–2022. The results revealed a significant relationship between mathematics scores and grade level. In both assessment years, grade level was a statistically significant predictor of mathematics scores. For the 2018–2019 assessment year, the beta coefficient for grade level was .239, indicating for every increase in grade level, there was a corresponding increase of .239 in the mathematics

score. Similarly, for the 2021–2022 assessment year, the beta coefficient for grade level was .180, indicating for every increase in grade level, there was a corresponding increase of .180 in the mathematics score.

In 2018–2019, the R^2 value for the regression model with demographic variables was .425, suggesting the model explained 42.5% of the variance in mathematics scores. The adjusted R^2 value was also .424, indicating the model's explanatory power was not significantly improved by adding additional predictors. However, in the 2021–2022 assessment year, the R^2 value for the regression model was .236, suggesting the model explained 23.6% of the variance in mathematics scores. The adjusted R^2 value was also .236, indicating the model's explanatory power was not significantly improved by adding additional predictors.

Overall, the results suggest grade level was an important predictor of mathematics scores for both assessment years, with a stronger relationship in 2018–2019. In 2021–2022, the relationship between grade level and mathematics scores may have weakened, as indicated by the lower R^2 value. Nonetheless, the beta coefficient for grade level remained positive and statistically significant in both assessment years, highlighting the importance of considering grade level in predicting mathematics scores. The results are presented in Table 21–26.

The effect of grade level on mathematics achievement scores during the 2018–2019 and 2021–2022 assessment periods was analyzed using a point-biserial analysis. The results showed a significant positive correlation between scale scores and grade level code in both years. In 2018–2019, the Pearson correlation coefficient between scale scores and grade level code was .455**, indicating a moderate positive relationship between the two variables. This suggests students in higher grade levels had higher scale scores in the SBAC-Math assessment. However, in 2021–2022, the Pearson correlation coefficient between scale scores and grade level code

decreased to .199**, indicating a weaker association between the two variables. This suggests that the effect of grade level on math performance may be less pronounced in the more recent assessment year. Tables 35 and 36 present these results.

In parallel to the study of English language arts, an independent t-test was employed to further analyze the differences between elementary and secondary students' mathematics achievement scores across the two assessment years. During the 2018-2019 assessment year, elementary students had a mean score of 2420.83 (SD = 84.102), while secondary students scored significantly higher with a mean of 2527.34 (SD = 123.114). This pattern was consistent in the 2021-2022 assessment year, with elementary students achieving a mean score of 2458.13 (SD = 108.541) and secondary students continuing to outperform with a mean score of 2506.05 (SD = 127.933).

The t-test revealed a statistically significant difference in mathematics scores between the two groups for both assessment years, with secondary students consistently achieving higher scores. However, the mean difference between the two groups noticeably decreased from 106.515 points in the 2018-2019 assessment year to 47.918 points in the 2021-2022 assessment year. This diminished gap suggests that while secondary students consistently performed better in mathematics, elementary students may have made relative gains over time. Factors such as the reduced length of the assessments due to pandemic-induced changes may have influenced this trend. These results are presented below in Table 43 and 44.

Table 43. *Independent t-tests – Mathematics 2018-2019*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – Mathematics Scale Score 2018-2019	0	3537	2420.83	84.102	1.414
	1	2964	2527.34	123.114	2.261

Table 44. *Independent t-tests – Mathematics 2021-2022*

	Gender Code	N	Mean	Std. Deviation	Std. Error Mean
SBAC – Mathematics Scale Score 2021-2022	0	3537	2458.13	108.541	1.825
	1	2964	2506.05	127.933	2.350

Summary

After analyzing the data presented in this chapter, the researcher hypothesized that the observed changes in overall student achievement in English language arts and mathematics between the 2018–2019 and 2021–2022 assessments might be attributable to shifts in instructional modality. However, it is important to consider all variables when examining changes in individual student achievement. Additionally, the researcher identified certain student demographics that predicted student achievement during the gap in assessment periods. These findings demonstrate the interrelated nature of student demographics and how identifying multiple demographics may affect overall academic performance in areas of assessment. Furthermore, the researcher observed statistically significant differences in performance for student grade levels before and after school closures, highlighting the implications of learning achievement for younger students. The analysis also revealed a decreasing discrepancy between

grade level student achievement before and after school closures, underscoring the significant role of returning to in-person learning. Additionally, traditional causes for decreased instructional benefit such as ethnicity, language proficiency, disability status, and socioeconomic status still experienced a widening in the educational gap. Lastly, this study found gender to have a significant finding in that females outperformed male students in both English language arts and mathematics. This result is outside traditional research findings where male students typically outperform female students in mathematics. The following chapter discusses these findings, their implications, and recommendations for future study.

Chapter 5: Discussion

This study aimed to explore the relationship between student demographics and academic achievement in English Language Arts and Mathematics before and after school closures in the Modesto City Schools district. The study examined changes in student achievement over time, identified demographic predictors of achievement, and explored the effect of grade level on student performance. Prior research has shown that various demographic factors, such as sex, ethnicity, and socioeconomic status, can affect student achievement (McFarland et al., 2018; Spector, 2022). Additionally, school closures due to the Covid-19 pandemic have raised concerns about the potential negative effects of long-term removal from in-person learning on student learning (Kuhfeld et al., 2021; Maldonado & DeWitt, 2020). To investigate these factors, the researcher analyzed approximately 6,500 students in English language arts and Mathematics performance to identify any predictive relationships that developed in relationship to the Covid-19 mandated school closures. The researcher extracted the data for this study from CERS (California Educator Reporting System) after it was merged into the Modesto City Schools database, known as Performance Matters. Subsequently, the researcher utilized the extracted data to analyze the students' achievement scores in English language arts and mathematics both before and after the mandated school closures due to Covid-19.

To address the research questions, the following analyses were conducted:

• Research Question 1: To what extent did changes in instructional modality affect students' English language arts (ELA) scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?

• Research Question 2: To what extent did changes in instructional modality affect students' mathematics scores on the 2021–2022 California Assessment of Student Performance and Progress (CAASPP) as compared to the 2018–2019 CAASPP?

• Research Question 3: Is there a relationship between demographic attributes (i.e., age, socioeconomic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

• Research Question 4: Is there a relationship between demographic attributes (i.e., age, socioeconomic status, sex, students with disabilities, and ethnicity) that were predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

• Research Question 5: Is school level (i.e., elementary or secondary) predictive of changes in students' ELA scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

• Research Question 6: Is school level (i.e., elementary or secondary) predictive of changes in students' mathematics scores on the 2021–2022 CAASPP as compared to the 2018–2019 CAASPP?

This study sought to identify demographic predictors of academic achievement in English Language Arts and Mathematics and explore the effects of school closures on student achievement in Modesto City Schools district. The findings of this study have important implications for educational practitioners, policymakers, and researchers interested in addressing the effect of school closures on student achievement. The following sections will discuss the findings of this study in relation to each research question.

Summary of Results

In response to the COVID-19 pandemic, the State Board of Education in California revised and shortened its annual standardized Smarter Balanced tests in math and English language arts for the 2021/2022 assessment years (Fensterwald, 2020). These modifications may have had potential effects on student achievement scores, as suggested by the changes in overall student performance in the data analysis. As the state plans to revert to the traditional test length in the 2023/2024 academic year, it will be essential to consider the potential influence of this change on student scores. Future research could build on the pattern of this study by continuing to track student achievement scores in the context of these changing assessment lengths. The insights from this future research could further illuminate the role of test length in shaping student performance and help inform policy decisions about the optimal design of standardized testing systems (Fensterwald, 2020).

The study identified several student characteristics that predicted a decrease in student achievement in English Language Arts and mathematics. The results suggested that there was a decrease in student achievement in English Language Arts and mathematics between the two assessment years. Additionally, demographic predictors of student achievement were identified, with significant differences observed between student subgroups based on ethnicity, English Language proficiency, and economic disadvantage (McFarland et al., 2018). The study also revealed a significant relationship between grade level and student performance, with higher grade levels associated with higher achievement scores (Kuhfeld et al., 2021; Spector, 2022). However, the effect of grade level on achievement may have weakened in the more recent assessment year.

The results of this study have significant implications for educational policymakers and practitioners, emphasizing the potential effect of school closures on student achievement, and the importance of considering student demographics and grade level in predicting academic performance (Kuhfeld et al., 2021; Spector, 2022). The findings can help inform future efforts to support student learning and success in the aftermath of school closures and other disruptions to the educational system.

Differences in English Language Arts Achievement

Descriptive analysis of the English Language arts data showed there was a decrease in overall achievement scores in English Language Arts from the 2018-2019 to the 2021-2022 assessment years. The mean scale score for all students in English Language Arts decreased by 7.3 points, from 2588.8 in 2018-2019 to 2581.5 in 2021-2022. Additionally, the percentage of students who met or exceeded the achievement standard decreased from 56.1% in 2018-2019 to 51.3% in 2021-2022. This suggests that overall, there was a decrease in English Language Arts achievement across the district during the gap in assessment periods.

This study observed a statistically significant decrease in English language arts achievement scores from the 2018-2019 assessment year to the 2021-2022 assessment year, as indicated by a decrease in mean scale scores for all grade levels in this study. These findings indicate a significant decrease in English language arts achievement scores across all grade levels in the Modesto City Schools district between the two assessment years, thereby suggesting a potential negative influence on student achievement due to remote learning and removal from in-person learning.

Differences in Mathematics Achievement

Analysis of the mathematics data showed a significant decrease in overall achievement scores for all students between the 2018-2019 and 2021-2022 assessment periods, as evidenced by a decrease in mean scale scores and the percentage of students who met or exceeded standards in mathematics. The mean scale score decreased from 2489 in 2018-2019 to 2413 in 2021-2022, and the percentage of students who met or exceeded standards decreased from 46% to 37%. These findings suggest that there was a notable decrease in mathematics achievement across the district during the gap in assessment periods.

Furthermore, there was a statistically significant decrease in mathematics achievement scores from the 2018-2019 assessment year to the 2021-2022 assessment year, as evidenced by a decrease in mean scores for all grade levels. These findings suggest a notable decline in mathematics achievement scores across all grade levels in the Modesto City Schools district between the two assessment years, highlighting the potential negative effects of remote learning. These findings show similarities between decreased performance in English language arts and mathematics between the 2018-2019 and 2021-2022 assessment years, underscoring the potential adverse effect of mandated school closures, including remote learning, on student achievement.

Differences in Achievement by Grade Level

The researcher found that grade level had a significant positive effect on English language arts achievement in both the 2018-2019 and 2021-2022 assessment years. However, the strength of the relationship weakened in 2021-2022 compared to 2018-2019, as indicated by a lower correlation coefficient. Nonetheless, the beta coefficient for grade level remained positive and statistically significant in both assessment years, highlighting the importance of considering grade level in predicting English language arts achievement. Overall, the results suggest that

students in higher grade levels tended to have higher scale scores in the English language arts assessment, and grade level is an important predictor of English language arts achievement in both assessment years. These findings indicate that prior to the mandated school closures, students in secondary grade levels typically outperformed students in elementary school in English language arts. However, after the school closures, this achievement gap has narrowed, indicating that students in the higher grades have shown less growth in this academic measure.

In the analysis of mathematics achievement, the researcher found a significant positive correlation between scale scores and grade level in both years. In 2018-2019, the Pearson correlation coefficient between scale scores and grade level code indicated a moderate positive relationship between the two variables. Similarly, in 2021-2022, the Pearson correlation coefficient between scale scores and grade level code decreased, suggesting a weaker association between the two variables. However, the beta coefficient for grade level remained positive and statistically significant in both assessment years, highlighting the importance of considering grade level in predicting Mathematics scores. The multiple regression analysis showed that grade level was a statistically significant predictor of Mathematics scores in both assessment years. The research determined that the findings of this study mirrored the results of English language arts. The results indicated that students in secondary grade levels typically outperformed elementary-aged students in overall math achievement. However, the results also revealed that this gap weakened after the mandated school closures, suggesting that secondary-aged students may have been more greatly affected in mathematics during the mandated school closures.

As a predictor variable, grade level was statistically significant in relation to achievement scores for both English language arts and mathematics. The researcher found that for both English language arts and mathematics, the results from the multiple regression analysis revealed

that in both assessment years (2018-2019 and 2021-2022), grade level was a statistically significant predictor of student achievement in both subjects. The beta coefficients for grade level were positive, indicating that as grade level increased, so did the corresponding achievement scores in English language arts and Mathematics. Additionally, the point-biserial correlation analysis showed a significant positive correlation between grade level and achievement scores in both subjects for both assessment years. The findings of this study suggest that grade level plays a crucial role in predicting student achievement in both English language arts and mathematics. Moreover, the results indicate that elementary-aged students may have been more significantly affected by the mandated school closures, emphasizing the importance of considering grade level as a determining factor in student achievement in both subjects.

To further evaluate the effects on grade level achievement, independent T-tests were conducted to evaluate the mean achievement scores from before and after the school closures. In the study of English language arts, during the 2018-2019 academic year, the researcher found a significant difference in English Language Arts (ELA) scores between elementary students and secondary students. The data indicates that secondary students scored on average higher than elementary students on the ELA assessment. Similarly, in the 2021-2022 academic year, the independent t-test revealed a significant difference between elementary and secondary students the data shows that secondary students continued to outperform elementary students, although the difference was reduced.

The researcher found similar results in the study of mathematics, with secondary students outperforming elementary age students. It is significant to note that in both areas of study, the achievement gap between elementary and secondary students narrowed, however, secondary students on average outperformed elementary students on these assessments. These results

underscore the need for ongoing attention to improving English language arts and math achievement among elementary students, to bridge the gap and ensure consistent progress across all grade levels.

The COVID-19 pandemic and related school closures have presented unprecedented challenges to education systems worldwide. The present study's findings suggest that these disruptions may have disproportionately affected elementary-aged students. Both in English Language Arts (ELA) and mathematics assessments, elementary students scored significantly lower than their secondary counterparts in the 2018-2019 and 2021-2022 school years. This suggests that younger students may have struggled more with the shift to remote learning, aligning with concerns about their access to necessary resources, ability to learn independently, adaptability to new modes of instruction, and ultimately the return to in-person learning.

To date, research on the effect of COVID-related school closures on student achievement has yielded inconsistent findings, with the specific effects on elementary students often underexplored. This gap in the literature emphasizes the need for more focused studies on this critical age group. Given the vital role of early education in laying the foundation for future academic success, understanding and addressing the pandemic's effect on elementary students should be a priority in both research and policy efforts (Hough & Chavez, 2022).

Differences in Achievement by Socio-Economic Status

In reviewing academic achievement and the effect of socioeconomic status, the researcher found that socioeconomic status (ED Code) had a statistically significant effect on English Language Arts (ELA) performance in both the 2018-2019 and 2021-2022 assessment years. In 2018-2019, there was a significant positive correlation between ELA scale scores and ED code, indicating that students from economically disadvantaged backgrounds tended to have

lower ELA scale scores compared to their more affluent peers. In 2021-2022, the correlation coefficient between ELA scale scores and ED code increased, suggesting a stronger association between these variables. This indicates that the gap in ELA performance between economically disadvantaged students and their more affluent peers may have widened during the pandemic.

The researcher found that there was a significant relationship between socioeconomic status and mathematics achievement in both 2018-2019 and 2021-2022. Specifically, students from higher socioeconomic backgrounds tended to perform better in mathematics than those from lower socioeconomic backgrounds in both years. However, the relationship between socioeconomic and mathematics achievement appeared to weaken in the more recent assessment year, as indicated by a lower correlation coefficient between socioeconomic status and mathematics achievement scores. Regardless, socioeconomic status remained a significant predictor of mathematics achievement in both assessment years, highlighting the importance of considering socioeconomic status in predicting mathematics scores.

As a predictor variable, the researcher found that socioeconomic status was a significant predictor variable in both English Language Arts and Mathematics achievement scores. The multiple regression analyses for both subjects showed that socioeconomic status was a statistically significant predictor of achievement scores in both the 2018-2019 and 2021-2022 assessment periods. Additionally, the point-biserial analysis conducted for both subjects showed a significant correlation between socioeconomic status and scale scores, indicating that students from higher socioeconomic backgrounds tended to have higher scale scores in both subjects. These findings suggest that socioeconomic status is an important predictor variable in determining student achievement, and that the achievement gap between lower and higher socioeconomic status students persists over time.

The findings suggest that school closures had a notable effect on the relationship between socioeconomic status and academic achievement in both English language arts and mathematics. Prior to the closures, there was an existing achievement gap between economically disadvantaged students and their more affluent peers. However, during the pandemic, the gap potentially widened in English language arts, as the correlation between socioeconomic status and English language arts scores strengthened. In mathematics, students from higher socioeconomic backgrounds consistently outperformed their peers from lower socioeconomic backgrounds, although the association weakened in the more recent assessment year. These results highlight the influence of school closures on the academic performance of students from different socioeconomic backgrounds, emphasizing the need for targeted support to address the disparities that may be caused by the school closures.

These findings add complexity to the multifaceted understanding of educational outcomes among economically disadvantaged students. These results are in line with Abbott and Joireman's (2001) exploration, reinforcing the intricate interplay between academic achievement, poverty, and ethnicity. The effect of the COVID-19 pandemic and the shift to remote learning added an extra layer of difficulty for economically disadvantaged students. These struggles, as identified by the researcher, reflect the findings of Abuhammad (2020) who outlined the barriers low-income families face in facilitating effective distance learning. These learning barriers follow the findings by Ash (2020), who highlighted the unique challenges that economically disadvantaged students face with e-learning.

Furthermore, the digital divide that became apparent during the pandemic, aligns with the insights provided by Bayern et al. (2020). The research underscores how limited access to reliable internet and digital resources can exacerbate educational disparities among economically

disadvantaged students. The researcher's findings are consistent with Atteberry and McEachin's (2021) research on potential academic setbacks during non-school periods. Their work underscores an increased risk for learning loss among economically disadvantaged students, a concern that these findings reinforce. In conclusion, the researcher's study affirms and expands upon the existing body of knowledge surrounding the educational experiences of economically disadvantaged students.

Differences in Achievement by Sex

In reviewing the effect of sex on academic achievement, a point-biserial analysis was conducted to examine the effect of sex on achievement scores in English Language Arts (ELA) during the 2018-2019 and 2021-2022 assessment periods. The results showed a significant positive correlation between scale scores and sex in both years. In 2018-2019, the Pearson correlation coefficient between scale scores and sex indicated a weak positive relationship between the two variables. This suggests that female students tended to have slightly higher scale scores than male students in the English language arts assessment, although the effect size was small. However, in 2021-2022, the Pearson correlation coefficient between scale scores and sex decreased, indicating an even weaker association between the two variables. This suggests that the gap in ELA performance between male and female students may have lessened in the more recent assessment year.

A multiple regression analysis was conducted to investigate the relationship between sex and English language arts scores for the years 2018-2019 and 2021-2022. The results revealed a significant relationship between ELA scores and sex in both assessment years. For the 2018-2019 assessment year, the beta coefficient for sex indicated that female students had slightly higher ELA scores than male students. Similarly, for the 2021-2022 assessment year, the beta

coefficient for sex was 0.028, indicating that female students had slightly higher ELA scores than male students.

The results suggest that sex is a predictor of ELA scores, with female students having slightly higher scores in both assessment years. However, the effect size is small, and the gap may have lessened in the more recent assessment year. The findings demonstrate the importance of considering sex when examining student achievement in ELA, but also highlight the need to explore other factors that may contribute to performance differences.

The analysis of the math achievement scores for males and females showed that females had higher mean scores than males in both the 2018-2019 and 2021-2022 assessment years. However, both males and females experienced a decrease in mean scores from 2018-2019 to 2021-2022. The decrease was larger for males than females, as indicated by the larger difference in means between the two assessment years for males. Additionally, the results of the ANOVA tests indicated that there was a statistically significant difference in math achievement scores between males and females in both assessment years. Overall, the findings suggest that while females outperformed males in math, both groups experienced a decrease in achievement scores after the Covid-19 mandated school closures.

As a predictor variable, sex was statistically significant in relation to achievement scores in English language arts and Mathematics. There were significant differences in achievement scores between males and females in both subjects during the 2018-2019 and 2021-2022 assessment periods. These differences were evident even after controlling for other variables such as grade level, socio-economic status, and ethnicity.

The findings indicate that sex played a role in academic achievement both before and after school closures, specifically in English language arts and mathematics. In English language

arts, male students consistently achieved slightly lower scale scores than female students in both the 2018-2019 and 2021-2022 assessment years. However, the correlation between sex and scores weakened in the more recent assessment year, suggesting a potential lessening of the gap in performance between male and female students during the school closures. Similarly, in mathematics, females consistently outperformed males with higher mean scores in both years. The more pronounced decrease in math scores for males compared to females suggests that school closures had a greater effect on males in this subject matter, potentially indicating differential consequences on academic performance due to the closures. These findings highlight the influence of sex on academic achievement in both English language arts and mathematics, with possible changes in the performance gap between male and female students following the school closures.

In a significant departure from traditional expectations, the findings from this study suggest a shift in the academic performance of male and female students. Notably, this research diverges from the traditional views that suggest gendered academic performance differentials in English language arts and mathematics (Hyde & Mertz, 2009; Else-Quest, Hyde, & Linn, 2010). Instead, the results from this study show that both male and female students exhibited similar performance levels across both subject areas. Historically, gender disparities in academic performance have been consistent, with females typically demonstrating superior performance in English language arts while males outperformed in mathematics (Hyde & Mertz, 2009; Else-Quest, Hyde, & Linn, 2010). This phenomenon was supported by research suggesting that girls excel in English language arts early, which may explain the gender gap in STEM fields in adulthood (Dameron & Clark, 2022).

In contrast, the researcher found that gender was not a significant predictor of performance in either English language arts or mathematics in this study. This aligns with the contention of Hyde, Lindberg, Linn, Ellis, and Williams (2008) that gender similarities characterize math performance. Simultaneously, it contests the conventional understanding that girls substantially outperform boys in English language arts (Dameron & Clark, 2022). In conclusion, these findings necessitate a reevaluation of preconceived ideas about gender-based achievement in English language arts and mathematics. The implications of this research could significantly affect instructional approaches, providing an opportunity to address and reduce gender disparity in these critical areas of academia.

Differences in Achievement by Disability Status

Disability status is an area that often has the greatest learning gap in results in education. The researcher found there was a significant difference in English language arts achievement between students with and without disabilities in both the 2018-2019 and 2021-2022 assessment years. In 2018-2019, the mean scale score for students without disabilities was 2517.98, while the mean scale score for students with disabilities was 2117.79. Similarly, in 2021-2022, the mean scale score for students without disabilities was 2421.59, while the mean scale score for students with disabilities was 2014.55. This indicates that students without disabilities outperformed students with disabilities in English language arts achievement in both years. Additionally, there was a significant decrease in mean scale scores for both groups of students from 2018-2019 to 2021-2022. The mean scale score for students without disabilities decreased by 96.39 points, and the mean scale score for students with disabilities decreased by 103.24 points. While the gap between the mean scale scores for students with and without disabilities remained consistent in both years, the decrease in scores for all students highlights the potential

effect of the COVID-19 pandemic on academic achievement. The ANOVA results showed that disability status was a significant predictor variable for English language arts achievement in both assessment years, with a significant effect size. The findings suggest that students with disabilities may need additional support to achieve academic proficiency in English language arts.

In the area of Mathematics, the researcher found that students with disabilities had lower mean scores on the mathematics assessment than students without disabilities in both the 2018-2019 and 2021-2022 assessment years. The ANOVA results indicated that disability status was a statistically significant predictor variable for mathematics achievement in both assessment years, with a significant effect size. These findings suggest that disability status is an important variable to consider when predicting mathematics achievement and that additional support may be needed to help students with disabilities reach academic proficiency.

As a predictor variable, the researcher found that students with disabilities had a larger gap in mean assessment scores between students with and without disabilities in both English language arts and mathematics in 2021-2022 compared to 2018-2019. This suggests that the effect of school closures and the COVID-19 pandemic may have had a disproportionate effect on students with disabilities.

The results of this study align strongly with existing research, further revealing the distinct challenges that students with disabilities encounter in their academic journeys. Our findings align with Abbott and Joireman's (2001) comprehensive study, demonstrating a complex interplay between academic achievement, economic factors, and disability status. The shift to remote education during the COVID-19 pandemic, as documented in the research, posed unique challenges for students with disabilities. These findings parallel Abuhammad's (2020)

qualitative review, which highlighted parents' concerns about the substantial barriers to successful distance learning for their children with special needs. Our study further echoes Ash's (2020) investigation, highlighting the shared difficulties of at-risk students in e-learning environments.

The research additionally emphasizes the digital divide's adverse effect on students with disabilities, consistent with Bayern et al.'s (2020) report on connectivity issues impeding remote learning during the pandemic. The researcher found that these digital barriers often heightened the difficulties for students with disabilities, as many rely on specialized learning resources. This study agrees with Atteberry and McEachin's (2021) research highlighting the importance of consistent and specialized supports being integral for students with disabilities, particularly during challenging times such as the pandemic.

Similarly, the research amplifies Bauer's (2018) argument on the critical role of regular school attendance in fostering student achievement. This factor becomes even more vital for students with disabilities who often depend on the structured support and accommodations provided in a conventional school environment. In summary, the findings emphasize the necessity of understanding and addressing the unique challenges that students with disabilities face. The intersection of the research with the current body of literature emphasizes the need for targeted interventions, enhanced digital access, and continuous support, which are key to mitigating these challenges and promoting academic success among students with disabilities.

Differences in Achievement by Ethnicity

The results of this study revealed a traditional outcome as anticipated by previous research in the field of Education. The researcher found a persistent negative correlation with English Language Arts (ELA) scale scores across both academic years (2018–2019 and 2021–

2022). These findings indicate that specific ethnic groups were consistently associated with lower scores on the ELA portion of the SBAC assessment. However, it is important to note the slight decrease in the strength of this correlation from 2018–2019 to 2021–2022. This reduction suggests that while ethnicity remained a significant predictor of ELA scores, its' predictive power was slightly reduced in the later academic year. This subtle change indicates that the relationship between ethnicity and ELA achievement is not static and can vary over time, further underlining the necessity for ongoing research in this area.

Similarly, in the study of mathematics achievement, a negative correlation between ethnicity and mathematics scores was noted in both academic years of 2018-2019 and 2021-2022. Ethnicity had a stronger correlation with mathematics scores in the academic year 2018-2019 compared to 2021-2022. This suggests that certain ethnic groups were consistently associated with lower scores in mathematics across both years, however, the association was slightly weaker in the later academic year.

These results provide critical evidence of the persistent achievement gaps among different ethnic groups in English language arts and mathematics. They underline the need for targeted educational policies and interventions aimed at addressing these disparities and ensuring equitable learning outcomes for all students, regardless of their ethnic background (Hough & Chavez, 2022). Consequently, educators and policymakers need to consider the differential effects of these demographic factors when developing strategies and interventions for improving student achievement. Understanding these correlations and their shifts over time is key to developing effective strategies for mitigating achievement gaps and promoting educational equity.

The findings of this study align with previous research on the significant role of ethnicity in academic achievement. Wakefield and Hudley (2007) highlighted the profound effect that ethnic and racial identity has on adolescent well-being, particularly in relation to educational performance. Similarly, Worrell (2007) explored the intricate interplay between ethnic identity, academic achievement, and self-concept among academically talented adolescents, further corroborating the association between these constructs.

The researcher of this study determined that these results resonate with these findings, revealing a statistically significant correlation between students' ethnicity and their academic success. In another pertinent study, Abbott and Martin (2001) analyzed the relationships among achievement, low income, and ethnicity across six groups of Washington State students. They found that ethnic background significantly influenced students' academic outcomes, even when controlling for income. This study expands upon this research by showing a consistent association between ethnicity and academic achievement across multiple academic years. This research indicates that students' ethnic identities are an important variable in predicting academic success. This correlation suggests the importance of incorporating an understanding of students' ethnic identities into educational policies and practices to promote equity in academic outcomes.

Differences in Achievement by Language Proficiency

English language proficiency or English Learner (EL) status demonstrated a noteworthy effect on students' academic achievement in both English Language Arts (ELA) and Mathematics over the academic years examined. The negative correlation between EL status and scores in both ELA and Mathematics consistently across two academic years indicates that English Learners had lower scores than their non-EL peers. This finding underscores the specific challenges English Learners face when navigating their education, particularly in the context of

school closures and remote learning due to the COVID-19 pandemic. The move to online instruction may have exacerbated existing challenges for these students, such as language barriers, lack of face-to-face support from teachers, and potential difficulties accessing digital resources.

Interestingly, the slight decrease in the strength of the correlation between EL status and scores in the later academic year suggests possible changes in the relationship between EL status and academic achievement. This could potentially be linked to factors such as improved online instruction, increased support for EL students during remote learning, or adaptability of these students over time. Regardless of the reasons behind this slight shift, the enduring negative correlation between EL status and academic achievement in both ELA and mathematics is a crucial finding. It underlines the importance of targeted instructional strategies, resources, and support systems specifically designed to assist English Learners.

These findings stress the need for educational policies and practices to be responsive to the unique needs of English Learners. Addressing these needs is critical in order to mitigate the existing achievement gaps and strive for equity in educational outcomes. Furthermore, educators and policymakers should recognize EL status as a significant predictor of student achievement, thus calling for continuous monitoring and adjustments in policy and practice to meet the evolving needs of English Learners. Overall, these results bring a vital perspective to the conversation about educational equity and the effect of school closures due to the pandemic, highlighting the importance of focused attention on English Learners' academic success.

These findings concerning English Learner (EL) status resonate with the preexisting research, highlighting the unique challenges these students face. For instance, Abbott and Martin (2001) acknowledged the significant obstacles that English Learners encounter, particularly

concerning standardized test performance. Further evidence for these difficulties is provided by Abuhammad's (2020) qualitative review, which identified barriers to distance learning during the COVID-19 outbreak from parents' perspectives. This study noted that EL students faced additional hurdles in accessing and participating in remote education, leading to potential learning loss. Similarly, Ash (2020) pointed out how at-risk students, including EL students, face significant challenges in e-learning environments.

Considering the sudden shift to remote learning due to the COVID-19 pandemic, connectivity issues presented a significant hurdle for EL students. As noted by Bayern et al. (2020), technical difficulties hampered remote learning, creating a learning environment that was particularly challenging for EL students who were already at a disadvantage. Biancarosa and Griffiths (2020) further elaborate on how the abrupt transition to digital tools can exacerbate educational disparities, especially for EL students who may lack resources or support at home.

These studies, along with our findings, emphasize the importance of educational policies and interventions that account for the specific challenges faced by EL students. As the study by Atteberry and McEachin (2021) stresses, these disparities can be amplified during out-of-school times, suggesting the need for targeted support during these periods. Similarly, Bauer (2018) highlights school attendance as a fundamental factor in student achievement, an aspect that can be severely affected for EL students during times of remote learning. Therefore, attention must be paid to ensure the inclusion and academic success of EL students in both physical and virtual learning environments.

Discussion of Findings and Areas of Further Research

This study found that changes in instructional modality significantly affected student achievement scores in both English language arts (ELA) and mathematics. The findings also

indicated that age, socio-economic status, sex, disability status, and ethnicity were predictive of changes in student achievement scores in both ELA and mathematics. Specifically, students with disabilities and those from lower socio-economic backgrounds were disproportionately affecteded in their achievement scores, suggesting the need for additional support for these student groups to reach academic proficiency. Moreover, the gap in achievement between males and females in mathematics widened significantly in 2021-2022, indicating a disproportionate effect on male achievement in this subject. Lastly, the relationship between grade level and ELA achievement weakened in 2021-2022, suggesting a potential disproportionate effect on achievement for lower grade levels in this subject.

These findings are consistent with previous research that has identified students with disabilities and those from lower socio-economic backgrounds as being at a disadvantage in terms of academic achievement (Fletcher et al., 2020; Heckman, 2011; Kavale & Forness, 2000). The disproportionate effect on male achievement in mathematics is also in line with prior research that has identified sex disparities in mathematics achievement (Reilly & Neumann, 2019). Although the weakening relationship between grade level and ELA achievement is a less explored area, previous research has suggested that younger students may require additional support in developing foundational skills in reading and writing (Vaughn et al., 2003).

These findings underscore the importance of considering various demographic attributes when analyzing changes in student achievement scores and suggest the need for additional support and resources for students with disabilities, those from lower socio-economic backgrounds, and younger students in ELA. Future research could further explore the potential causes of these disparities and identify effective interventions to address them.

Recommendations for K-12 Public Education

Future research should investigate the underlying causes of the disproportionate effects observed for students with disabilities, students from lower socio-economic backgrounds, males in mathematics, and lower grade levels in English Language Arts (ELA), building upon the findings of this study. This research should focus on examining the specific instructional practices and strategies that successfully mitigate these effects and identifying areas where additional support and resources are needed. Furthermore, it is crucial to conduct further research to explore the effect of instructional modality on student achievement and determine the most effective strategies for supporting student learning in remote and hybrid learning environments.

Schools should continue to explore the effect of changes in instructional modality, including remote and hybrid learning, on student achievement. Understanding how these instructional modalities effect student achievement, particularly for students at risk of experiencing disproportionate effects, is essential, considering the accelerated adoption of remote and hybrid learning during the COVID-19 pandemic. While schools have returned from distance learning, some students have opted to remain in remote settings. The choice provided by school districts to allow families to opt for in-person or remote learning may have profound negative effects on students that are not yet fully understood. Additionally, it is crucial to continue examining the relationship between school level and student achievement to identify and address any disparities in educational outcomes.

Schools should invest in professional development opportunities for teachers and staff to support the implementation of effective instructional strategies for diverse learners, including those with disabilities and from low socio-economic backgrounds, who are at risk of experiencing disproportionate effects on their academic achievement. Research has consistently

demonstrated that effective instructional strategies can significantly improve academic outcomes for these students (Kavale & Forness, 2000; Vaughn et al., 2003).

Overall, these recommendations emphasize the importance of collecting and analyzing data on student demographics and the need for effective professional development focused on instructional strategies to support diverse learners. By implementing these recommendations, public schools nationwide can strive to alleviate the disparities in student achievement, thereby working towards closing the achievement gaps that have arisen as a result of the mandated school closures. These implementations have the potential to provide support to all students and facilitate their journey towards academic proficiency.

Recommendations for California Public Schools

To address the unequal effects of the pandemic on students with disabilities and those from lower socio-economic backgrounds, future research should investigate the effectiveness of targeted interventions, such as tutoring, mentoring, and specialized instructional approaches, to support these students. Previous research has shown that targeted interventions can effectively improve achievement outcomes for these student populations (Guryan & Kim, 2010). In addition, research should examine the role of teacher training and professional development in supporting the implementation of these interventions (Baker et al., 2018; Delgado & Priestley, 2019).

Furthermore, future research should investigate the causes and implications of the widening gap in mathematics achievement between males and females. Previous research has shown that sex stereotypes and biases can effect academic achievement outcomes (Heyman & Giles, 2006; Giofrè et al., 2020; Stoet & Geary, 2018), and that interventions aimed at reducing these biases can improve achievement outcomes (Good et al., 2012; Master et al., 2017).

Research should also examine the potential effect of school closures and remote learning on sex differences in mathematics achievement.

Lastly, future research should investigate the effect of changes in instructional modality on student achievement outcomes in both English language arts and mathematics. Specifically, research should explore the effect of various instructional approaches, such as hybrid and fully remote learning, on student achievement outcomes (Dynarski et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). Research should also examine the role of teacher training and professional development in supporting effective implementation of these instructional approaches (Penuel et al., 2017).

Recommendations for Teachers

To address the disproportionate effects on students with disabilities and lower socio-economic status backgrounds, teachers can provide targeted interventions and support systems. Chiang et al. (2019) suggest that individualized education plans (IEPs) can be effective in improving academic outcomes for students with disabilities. Providing accommodations and modifications can also help level the playing field for these students (Hitchcock & Meyer, 2019). For students from lower socio-economic backgrounds, research suggests that providing additional resources and support, such as tutoring and mentoring programs, can improve academic outcomes (Kim & Deplanty, 2018; Yeager et al., 2014). Teachers can also work to create a culturally responsive classroom environment that values diversity and promotes inclusivity (Ladson-Billings, 2014).

To highlight the disparities on males in mathematics and lower grade levels in English language arts, teachers can provide targeted interventions and support systems. Research suggests that teachers can work to create a more engaging and supportive classroom environment

that fosters a positive attitude towards math for males (Hill & Lynch, 2015). Teachers can also provide opportunities for hands-on and real-world application of math concepts (National Council of Teachers of Mathematics, 2014). For lower grade levels in English language arts, research suggests that teachers can focus on building foundational literacy skills, such as phonics, fluency, and comprehension (National Reading Panel, 2000). Teachers can also provide targeted interventions for struggling readers, such as small-group instruction and individualized reading plans (Vaughn et al., 2016).

Recommendations for Parents and Students

It is crucial that parents and students recognize the urgency of the situation and take immediate action to address the necessary supports for their academic progress. Maintaining open communication with teachers and school officials (Hill & Tyson, 2009) is strongly recommended. Regular check-ins with teachers can effectively identify any learning gaps that may have emerged during the school closures, enabling targeted support to be provided (Kaufman & Diliberti., 2021). Moreover, establishing a consistent study schedule and setting achievable academic goals (Dettmers et al., 2010) can aid students in staying on track and ensuring ongoing academic progress. It is imperative that families act promptly to secure the needed assistance for their students.

Furthermore, the importance of equitable access to technology and reliable internet connectivity cannot be overstated when it comes to facilitating successful learning (Kuhfeld et al., 2020). Therefore, it is imperative for parents to act promptly in acquiring access to the required technology. Families can proactively reach out to schools or community organizations to inquire about available resources and seek support in obtaining the necessary technology for their students to fully participate in technology-inclusive classrooms (Kozleski, et al., 2020).

Taking immediate action to ensure equal access to technology will significantly contribute to enhancing the educational experience and opportunities for students.

Lastly, it is recommended that parents and students prioritize their own well-being during these challenging times. The stress and uncertainty of the pandemic may have an effect on mental health and addressing these concerns can have a positive effect on academic success (Sparks, 2022). Engaging in self-care practices and seeking support from mental health professionals can be beneficial for both students and parents (Morgan, 2021).

Overall, parents and students play an important role in mitigating the effects of the widening gap in academic achievement during school closures. By prioritizing communication, maintaining consistent study habits, ensuring access to technology, and addressing mental health concerns, students and their families can work to close the gap and maintain academic progress.

Conclusion

The Covid-19 pandemic and the resulting school closures had a significant effect on student achievement in Modesto City Schools. This study found that certain student groups were disproportionately affected in their achievement scores in both English language arts and mathematics on the CAASPP. Students with disabilities and those from lower socio-economic backgrounds experienced significant effects on their achievement scores in both subjects. Furthermore, male students experienced a disproportionate effect on their mathematics achievement scores, and lower grade levels had lower achievement scores in English language arts. These findings provide valuable insights for the K-12 public education field to address the widening gap in student achievement caused by the school closures and the transition to remote learning.

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Appendix A: Exemption from Marshall University Office of Research Integrity

MARSHALL UNIVERSITY
www.marshall.edu

Office of Research Integrity
Institutional Review Board
One John Marshall Drive
Huntington, WV 25755

FWA 00002704

IRB1 #00002205
IRB2 #00003206

January 11, 2023

Eugenia Lambert, Ed.D.
COEPD, Leadership Studies

RE: IRBNet ID# 1998355-1
At: Marshall University Institutional Review Board #2 (Social/Behavioral)

Dear Dr. Lambert:

Protocol Title:	[1998355-1] Covid-19 mandated school closures: An exploration of student learning loss and the effects of a rapid shift in instructional modality.	
Site Location:	MUGC	
Submission Type:	New Project	APPROVED
Review Type:	Exempt Review	

In accordance with 45CFR46.104(d)(4), the above study was granted Exempted approval today by the Marshall University Institutional Review Board #2 (Social/Behavioral) Designee. No further submission (or closure) is required for an Exempt study **unless** there is an amendment to the study. All amendments must be submitted and approved by the IRB Chair/Designee.

This study is for student Ryan Sherwood.

If you have any questions, please contact the Marshall University Institutional Review Board #2 (Social/Behavioral) Coordinator Lindsey Taylor at (304) 696-6322 or l.taylor@marshall.edu. Please include your study title and reference number in all correspondence with this office.

Sincerely,

Bruce F. Day, ThD, CIP
Director, Office of Research Integrity

Appendix B: IRB Approval – Modesto City Schools

DATE: 1/10/2023
TO: Ryan Sherwood
FROM: MCS IRB
RE: IRB Proposal

Dear Ryan
After reviewing your revised research proposal, the MCS IRB panel has approved your project pending the following steps:

- Interviews of District staff are based on voluntary participation and formal consent, and with consideration of their time and availability.
- No MCS students will be interviewed as part of the study.
- As outlined in your proposal, no information identifying names of participants, school sites, or the District will be used in your report findings or published research as such information will be reported through pseudonyms or anonymous labels.
- All data collected will be kept confidential and secure throughout and after the completion of your project.
- MCS is interested in your study's outcome and requests a copy of your final dissertation within one year of data collection.

Your primary contact for the provision of data will be Ryan Reynolds, Senior Director, Assessment & Evaluation. Data will be provided to you in a manner that ensures the anonymity of students by removing identifying names and other personal information.

We look forward to working with you on this project. Please let us know if we can help in any way. Please keep this IRB approval for your records and submit any documentation according to the IRB process for both your institution and MCS.

We wish you the best with your research,

Mike Rich
Associate Superintendent, CIPD
Modesto City Schools

Appendix C: Research Letter of Support – Modesto City Schools

January 6, 2023

Dear Mr. Sherwood,

On behalf of Modesto City Schools (MCS), I am writing to grant approval of your request for MCS to be a participating district in your doctoral research study examining the impact of the pandemic and resulting school closures on student achievement and/or learning loss. Specifically, as outlined in your project summary, the focus of the study is "the analysis of student assessment data prior to and after school closures imposed by the COVID-19 global pandemic to examine changes, if any, in students' academic performance in English language arts and mathematics. The results of this study will enhance Educators' understanding of learning loss in general as well as help educators in developing appropriate interventions to mitigate the impact of unforeseen and catastrophic circumstances that interrupt schooling." Research activities involving MCS and the data you requested may begin after formal IRB approval of your project proposal. MCS participation is based on the following understandings and agreements related to your study:

- Interviews of District staff are based on voluntary participation and formal consent, and with consideration of their time and availability.
- Perceptions and opinions of participating staff do not necessarily represent the formal positions of the District on the various topics that may be addressed through the course of your research.
- No MCS students will be interviewed as part of the study.
- As outlined in your proposal, no information identifying names of participants, school sites, or the District will be used in your report findings or published research as such information will be reported through the use of pseudonyms or anonymous labels. Your primary contact for the provision of data will be Ryan Reynolds, Senior Director, Assessment & Evaluation. Data will be provided to you in a manner that ensures anonymity of students by removing identifying names and other personal information.
- All data collected will be kept confidential and secure throughout and after the completion of your project.
- MCS has an interest in the outcome of your study and hereby requests a copy of your final dissertation within one year of data collection.

I will serve as your liaison on behalf of MCS should you need direction or clarification relative to any District procedures or representatives, or questions that arise for which you may need assistance through the course of study. If I can be of assistance in notifying MCS staff of the District's approval of this study as you begin making contacts following IRB approval, please feel free to contact me.

Congratulations on advancing your studies and professional growth through the doctorate program.

Sincerely,

Mike Henderson
Associate Superintendent, Human Resources

MH/bg

Appendix D: Resume

Ryan Sherwood

Vice Principal - Franklin Elementary School

http://www.linkedin.com/in/ryan-sherwood-48880353

Contact

2001 Tioga Avenue, Oakdale CA 95361
209-534-1202
rsherwood7@gmail.com
Sherwood10@marshall.edu
Sherwood.r@monet.k12.ca.us

Education

- Marshall University - EdD Leadership studies
- University of the Pacific – M.A Special Education;
- Teachers College of San Joaquin County – CA Administrative services; Education Specialist Credential Mild/ Moderate & Moderate/Severe;
- University of California, Merced – B.S. Cellular and Molecular Biology

Additional Training

- Modesto City Schools: Future Principal's Training
- Modesto City Schools: Aspiring Administrators
- Administration focused Conferences:
- Professional Learning Communities
- ACSA – Every Student Succeeding
- CA League of Schools Technology Conference
- CA PBIS coalition
- Restorative Practices
- Mental Health Supports
- PBIS and Tiered Interventions

Professional Memberships

- Association of California School Administrators – ACSA
- Modesto City Schools Managers Group
- National Association for Family, School and Community Engagement

Objective

To advance in my role as an educational leader that will enable me to have a more significant role in the community. Using my skills, I look to innovate educational programs for the determined site that will better prepare local youth for 21st century skills and careers.

Experience

08/2022 - Present
Course Instructor - Teachers College of San Joaquin County

07/2022 - Present
Vice Principal • Franklin Elementary School

07/2019 – 06/2022
Assistant Principal • James C. Enochs High School

07/2018 – 06/2019
Assistant Principal, Supervision/Attendance • Thomas Downey High School

07/2017 – 06/2018
Education Specialist • Grace M. Davis High School

07/2015 – 06/2017
Education Specialist • Sylvan Unified School District

07/2013 – 06/2015
Education Specialist • Stanislaus Union School District

References

(Contact Information available upon request)

Catherine Mullins - Principal

Heather Contreras EdD - Assistant Superintendent of Educational Leadership

Amanda Moore – Principal

Richard Baum – Principal

Sylvia Frasier - Leadership Coach