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School-wide Academic Outcomes and Instructional Modality Used During the 2018-2022
School Years

A dissertation
presented to
the faculty of the Department of Educational Leadership and Policy Analysis
East Tennessee State University

In partial fulfillment
of the requirement for the degree
Doctor of Education in Educational Leadership

by
Matthew A. Bowser
August 2023

Dr. William Flora, Chair
Dr. Don Good
Dr. Pam Scott

Keywords: instructional modality, student academic outcomes, covid-19 pandemic, virtual
instruction, hybrid instruction

ABSTRACT

School-wide Academic Outcomes and Instructional Modality Used During the 2018-2022

School Years

by

Matthew A. Bowser

The purpose of this quantitative study was to determine if there was a significant relationship between school-wide academic outcomes and the instructional modalities utilized by public schools during the 2019-2022 school years. This study also determined if there was a significant difference in assessment scores earned by public school students in Tennessee before and after the shift from in-person schooling caused by the COVID-19 Pandemic. The researcher used a chi-squared test for independence to determine if there was a significant relationship between the modality of instruction used within a school during the 2020-2021 and 2021-2022 school years and the school-wide academic outcomes from the American College Test (ACT) and the Tennessee Comprehensive Assessment Program Test (TCAP). Furthermore, the researcher used a two-tailed t-test for paired samples to determine if there was a significant difference in school-wide ACT composite scores, school-level TCAP one-year success rates, and TVAAS growth rates by comparing data across the 2018-2019, 2020-2021, and 2021-2022 school years.

The findings within this study showed mixed results relative to school-wide academic outcomes before, during, and after the pivot from in-person instruction caused by the COVID-19 Pandemic. Findings showed that school-wide academic success rates were significantly higher prior to the shift from in-person instruction caused by the COVID-19 Pandemic; however, school-wide TVAAS growth rates did not change significantly. Furthermore, this study demonstrated a statistically significant yet weak association between instructional modality and

student academic outcomes. Therefore, instructional modality may not be a primary determinant of student performance. Thus, practitioners should emphasize delivering quality instruction, regardless of the instructional modality.

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TABLE OF CONTENTS

ABSTRACT.....	2
ACKNOWLEDGEMENTS.....	4
TABLE OF CONTENTS.....	5
List of Figures.....	8
Chapter 1. Introduction.....	9
Research Questions.....	9
Significance of the Study.....	11
Definitions of Terms.....	12
Limitations.....	14
Delimitations.....	15
Overview of Study.....	16
Chapter 2. Review of Literature.....	17
Impact of the Covid-19 Pandemic on Education.....	21
Consequences of Rapid Shift in Instructional Modality.....	24
Student Well-being.....	25
Instructional Modalities Used During 2019-2020.....	27
COVID-19 Impact on the 2020-2021 School Year.....	28
Instructional Modalities During the 2020-2021 School Year.....	29
Virtual Instructional Modality.....	30
Hybrid Instructional Modality.....	32
Widening Achievement Gaps.....	33

Mitigation of Achievement Gaps.....	34
Continuous Learning Plans.....	35
Strengthening of Laws and Regulations that Govern Virtual Education.....	36
Spending on Education in the United States.....	37
Chapter Summary	38
Chapter 3. Research Methodology.....	40
Research Questions and Null Hypotheses	41
Population and Sample	44
Instrumentation	46
Data Collection	47
Data Analysis	48
Chapter Summary	52
Chapter 4. Findings.....	53
Research Question 1	53
Research Question 2	54
Research Question 3	56
Research Question 4	58
Research Question 5	59
Research Question 6	61
Research Question 7	62
Research Question 8	64
Research Question 9	66

Research Question 10	67
Chapter Summary	68
Chapter 5. Discussion, Conclusions, and Recommendations	71
Discussion of Findings.....	71
Conclusions.....	73
Recommendations for Practice	75
Recommendations for Future Research.....	75
Summary.....	77
References.....	78
VITA.....	96

LIST OF FIGURES

Figure 1. School-wide Composite ACT Scores for the 2018-19 and 2020-2021 School Years . 54

Figure 2. School-wide Composite Act Scores by Instructional Modality for the 2020-2021
School Year 56

Figure 3. Percentages of Schools within Category of ACT Composite Score by Instruction
Modality for the 2020-2021 School Year..... 58

Figure 4. School-wide TVAAS Growth-Measure Scores for the 2018-2019 and 2020-2021
School Years..... 59

Figure 5. Percentages of Schools Within Student Growth Category by Instructional Modality for
the 2020-2021 School Year 61

Figure 6. School-wide TCAP One-year Success Rates for the 2018-2019 and 2020-2021 School
Years..... 62

Figure 7. Percentages of Schools Within Category of Student Achievement by Instructional
Modality for the 2020-2021 School Year..... 64

Figure 8. Percentages of Schools within Category of Student Achievement by Instructional
Modality for the 2021-2022 School Year 65

Figure 9. School-wide TCAP One-year Success Rates for Schools that Utilized a
Virtual/Hybrid/Remote Modality in the 2020-2021 School Year..... 67

Figure 10. School-wide TCAP One-year Success Rates for Schools that Utilized an In-Person
Modality in the 2020-2021 School Yea 68

Chapter 1. Introduction

The purpose of this study was to determine if there was a significant relationship between school-wide academic outcomes of public-schools in Tennessee and the instructional modalities utilized by public schools during the 2019-2022 school years. Additionally, this study aimed to determine if there were significant differences in school-wide academic outcomes before and after the shift from in-person learning caused by the COVID-19 Pandemic in the 2019-2020 and 2020-2021 school years. This study used a quantitative methodology, enabling the researcher to determine if significant relationships and differences exist by analyzing American College Testing (ACT) school-wide composite scores, school-wide Tennessee Comprehensive Assessment Program (TCAP) achievement and growth data, and the instructional modalities used in the 2020-2021 school year.

Research Questions

The following research questions were addressed through testing the null hypothesis:

1. Is there a significant difference in school-wide ACT composite scores between the 2018-2019 school year and the 2020-2021 school year?
2. Is there a significant difference in school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year and the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional modality in the 2020-2021 school year?
3. Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the

category of the school's school-wide ACT composite score (school-wide composite of 19.1 or greater, school-wide composite score lower than 19.1)?

4. Is there a significant difference in the school-wide TVAAS growth-measure earned by Tennessee public school students in the 2018-2019 school year and the 2020-2021 school year?
5. Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the category of student growth as indicated by school-wide TCAP growth level in the 2020-2021 school year (showed growth, showed no growth)?
6. Is there a significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year?
7. Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year (majority of students on-track or mastered, majority of students below or approaching)?
8. Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2021-2022 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year (majority of students on-track or mastered, majority of students below or approaching)?

9. Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year?
10. Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year?

Significance of the Study

The body of research focusing on the impact that the COVID-19 Pandemic had on educational systems is continually growing. Several recent studies have systematically examined the impact that the shift from in-person instruction caused by the COVID-19 Pandemic during the 2019-2020 and 2020-2021 school years had, and will have, on student success (Hammerstein et al., 2021; Jack et al., 2021; Kane, 2022). However, relatively few studies have examined the impact that the shift from an in-person modality of learning had on students' academic outcomes in Tennessee. School districts across Tennessee used differing instructional modalities as mitigation tactics to allow for social distancing within the school buildings during the 2019-2021 school years. This study examined the impact that instructional modalities had on school-wide academic outcomes and determines if the shift from in-person learning had a significant impact on student academic growth and achievement during the 2020-2021 school year. This study deepened the body of research related to the impact of the COVID-19 Pandemic on education and will serve as a starting point for further research related to the impact that instructional modality has on students' academic outcomes. Educators and school leaders may be able to use this research to inform their instructional practices, identify areas for improvement, and develop strategies to address any learning gaps that may have arisen during the COVID-19 Pandemic.

This research will also provide information that policy makers can potentially use to shape education policy, allocate resources, and make informed decisions about instructional modalities in the future.

Definitions of Terms

To establish a common understanding of terms within this study the researcher has provided definitions for the following terms:

1. American College Test (ACT): The ACT test is a standardized test that provides an overview of high school student's preparedness for attending college. This test is typically taken by students in their 11th grade year. The ACT measures skills that are important for success in college (ACT Incorporated, n.d.).
2. ACT composite scores: A schools' average ACT score that is calculated using the highest scores students earn in the three years preceding their graduation only for those students who are counted as graduates for a given school or district (Tennessee Department of Education, n.d.a).
3. Asynchronous Virtual Instruction: A type of virtual instruction that does not require students to attend regularly scheduled (e.g., daily/every other day) virtual classes with a teacher, and communication between student and instructor does not happen in real-time (Irvine, 2020).
4. Growth Measure: Growth measure is also known as the value-added measure which measures progress within a grade and subject, which demonstrates the influence the school has on the students' performance. These data provide diagnostic information for improving educational opportunities for students at all achievement levels (Tennessee Department of Education, 2017).

5. Hybrid Instruction: An instructional modality in which a class of students learn through virtual learning or in-person learning. Hybrid instruction can occur concurrently, in a hybrid modality, or where the class as a whole either learns in-person or virtually (Ladd, 2020; Miller et al., 2021; Raes, 2022).
6. In-person Instruction: Instructional interaction that occurs within a face-to-face environment and in real time between teachers and students (Irvine, 2013; Jensen et al., 2022; Robbie, 2013).
7. Modality of Instruction: The location and timing of instructional interactions (Irvine, 2020). The method in which a student participates in instruction. Common modalities include: In-person, Remote, Hybrid, or Virtual (Carrol & Burke, 2010).
8. Remote Instruction: Instructional interactions provided by teachers in a remote setting other than a traditional, brick-and-mortar school setting (Morgan, 2022).
9. Synchronous Virtual Instruction: A type of virtual instruction that provides scheduled, teacher supervised instruction that is fully virtual/online where students remotely participate in teacher supervised and directed classes by means of video and/or audio technologies (Bower et al., 2019; Howlett et al., 2009).
10. Tennessee Value-Added Assessment System (TVAAS): The Tennessee Value-Added Assessment System measures student growth across years. In calculating a TVAAS score, a student's performance is compared relative to the performance of his or her peers who have performed similarly on past assessments (Tennessee Department of Education, n.d.b).
11. TCAP One-Year Success Rates: The percentage of students within a school that earned a score within the categorical threshold of "on-track" or "mastered" on math and English

subject level Tennessee Comprehensive Assessment Program Tests (Tennessee Department of Education, 2021a).

12. Virtual Instruction: An instructional modality that provides students with access to fully virtual/online instruction through the use of the internet (Irvine, 2020).

Limitations

The Tennessee Department of Education was one of several state education agencies that did not publicly provide data defining the predominant modality of instruction used within individual schools during the shift from in-person schooling during the 2019-2021 school years. Therefore, this study used Tennessee Educator Survey (TES) data to determine the predominant teaching modality within a school. The TES provided survey data for schools with a district response rate of 45% or greater. Ninety-three percent of Tennessee districts within this sample had an overall response rate of 51% or more, which may not be representative of all schools in Tennessee. As a result, the findings may not be generalizable to schools with lower response rates or those that were not included in the study. Ninety-three percent of Tennessee districts within this sample had an overall response rate of 51% or more.

Furthermore, the researcher categorized the teaching modalities used by schools during the 2020-2021 school year into two categories, virtual/hybrid/remote and in-person and categorized the types of virtual instruction used into two categories, synchronous and asynchronous. It should be noted that schools fluidly pivoted between learning modalities throughout the 2020-2021 school year according to the school's continuity of learning plan. The instructional modality used within a school was derived by analyzing qualitative data from the TES and determining which modality the school used 51% or more during the 2020-2021 school year. Therefore, it should be noted that it is possible that not all instruction within a school

aligned to the specified modality of instruction. Additionally, many researchers cautioned against interpreting trends in achievement test results between 2019 and 2021 due to differences in testing population, differences in test mode administration, and unrealized changes in the assessments themselves (Barnum, 2021; Gewertz, 2021; Ho, 2021). While research within this study indicates that instructional modality did have a statistically significant relationship to 2020-2021 student academic growth and achievement outcomes, factors that were not addressed within this study could have skewed testing results.

Delimitations

This study used school-wide assessment outcome data to compare academic outcomes across school years. Only schools that generated unsuppressed assessment data for the 2018-19, 2020-2021, or 2021-2022 school years were used within this study. Furthermore, to ensure findings were generalizable, this study used ACT and TCAP data that represented all Tennessee students across grades 3-12 rather than including data specific to individual student groups. However, all results are not necessarily generalizable to other settings. Furthermore, during the 2021-2022 school year, the Tennessee State Board of Education (SBE) suspended the use of continuous learning plans (CLP) that allowed public schools to leverage wide-spread virtual/hybrid/remote instruction within non-virtual schools. During this school year, only public virtual schools were permitted to utilize a predominantly virtual/hybrid/remote modality of instruction. This allowed the researcher to compare student's academic outcomes between public virtual schools that utilized a predominantly virtual/hybrid/remote modality of instruction and non-virtual schools within the 2021-2022 school year.

Overview of Study

This study was conducted to determine if there was a significant relationship between a school's designation of academic growth and achievement during the 2020-2022 school years and the instructional modalities utilized by schools during the 2020-2022 school years. This study also determined if there was a significant difference between school-wide academic growth and achievement scores attributed to public school in Tennessee from before the shift from in-person instruction resulting from the COVID-19 Pandemic during the 2019-2020, 2020-2021, and 2021-2022 school years. The following chapters provide a review of pertinent literature, the researcher's study methodology, the study findings, and considerations for educational practices based on conclusions drawn from the study. Chapter 2 will review the literature that encompasses the supporting scholarly writing relevant to the COVID-19 Pandemic, instructional modalities used during the shift from in-person instruction caused by the COVID-19 Pandemic during the 2019-2020 and 2020-2021 school years, and school-wide academic outcomes relative to the COVID-19 Pandemic. Chapter 3 will contain the research methodology and design used within this study. Chapter 4 will present the interpretation of data according to the statistical findings within this study. Chapter 5 concludes with a summary of findings, conclusions, implications for practice and recommendations for further research.

Chapter 2. Review of Literature

The literature review is structured to expound on the widespread effects of the COVID-19 Pandemic on K-12 public education. It explores literature related to the effect of the COVID-19 Pandemic on public education and the academic outcomes resulting from the shift from in-person instruction caused by the COVID-19 Pandemic during the 2019-2020 and 2020-2021 school years. It also explores literature related to the strategies that public school districts used to support remote instruction during the shift from in-person schooling.

The COVID-19 Pandemic changed the landscape of K-12 education and has interrupted most aspects of K-12 schooling (Baker, 2022; Kuhfeld et al., 2022). Educational leaders were forced to restructure and adapt instructional delivery and educational services during the shift from in-person instruction caused by the COVID-19 Pandemic in early 2020 (Olneck-Brown, 2021). Based on survey data collected by the United States Census Bureau, approximately 93% of people residing within households containing school-aged children indicated that the children within the household engaged in some form of distance learning during the shift from in-person instruction caused by the COVID-19 Pandemic in the spring of 2020. Within this group, 80% reported that the children within the household were engaging in virtual learning as their primary form of distance learning during the shift from in-person instruction as a result of COVID-19 (Mcelrath, 2020). The National Principal and Teachers Survey (NTPS) conducted by the US Department of Education in conjunction with the National Center for Educational Statistics collected data from approximately 9,920 public school principals and 68,300 public school teachers. A report summarizing these data showed that in the spring of 2020, 77% of public-school principals reported moving classes within their school to online distance-learning formats as a result of the COVID-19 Pandemic. Additionally, 83% of public-school teachers reported

that all or some shifted to an online or distance-learning modality during the COVID-19 Pandemic in the spring of 2020. Public school teachers in cities and suburbs (86% and 87%) reported shifts from in-person instructional modalities at higher rates than those in towns and rural areas (75% and 77%). The report included data showing that 42% of teachers within schools with an enrollment of less than 200 students reported that all or some of their classes normally taught in person moved to a distance learning modality using paper materials sent home with students rather than online or virtual materials as compared to 17% of teachers within schools with an enrollment of 1,000 students or more. Approximately 38% of teachers reported that they held scheduled synchronous sessions with individual students to teach lessons or provide support through a video or audio call and approximately 46% of teachers reported that they taught synchronous lessons to classes in which students could ask questions during the lesson through a video or audio call. When asked about real-time interactions with students during the spring of 2020, 32% of teachers said that they had real-time interactions with between 76% and 100% of their students. Sixty-one percent of teachers said that they had the support and resources they needed to effectively teach within their school during the spring of 2020 (Berger et al., 2022).

During the onset of COVID-19, political and educational leaders worked collaboratively to make policies to help ensure the continued operation of educational institutions (UN News, 2022). Leaders also proposed mitigation strategies that resulted in a pivot to remote learning and work during the early phases of the COVID-19 Pandemic (UNESCO, 2020). School leaders within the United States widely adopted remote learning mitigation strategies that slowed the spread of COVID-19. These strategies included digital instruction and social distancing between school staff and students (Zeng et al., 2020). School leaders were able to lead a systemic pivot

from in-person schooling to remote schooling largely due to the widespread availability of high-speed Internet (NCES, 2021). As school leaders and policymakers worked to retool education, they focused heavily to balance safety with continuity of instructional services (Faden & Faxon, 2020). Economically disadvantaged students and students who traditionally receive more targeted instructional services were most negatively impacted by remote instruction during the shift from in-person instruction during the 2019-2020 school year (Gross & Opalka, 2020; Kamenetz, 2020).

The COVID-19 Pandemic was documented as a public health emergency in the United States in February 2020 (American Journal of Managed Care, 2021). Due to the frequency and ease of transmission, the health crisis has both impacted society and has forced educational reform and retooling on a global scale (Education Week, 2020b). The reported transmittal avenues of COVID-19 included inhalation of very fine respiratory droplets and aerosol particles, deposition of respiratory droplets and particles on exposed mucous membranes in the mouth, nose, or eye by direct splashes and sprays, and touching mucous membranes with hands that have been soiled either directly by virus-containing respiratory fluids or indirectly by touching surfaces with virus on them (Centers for Disease Control, 2021a). The World Health Organization (WHO) issued findings that the most common form of COVID-19 transmittal was in the form of aerosol or respiratory particles transmitted when an infected person exhaled heavily, coughed, or sneezed (World Health Organization, 2021). Based on reporting from the Mayo Clinic, respiratory droplets expelled from heavy breathing, coughing or sneezing, traveled no more than 6 feet and the infection spread when people breathed in the infected droplets or when the droplets entered the eyes, mouth, or nose of another person in close proximity (Mayo Clinic, 2022).

Because COVID-19 was primarily spread from inhalation of infected droplets, the World Health Organization (2021) issued guidance that COVID-19 is spread most efficiently in crowded in-door settings with poor ventilation. Guidance issued in the early stages of the spread of COVID-19 suggested that transmittal rate amongst school age children was lower than the transmittal rate between adults (Goldstein et al., 2021). Later evidence suggested that the decreased incident and transmittal rate of school age children was possibly due to the lack of exposure due to the shift from in-person schooling during the 2019-2020 school year (Reese et al., 2021). Evidence gathered from several studies concluded that COVID-19 spreads at a comparable rate in other school age children, adolescents, and adults and sometimes at a higher rate in school age children if their school environment does not safeguard against the spread (Fontanet et al., 2021; Grijalva, 2020; Lewis et al., 2021).

The Centers for Disease Control (CDC) identified a layered approach to the prevention of COVID-19. This approach contained multiple strategies and procedures to safeguard against transmittal including: promoting vaccination, physical distancing, screening testing in schools to promptly identify cases, improved ventilation, staying home when sick and getting tested, contact tracing in combination with isolation and quarantine, handwashing and respiratory etiquette, and routine cleaning with disinfection under certain conditions (Centers for Disease Control, 2021a). The CDC (2021) published that the most effective safeguard against transmittal of COVID-19 is to social distance and to receive appropriate inoculation. However, the CDC asserted that for people that are not fully vaccinated or who choose not to receive the vaccination, social distancing, hand washing, and respiratory etiquette, including face coverings, is the best way to avoid transmittal (Centers for Disease Control, 2022). A study of the transmission of COVID-19 in 11 North Carolina schools concluded that layered mitigation and

prevention strategies significantly limited the transmittal of COVID-19 amongst students, faculty, and staff (Zimmerman et al., 2021). Additionally, findings from contemporary studies asserted that layered mitigation and prevention strategies significantly reduced effects of COVID-19 on schools (Dawson, 2021; Gandini et al., 2021; Hershov, 2021).

Impact of the Covid-19 Pandemic on Education

In early February 2020, the U.S. Centers for Disease Control (CDC) and the U.S. Federal Government declared a public health emergency in response to the CDC's confirmation that the novel coronavirus was spreading within the United States (American Journal of Managed Care, 2021). Ohio became the first state in the United States to announce a statewide shift from in-person instruction in response to advice from global health experts on March 12, 2020. By March 25, most public-school buildings in the United States were closed due to governmental mandates or strong suggestions of state and local leadership (Education Week, 2020b). On March 26-27, 2020, the United States Congress passed into law the first of several Coronavirus Aid, Relief, and Economic Security (CARES) Acts which would help educational institutions across the United States address the needs created by the COVID-19 Pandemic (American Journal of Managed Care, 2021). In response to the statutory requirements, school leadership acquiesced to pivot schooling into a remote/virtual instructional modality (Gewertz, 2020). On April 2, 2020, the United States Department of Education relaxed ESSER laws that required states to administer standardized testing (Baker, 2022). In May 2020, 48 states, four U.S. territories, the District of Columbia, and the Department of Defense Education Activity either ordered or recommended that school buildings remain unutilized for the remainder of the 2019-2020 school year. On May 20, 2020, the CDC released guidelines to safely reopen in-person school buildings for the 2020-2021 school year. This guidance introduced social distancing

within schools as well as guidance on face coverings, contact tracing, hand washing, and the continual disinfecting of common surfaces (Baker, 2022). On July 2, 2020, the largest one-day spike of 50,000 COVID-19 cases caused many educational leaders and policymakers across the United States to reverse their educational reopening plans (American Journal of Managed Care, 2021).

The COVID-19 Pandemic caused disruption in educational systems on a global scale; by April 2020, 188 countries across the globe shifted from in-person instruction to remote instruction due to social distancing requirements or recommendations (Lee, 2020). More than 1.5 billion students were affected by the shift from in-person instruction in 195 countries worldwide as of April 2020 (World Health Organization, 2020). During the shift from in-person instruction, leaders within educational systems around the world worked to pivot to remote or virtual instruction and services; lack of technology and access to broadband Internet reduced the ability of many disadvantaged children and youth to engage in these pivotal strategies (Ramos & Scarpetta, 2020; World Health Organization, 2021).

The United Nations Children's Fund (UNICEF) posited that learning time lost resulting from widespread shift from in-person schooling has not been fully realized and may cost this generation of students trillions of dollars in lifetime earnings (UNICEF, 2021). UNICEF reported that the COVID-19 Pandemic exacerbated the inequality in global education and asserted that offering learning recovery programs composed of evidence based instructional strategies is the best mitigation strategy to address academic deficits caused by the shift from in-person schooling during the 2019-2020 school year (UNESCO et al., 2021). Leadership within education agencies in the United States worked to establish plans to make-up for lost educational opportunities resulting from the shift from in-person schooling (Olneck-Brown, 2021). School operations

within the United States changed abruptly in March 2020 when public schools were unexpectedly closed and thrust into remote operation (Education Week, 2020b). Most school buildings in the United States closed in March 2020; school leaders were forced to alter the way that students receive educational services during these closures (Hodgeman et al., 2021). Changes in schooling were largely based on the recommendations of social distancing by the CDC and local health agencies (Centers for Disease Control, 2021b). The quick switch from in-person schooling to virtual and remote schooling created a sense of urgency for teachers and school leaders to develop adaptive instructional methods to fit remote and virtual instruction (Buschman, 2022). Many school leaders were unequipped to properly offer remote schooling during the shift from in-person instruction caused by the COVID-19 Pandemic. In a study conducted by the Center for Reinventing Public Education, researchers found that within their sample of 477 school districts, just one in three districts expected teachers to provide instruction, track student engagement, or monitor academic progress for all students (Gross, 2020a).

School leaders in the United States cited staffing shortages as an ongoing challenge in supporting students who are struggling due to the Pandemic related shift from in-person schooling (Goldberg, 2021). Although buildings remained closed, school personnel worked to provide both educational and essential services to the families within their communities (Education Week, 2020b). During the spring of 2020, over 90,000 school buildings were closed and millions of students across the United States were thrust into remote learning in less than a month, leaving students and families in an unprecedented situation (UNICEF, 2020). Although school buildings were closed physically, school leaders were still required to fulfill their statutory duty to provide educational services to students (US Dept of Education, 2020). With little uniformity, many school leaders pivoted to remote instruction as their primary mode of

instructional delivery for the remainder of the 2019-2020 school year (Olneck-Brown, 2021). Tennessee students lost, on average, forty to fifty instructional days during the shift from in-person schooling caused by the COVID-19 Pandemic during the 2019-2020 school year (Chisholm-Burns et al., 2020).

Consequences of Rapid Shift in Instructional Modality

Teachers and students in high-poverty and rural areas were more heavily impacted by the transition to remote instruction during the 2019-20 school year (Hodgeman et al., 2021). Many teachers in high-poverty areas were unable to maintain one-on-one contact with their students in a virtual or remote setting (Goldberg, 2021). Additionally, the amount of time that students were expected to engage in learning dropped during the shift to remote instruction. A nationally representative survey showed that only 15% of districts sampled in the survey expected their elementary students to engage in more than four hours of instruction per day and 96% of school districts were cited as offering less than the national average of five hours of daily instruction as recorded prior to the shift to remote instruction caused by the COVID-19 Pandemic (Rickles et al., 2020). Rickles also posited that 36% of districts sampled in the survey did not focus on learning new information or skills during the shift to remote instruction in the 2019-2020 school year. The Center for Reinventing Public Education (CRPE) analyzed the teaching expectations of large urban school systems in the United States, they cited that only 33% of school districts within their sample of 477 school districts expected teachers to provide instruction to all students and many students completed the 2019-2020 school year without instructional services. Additionally, approximately 40% of school districts within the sample did not track student progress and engagement during the transition to remote instruction in the spring of 2020. The CRPE reported that there was a disparity between the percentage of teachers that were expected

to provide instruction to their students when comparing urban and rural communities.

Approximately 52% of teachers that teach in an urban school district were expected to provide instruction to all students; whereas approximately 27% of teachers that teach in a rural school district were expected to provide instruction to all students (Gross, 2020a). The CRPE reported that most students living in or near poverty began the 2020-2021 school year in a fully remote setting and suggested that new systems and strategies should be built to lessen the opportunity gap for students living in poverty by connecting them with the resources, supports, and opportunities that they need and would receive in an in-person setting (Gross & Opalka, 2020).

Data retrieved from the United States Census showed that, as of July 2020, approximately 36% of households that earn less than 25,000 dollars a year, did not have regular Internet access in their home (US Census Bureau, 2020).

Student Well-being

An analysis of data from 44 hospitals across 26 states shows that suicide and depressive injury rates increased in the Fall 2020, after the shift from in-person schooling. Hospitalizations for suicide attempts or self-injury increased approximately 42% with a disproportionate increase for adolescents and adolescent girls (Zima et al., 2022). Emergency hospital visits declined during the early phases of the COVID-19 Pandemic from March through April 2020; however, beginning in April 2020, the number of mental-health related emergency hospital visits increased and remained elevated through October with approximately 31% for children 12-17 years of age and 24% for children 5 to 11 years of age (Leeb, 2020). During March 2020, in the early phases of the shift from in-person schooling, the Gallup Panel collected data from parents of school-aged children regarding their child's overall mood and feeling during the day. Based on the polling results, approximately 89% of parents polled expressed that their children experienced

enjoyment and happiness during a large portion of the day and 65% of parents within the same sample group stated that their child also experienced boredom during the day due to online learning. A majority of parents within this sample stated that they personally have feelings of worry (66%) and stress (71%) regarding their child's academic engagement and progress (Jones, 2020). In May 2020, the Gallup Panel released data that showed 30% of parents surveyed stated that their child's emotional health was suffering due to the shift from in-person schooling caused by the COVID-19 pandemic. Parents were asked to identify which challenges most negatively impacted their children, 45% of parents indicated that separation from classmates and teachers was a major factor that negatively impacted their child's mental health (Calderon, 2020). A subsequent poll completed by the Gallup Panel in February 2021 established that 79% of parents support and prefer in-person schooling over remote learning (Brenan, 2021). The CDC (2021a) reported that the abrupt interruption of daily life took a toll on the social and emotional well-being of students. Many adolescents' social, emotional, and mental well-being was impacted by the COVID-19 Pandemic in the areas of changed routines, breaks in the continuity of learning, breaks in the continuity of healthcare, missed significant life events, and loss of security and safety. The CDC also reported that stay at home orders prevented some parents from taking their children to healthcare providers during the COVID-19 Pandemic (Centers for Disease Control, 2021a). Edsource staff (2021) compiled data collected by the California Teacher Consultant Response Network and indicated that 46% of teachers reported that distance learning was not effective in meeting students' social and emotional needs, 65% reported that a substantial number of their students were in significant danger of suffering long-term mental health issues. Additionally, many teachers reported that they believed that nearly all of their students were in danger of suffering long-term mental health issues (Edsource Staff, 2021). According to the

National Association of Elementary School Principals, nearly 70% of school principals indicated that meeting their students' mental and physical needs with their current resources was a challenge (Mazzuchi, 2021).

Instructional Modalities Used During 2019-2020

The National Center for Educational Statistics analyzed data that outlined the primary instructional modality for U.S. students in fourth and eighth grade during the spring of the 2019-2020 school year. The data showed that 43% of students within the study were enrolled in schools that primarily leveraged remote or virtual instruction, 21% of students within the study were enrolled in schools that primarily leveraged hybrid instruction, and 35% of students within the study were enrolled in schools that primarily leveraged in-person instruction (NCES, 2022).

In response to the COVID-19 Pandemic, educational leaders retooled educational delivery methods to accommodate a wider variety of teaching modalities (Schleicher, 2020). During the Spring 2020, a majority of secondary and elementary schools across the country completely closed or pivoted to remote instruction in response to the COVID-19 Pandemic. More than 55 million students in more than 124,000 schools across the United States closed or pivoted to remote learning during this time (Education Week, 2020a). During the shift from in-person schooling caused by the COVID-19 Pandemic, schools across the world pivoted to emergency eLearning protocols (Murphy, 2020). During this transition, school leaders struggled to provide continuity of instruction for students. Although most schools pivoted to remote or virtual learning during the shift from in-person schooling, many educators and educational institutions cited that distractions, technical glitches, and the many other pitfalls of online education made it far less effective than in-person school (Kane, 2022). The transition to remote teaching was difficult for many teachers as most public school teachers used an modality that

focused on in-person learning and direct instruction before the shift to remote instruction caused by the COVID-19 Pandemic (Krishnan, 2020).

COVID-19 Impact on the 2020-2021 School Year

Disruptions caused by the COVID-19 Pandemic were carried into the 2020-2021 school year with the majority of K-12 students in the United States receiving some form of remote instruction (Kuhfeld et al., 2022). The Center on Reinventing Public Education (CRPE) reported that for the Fall semester of the 2020-2021 school year, almost half of the public school districts within the United States, returned to full in-person instruction (Gross, 2020b). Gross (2020b) also asserted that many public-school districts provided detailed planning documents outlining the path that schools would take to safely return to in-person instruction. The plans also included strategies to mitigate the spread of COVID-19 and details regarding how school districts would pivot to remote instruction if needed. Approximately 26% of public Schools across the United States began the 2020-2021 school year fully remote and approximately 12% of public schools in the United States started the school year using a hybrid modality of instruction in which students attend both in-person and remotely. Additionally, approximately 85% of public school districts in the United States offered a fully remote option (Gross, 2020b).

Public education changed in the wake of the COVID-19 Pandemic (Chisholm-Burns et al., 2020). Public concern regarding students attending school in-person coupled with shifts to remote learning due to wide-spread sickness and employee shortages caused educational institutions to rethink normal operating models (National Education Association, 2021). This change was born of necessity, compliance with law and policy, and additional funding from numerous state and federal grants. Many state education agencies, including the Tennessee Department of Education, worked to provide school districts guidance and pathways to meet the

requirements of social distancing and remote learning during the 2020-2021 school year. In June 2020, the Tennessee State Board of Education promulgated a rule in which the Tennessee Department of Education provided local education agencies (LEAs) resources and guidance by which school districts were required to create continuous learning plans (Tennessee Department of Education, 2020a). School leaders struggled to stay abreast of the latest guidance and requirements from the CDC as they worked to create school reopening plans and develop mitigation strategies for the 2020-2021 school year (Sauer et al., 2021). School reopening guidance was provided to school leadership on an ongoing basis. Constant guidance updates were caused by new mitigation strategies based from the increased study of COVID-19 and the evolving knowledge of the medical community (Cummins, 2020).

Instructional Modalities During the 2020-2021 School Year

In the spring of the 2020-2021 school year, the Tennessee Education Research Alliance surveyed teachers and educational leaders across Tennessee. Survey results show that approximately 55% of teachers surveyed stated that they taught the majority of the 2020-2021 school year using a teaching modality other than an in-person instructional modality with approximately 20% of teachers stating that they mostly taught in a fully virtual modality during the 2020-2021 school year (Tennessee Educational Research Alliance, 2021). Many schools across the U.S. leveraged an in-person instructional modality to begin the 2020-2021 school year (COVID-19 School Data Hub, n.d.). Most public K-12 teachers within the U.S. leveraged some form of virtual, remote, or distance instruction during the 2020-2021 school year to ensure that classrooms had adequate room to properly apply COVID-19 mitigation tactics like social distancing. In Tennessee, entire districts and countless schools had to completely change the instructional modality used from in-person to a virtual environment as COVID-19 infection rates

increased (Chisholm-Burns et al., 2020). To mitigate lost learning opportunities, public school teachers used a variety of instructional modalities during the 2020-2021 school year, schools that utilized fully remote instruction tended to serve higher percentages of minority and low-income students than schools that predominantly utilized in-person instruction. Additionally, allocated instructional time and curriculum coverage were significantly lower in schools that were fully remote for the majority of the school year and remote teachers' estimates of student assignment incompleteness and absenteeism were almost twice as high as those of teachers in fully in-person settings (Kaufman & Dilberti, 2021). To address the disparity between in-person instructional modalities and remote instructional modalities, the Tennessee State Board of Education (2022) asserted that remote instructional modalities must include 6.5 hours of daily instruction akin to in-person instruction.

Virtual Instructional Modality

Many Tennessee teachers provided instruction to students through a mixture of synchronous and asynchronous virtual modalities to ensure that students stayed on track within the curriculum (Chisholm-Burns et al., 2020). The synchronous instructional modality was utilized as a modality in which students attend virtual classes at the same time and with direct interaction with a teacher (Bower et al., 2019; Tennessee Department of Education, 2022b). This modality more closely modeled direct instruction in an in-person classroom. Synchronous modalities simulated familiar instructional practices primarily based on whole class activities engaging students in discussions, individual writing, or peer to peer feedback. This modality heavily utilized videoconferencing platforms to leverage two-way communication through watching (digital camera), speaking and listening (microphone and headphones), and sharing screens for presentation and teamwork (Blau & Hameiri, 2017; Weiser et al., 2018).

Many teachers also utilized an asynchronous instructional modality during the 2020-2021 school year. The asynchronous instructional modality was utilized to provide students access to on-demand instruction in a fully virtual/online manner. Within this modality, students were able to progress at their own pace through curriculum (Irvine, 2020). The bichronous modality was a mixture of both synchronous and asynchronous instruction within a course. These modalities used in tandem afforded teachers the flexibility to either allow students to access instructional materials and progress at their own pace or provide direct instruction akin to in-person, direct instruction (Martin et al., 2020; Tennessee Department of Education, 2022a). Teachers provided asynchronous instruction to promote students' independent, self-paced learning. Researchers (e.g., Blau & Shamir-Inbal, 2017; Galley et al., 2010) posit that bichronous online learning can be an effective way to engage students as active participants in the learning process. Researchers assert that the combination of synchronous and asynchronous modalities can assist the continuity of schooling during shifts to remote learning by maintaining the teaching and learning routine and can help teachers monitor the well-being of their students (Ralph, 2020). Additionally, researchers have concluded that in-person learning is more effective than virtual learning and that if virtual learning does take place, it should be of a synchronous nature (Heppen et al., 2017). Conversely, other researchers (Kaufman & Dilberti, 2021; Raes, 2022) assert that virtual education can be an effective modality of instruction when regulated and intentionally tailored to fit a student's academic need. Researchers (e.g. Fredricks et al., 2004; Furlong & Christenson, 2008; Liberante, 2012; Quin, 2017) established that the positive relationships that teachers build with their students and a student's behavioral and cognitive engagement during teaching and learning are the common tenants of instruction that yield favorable results regardless of modality.

Kamenetz (2020) expounded on the importance of teacher and student relationships to maintain a high level of student engagement during times of virtual or remote instruction.

Hybrid Instructional Modality

During the 2020-2021 school year, most Tennessee school districts leveraged a hybrid modality of instruction in which a portion of students attended in-person each day and a portion engaged in remote or virtual learning (Chisholm-Burns et al., 2020). Within the hybrid modality, students would rotate days of in-person and virtual learning during the week which allowed students to receive both methods of instruction, teachers utilized the hybrid instructional modality in response to social distancing requirements (Tucker, 2021). Within this modality of instruction, separate student groups engage in separate learning modalities simultaneously. Many teachers structured this modality so one student group could engage in an in-person instructional setting while a separate virtual group engaged in a synchronous, virtual modality within the same class in real time (Baylor University Staff, n.d.; Raes, 2022). Many teachers cited that this teaching modality is difficult for both teachers and students to effectively engage in instruction (Shah, 2021; Tucker, 2021). During COVID-19 school mitigation strategies that called for smaller classes and hybrid teaching, some students preferred an in-person class setting, while other students preferred to learn in a virtual setting (Sahni, 2019; Weitzel, 2021). Raes (2021) found that there were no significant differences in conceptual understanding between physically present hybrid students and remote hybrid students; however, in-person students engaged more with lesson content than their remote peers. Raes posited that successful learning and teaching activities are interrelated with set, epistemic, and social design decisions.

Widening Achievement Gaps

Goldhaber et al. (2022) analyzed data from 2.1 million students within 10,000 schools across 49 states and found that student learning modality during the shift from in-person schooling was a primary driver of widening achievement gaps. Students in high poverty schools experienced 50% more achievement loss than students in low poverty schools. The data showed that students who attended districts that utilized a predominantly in-person modality of instruction during the 2020-2021 school year had a smaller achievement gap in math as compared to students who attended a school district that utilized a predominantly remote modality of instruction. Jack et al. (2021) posited that the instructional modality used during the 2020-2021 school year had an impact on student assessment scores and students who attended a school district that utilized a less in-person modality of instruction achieved lower pass rates on standardized tests. Additionally, students who attended a school district that utilized a less in-person modality of instruction saw a 14.1% decline in math pass rates as compared to an approximately 4% decline in math pass rates for students who attended a school district that utilized a predominantly in-person modality of instruction during the 2020-2021 school year (Jack et al., 2021).

The Tennessee Department of Education (TDOE) in conjunction with Governor Bill Lee's office released a statement highlighting the effect that the shift from in-person schooling due to the COVID-19 Pandemic had on Tennessee students and teachers. The study estimated a 50% decrease in academic proficiency rates in 3rd grade reading and a projected 65% decrease in proficiency in math. Leadership within the TDOE posited that the learning time lost during the 2019-2020 school year was detrimental to student progress and that the learning time lost was 2.5 times greater than the normal loss over the summer months (Tennessee Department of

Education, 2020b). According to Kuhfield et al. (2022), twenty-one states released student proficiency rates for both the 2018-2019 and 2020-2021 school year which allowed researchers to compare proficiency rates across years. The results of the analysis showed that numeracy achievement in grades 3 to 8 declined more than literacy scores in most of the reviewed studies. The data showed that the average percentage of students who were proficient on their spring 2021 state assessment dropped 11% in numeracy and 6% in literacy.

Mitigation of Achievement Gaps

Tutoring programs are shown to yield consistent and substantial positive impacts on learning outcomes (Nickow et al., 2020; The Abdul Latif Jameel Poverty Action Lab Staff, 2020). Nickow et al. assert that tutoring led by a teacher or paraprofessional had a higher positive effect than tutoring led by nonprofessionals. Positive effects from tutoring were strongest among the earlier grades and overall effects for math and reading interventions yielded similar results. However, math tutoring yielded higher effect sizes in later grades, while reading tutoring yielded higher effect sizes in earlier grades. Additionally, tutoring programs conducted during school hours had greater impacts than programs conducted after school. To mitigate lost learning opportunities caused by the shift from in-person schooling, school leaders provided high-dosage, low ratio tutoring. High-dosage, low ratio tutoring provided students with a trained tutor working with small groups of students (one to four students at a time), three times a week for an entire academic year (Kane, 2022). Educational leaders within Tennessee's Department of Education created the Tennessee All Corps model, a state funded tutoring program created to align with findings from Nickow et al. (2020). In addition to the positive outcome of high-dosage tutoring, summer programming yielded positive student academic outcomes of growth and remediation. In a report of the findings of a meta-analysis of 37 contemporary studies, researchers found that

students who participated in summer programs that included mathematics activities experienced significantly better mathematics achievement outcomes, compared to their control group counterparts. Researchers also found the effect of summer programs on non-cognitive outcomes yielded positive impacts. The results indicate that summer programs are a promising tool to strengthen children's mathematical proficiency outside of school time (Lynch et al., 2022; Nomi & Allensworth, 2009).

Continuous Learning Plans

Four years prior to the shift from in-person schooling during the Spring 2020, the United States Department of Education released guidance that urged school districts to create continuous learning plans to enact during extended shifts from in-person schooling (Readiness and Emergency Management for Schools Technical Assistance Center, 2015). The United States Department of Education provided guidance that urged school districts to create continuous learning plans that primarily utilize in-person learning with social distancing mitigation strategies. The guidance included data and information that showed that in-person learning leads to better academic outcomes, greater levels of student engagement, and better social and emotional wellbeing (US Dept of Education, 2021). According to Kane (2022), 20% of students in the United States were enrolled in a school district that enacted a continuous learning plan leveraging a fully virtual instructional modality for the majority of the 2020-2021 school year. These students experienced stunted academic growth as compared to students who attended a school district that enacted a continuous learning plan leveraging a primarily in-person instructional modality. Additionally, Kane posited that high-poverty students involved in fully virtual learning for the majority of the 2020-2021 school year experienced fewer academic gains than students involved in fully virtual learning for the majority of the 2020-2021 school year in

low-poverty schools. Fifty percent of students within the United States were enrolled in school districts that returned to in-person instruction in the fall of the 2020-2021 school year. These students received, on average, less than one month of fully virtual instruction in the fall of the 2020-2021 school year. Kane explained that the student group that engaged in primarily an in-person instructional modality lost the equivalent of about seven to 10 weeks of in-person instruction as compared to the 13-22 weeks of in-person instructional loss for students who attended schools that prescribed fully virtual instruction (Kane, 2022). The Tennessee Department of Education (2020b) released a study that showed that students with formerly realized learning deficits were heavily impacted by learning time lost due to the shifts from in-person schooling which widened existing achievement gaps (Tennessee Department of Education, 2020b). Tennessee was one of only twelve states in the country to require instructional plans from districts for the 2020-2021 school year. The framework for Tennessee's continuous learning plan was developed through a strong partnership between the Tennessee State Board of Education, the Tennessee Department of Education, and public school districts within Tennessee (Chisholm-Burns et al., 2020).

Strengthening of Laws and Regulations that Govern Virtual Education

In response to the COVID-19 Pandemic, law and policymakers in the United States have taken steps to strengthen laws and regulations that govern virtual education (Olneck-Brown, 2021). These changes include increased oversight and accountability for virtual schools, as well as providing additional funding and support for virtual education programs (Tennessee State Board of Education, 2022; Texas Education Agency, 2022). Since the onset of the COVID-19 Pandemic, policymakers have taken steps to strengthen laws and regulations that govern virtual education. These laws and regulations focused on areas such as curriculum and instruction,

student assessment, teacher certification, and student data privacy (Tennessee State Board of Education, 2021). Educational change does not happen in a vacuum; it is often the product of cultural or societal change and is more nuanced as educational change is not only impacted by perceived cultural change, but also legislative action (Molnar et al., 2021). Legislative action alone does not create educational change; rather, it takes statutory change coupled with effective implementation planning to drive change within the educational space (Viennet & Pont, 2017).

Spending on Education in the United States

School closures and the shift to remote learning led to increased demand for technology and online learning platforms. Additionally, schools faced increased costs for personal protective equipment and other measures to promote safety. Some states and local governments also provided additional funding to schools to help offset these costs. Despite these additional expenses, many schools and districts faced budget cuts due to a decrease in tax revenue as a result of the economic downturn caused by the COVID-19 Pandemic. Overall, the COVID-19 Pandemic placed a significant financial burden on the education system in the United States (Zhou et al., 2021). In early 2020, the United States Congress appropriated funds in response to the COVID-19 Pandemic. These funds were made available to numerous federal and state agencies through the Coronavirus Aid, Relief, and Economic Security (CARES) Act and American Rescue Plan Act (USA Spending, 2022). Goldhaber et al. (2022) explains that to combat the unforeseen costs of lost learning time, school districts across the United States applied for federal and state grants. These resources provided the additional fiscal means for school districts to amend their set yearly fiscal budgets to include mitigation tactics and futureproofing in the instance the country is impacted by another pandemic. The United States federal government provided \$190 billion in aid to education agencies; however, the American

Rescue Plan only required districts to spend 20% on academic recovery. The final package of aid was committed in spring of 2021 before the impact of the COVID-19 Pandemic on achievement was clear (Goldhaber et al., 2022).

K-12 funding in Tennessee increased more than 3% each year over the last thirty years and per pupil funding increased an average of 2.3% each year (Pellegrin, 2021a). Sales tax in Tennessee was the primary revenue source for general education funds. In fiscal year 2020, 93% of public educational funding in Tennessee was derived from state revenues, the remainder was granted by the US federal government. Funding for education held the largest percentage of the state budget in Tennessee with ~30% of state spending in the last decade (Pellegrin, 2021b). Pellegrin (2021a) reported that during the COVID-19 Pandemic sales tax revenue in Tennessee decreased dramatically; to combat this downswing in economic conditions due to COVID-19, the United States Congress passed several Acts to stimulate the economy.

Chapter Summary

In the spring of 2020, school and government leaders leveraged social distancing mitigation procedures to quell the spread of the COVID-19 Pandemic. These strategies led leaders to close school buildings which forced students and teachers across the United States to engage in remote learning throughout the remainder of the 2019-2020 school year (Kuhfeld et al., 2022). State educational agencies worked with educational leaders and policymakers to ensure that educational services continued during the shift from in-person schooling due to the COVID-19 Pandemic; however, many students, families, and educational leaders struggled to adapt to this new modality of instruction (Kane, 2022). Hammerstein et al. (2021) relayed that empirical evidence related to academic achievement is slowly emerging as society moves back to a more traditional schooling model and an early systematic review of the effects of COVID-19-

related school closures on student achievement reported mixed findings. The review outlined the negative impact that the shift from in-person schooling during the COVID-19 Pandemic had on student achievement in mathematics, reading, and science. Within the review, Hammerstein posited that in some instances shifts to remote instruction had a positive effect on student achievement scores, the review showed that student achievement scores increased when students had previously taken remote or online courses and were familiar with the process of remote or online learning (Hammerstein et al., 2021).

Tennessee's educational leaders and policymakers worked to ensure that schools were prepared to open for in-person learning in the fall of 2020-2021. Tennessee state officials provided guidance for schools and district that emphasized the need for in-person learning; however, allowed each local school board to decide the instructional modality that would best fit their community's needs (TN Office of the Governor, 2020). Most school leaders establish different options for schooling during the 2020-2021 school year and school district officials were required to submit Continuous Learning Plans (CLP) to the Tennessee Department of Education before the start of the 2020-2021 school year. These plans outlined the modalities of instruction that the school district would utilize during shifts to remote instruction to mitigate the spread of COVID-19. During the 2020-2021 school year, school leaders were able to fluidly shift from in-person instruction to virtual instruction. Many leaders utilized a mixture of virtual and in-person instruction labeled hybrid instruction (Tennessee Department of Education, 2021b).

Chapter 3. Research Methodology

Research presented in Chapter 2 indicated that most schools across the United States utilized some form of virtual, hybrid, and/or remote instructional modalities during the 2020-2021 school year in response to the COVID-19 Pandemic. Researchers concluded that school closures and the use of virtual, hybrid, and remote instructional modalities used during the pivot from in-person instruction during the 2019-2020 school year and throughout the 2020-2021 school year were major factors that contributed to significant decreases in student academic achievement across the United States. The purpose of this study was to determine if there was a significant relationship between the academic achievement of public-school students in Tennessee and the instructional modalities utilized by public schools during the 2019-2022 school years. This study also determined if there was a significant difference in assessment scores earned by public school students in Tennessee before and after the pivot from in-person instruction to virtual/hybrid/remote instruction caused by the COVID-19 Pandemic.

This chapter outlines the study by presenting the research methodology used, indicating the purpose of the research, highlighting the design and rationale behind the study, identifying the null hypotheses, outlining data collection techniques, and explaining academic achievement data and instructional modality data used in the study. Within this study, the researcher used a chi-squared test for independence to determine if there was a statistically significant relationship between the predominant modality of instruction used within public schools and the school's category of student academic growth and achievement for the 2020-2022 school years. Additionally, the researcher used a two-tailed t-test for independent samples to determine if there were significant statistical differences in the assessment scores for Tennessee public schools that

utilized a predominantly in-person instructional modality and the virtual/hybrid/remote instructional modality in the 2020-2022 school years.

The COVID-19 Pandemic changed the landscape of K-12 education, it forced many educational leaders to quickly restructure and adapt instructional delivery and educational services from a traditional, in-person modality to a mixed modality of virtual, hybrid, and remote instruction. A relatively sparse collection of research related to the relationship of teaching modality and student academic outcomes in Tennessee lead the researcher to focus on this topic and add to the body of research that surround the impact that the COVID-19 Pandemic had on public education. The researcher used data from the well-established Tennessee Educator Survey, publicly available school-level student growth and achievement data from both the 2018-2019, 2020-2021, and 2021-2022 school years, and ACT school-wide composite scores from the 2018-2019 and 2020-2021 school years retrieved from the Tennessee Department of Education's public data website.

Research Questions and Null Hypotheses

The following research questions were addressed through testing the null hypothesis:

RQ₁: Is there a significant difference in school-wide ACT composite scores between the 2018-2019 school year and the 2020-2021 school year?

H₀₁: There is no significant difference in school-wide ACT composite scores between the 2018-2019 school year and the 2020-2021 school year.

RQ₂: Is there a significant difference in school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year and the school-wide ACT composite scores

earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional modality in the 2020-2021 school year?

H₀₂: There is no significant difference in school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year and the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional modality in the 2020-2021 school year.

RQ₃: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the category of the school's school-wide ACT composite score (school-wide composite of 19.1 or greater, school-wide composite score lower than 19.1)?

H₀₃: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the category of the school's school-wide ACT composite score.

RQ₄: Is there a significant difference in the school-wide TVAAS growth-measure earned by Tennessee public school students in the 2018-2019 school year and the 2020-2021 school year?

H₀₄: There is no significant difference in the school-wide TVAAS growth-measure earned by Tennessee public school students in the 2018-2019 school year and the 2020-2021 school year.

RQ₅: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the school's

category of student growth as indicated by school-wide TCAP growth level in the 2020-2021 school year (showed growth, showed no growth)?

H₀₅: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the category of student growth as indicated by school-wide TCAP growth level in the 2020-2021 school year.

RQ₆: Is there a significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year?

H₀₆: There is no significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year.

RQ₇: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year (majority of students on-track or mastered, majority of students below or approaching)?

H₀₇: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year.

RQ₈: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2021-2022 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the

2021-2022 school year (majority of students on-track or mastered, majority of students below or approaching)?

H0₈: There is no significant relationship between the predominant modality of instruction used within a school in the 2021-2022 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year.

RQ₉: Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year?

H0₉: There is no significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year.

RQ₁₀: Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year?

H0₁₀: There is no significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year.

Population and Sample

This study was conducted using publicly available school-wide ACT composite score data, school-wide TVAAS growth measure data, and school-wide TCAP success rate data for the school years of 2018-2019, 2020-2021, and 2021-2022. The sample for this study was derived from the available datasets publicly provided by the Tennessee Department of Education (TDOE) for the respective school years. Data used in this study were reported at the school-level

in aggregate. All TCAP and TVAAS data were limited to include records for the All-Students group across grades 3-12. Additionally, ACT data were limited to the All-Student group. Data from the Tennessee Educator Survey (TES) were used to identify the predominant modality of instruction (in-person, virtual/hybrid/remote) and the predominant type of virtual instruction used within schools (synchronous, asynchronous) used by schools during the 2020-2021 school year. The researcher limited the 2021 TES survey data to include responses from teachers within schools that generated a survey response rate of 51% or higher. The sample consisted of 944 schools that met the instructional modality inclusion criteria.

For Research Question 1, ACT composite score data were limited to include 356 Tennessee public high schools that had available data for both the 2018-2019 and 2020-2021 school years. For Research Questions 2 and 3, ACT composite score data were limited to include 183 records for schools that had both available ACT composite scores for the 2020-2021 school year and data within the Tennessee Educator Survey to determine the predominant modality of instruction used within the school during the 2020-2021 school year. For Research Question 3, the researcher limited the research sample to 183 schools that had both an identified predominant modality of instruction and reported ACT scores for the 2020-2021 school year. For research Question 4, TVAAS growth measure data were limited to include records for 1,690 schools having data in both the 2018-2019 and 2020-2021 school years. Additionally, these data were limited to include EOC and TNReady (3-8 tests) tests and grades 3-12 (cumulative and null grades). For Research Question 5, TVAAS composite score data were limited to include records for schools with available TVAAS composite score data for the 2020-2021 school year and data within the Tennessee Educator Survey to determine predominant modality of instruction used in the 2020-2021 school year; these stipulations limited this data sample to 691 schools. TVAAS

composite score data was limited to include records for the All-Students groups and grades 3-12. Additionally, the researcher categorized the TVAAS growth levels into two categories (showed growth, showed no growth) where TVAAS level 1 and 2 growth data were categorized into the showed no growth category and TVAAS level 3,4, and 5 data were categorized into the showed growth category.

For Research Question 6, the researcher used TCAP success rate data limited to 1509 schools that had available TCAP achievement data within the publicly available within the Tennessee Department of Education's suppressed data files for both the 2018-2019 and 2020-2021 school years. Research Question 7 used 2020-2021 TCAP success rate data with a sample of 892 schools limited to schools that had both an instructional modality as identified within the TES survey results and data within the 2020-2021 suppressed TCAP success rate data. Data for Research Question 8 was limited to 1222 schools that utilized an in-person modality of instruction during the 2020-2021 school year and 37 public virtual schools that operated in the 2021-2022 school year. Data for Research Question 9 was limited to 285 schools that utilized a virtual/hybrid/remote modality of instruction during the 2020-2021 school year and had available TVAAS success rate data for the 2020-2022 school years. Research Question 10 was limited to 383 schools that utilized an in-person modality of instruction during the 2020-2021 school year and had available TVAAS success rate data for the 2020-2022 school years.

Instrumentation

The Tennessee Educators Survey (TES) is conducted annually in partnership with the Tennessee Education Research Alliance (TERA) at Vanderbilt University. It is a voluntary and confidential survey, open to all teachers, administrators, and other certified staff. Educators received a personalized invitation to participate in the survey from March 8 through April 31,

2021. Survey questions within the TES were drawn from other large-scale, validated educator surveys including the Teaching, Empowering, Leading, and Learning (TELL) survey, the University of Chicago Consortium on Chicago School Research's 5 Essentials survey, and the Schools and Staffing Survey (SASS). Participants received survey questions differentiated by reported role. In addition, participants received one randomly assigned special topic survey module. (Tennessee Educational Research Alliance, 2021). Data used within this study included question items TC_17a through TC_17d from the 2021 TES which ask the participants to select the one modality that has been the primary way they have taught during the 2020-2021 school year. The participants responded by selecting one of four options to indicate their primary modality of instruction for the 2020-2021 school year. These options included:

- Fully in person: I taught lessons in person with all students physically in school.
- Fully virtual: I taught lessons virtually with all students participating remotely.
- In-person and Virtual: I taught lessons with both in-person and virtual students at the same time.
- Student-paced Distance learning: I taught students remotely by providing lesson materials for students to learn at their own pace.

Data Collection

Data were obtained from the Tennessee Department of Education's public data downloads website. The variables measured within this research were relative to the academic performance of students during the 2018-2022 school years. These variables included:

- school-wide average ACT composite scores;
- prominent modality of instruction used during the 2020-2021 school year;
- school-wide TCAP growth measure;

- school-wide TVAAS composite score; and
- school-wide TCAP one-year success rates.

The researcher used data from the well-established Tennessee Educator Survey (TES) to determine the predominant instructional modality of public schools in Tennessee during the 2020-2021 school year. The results for each TES item were publicly available on the Tennessee Department of Education's website. For the purposes of this study, the 2021 TES data were downloaded from the Tennessee Department of Education's public-facing website and used to determine the prominent instructional modality used in individual Tennessee schools during the 2020-2021 school year. The 2021 TES had a statewide educator response rate of 50% with approximately 36,000 respondents. Only districts that had an overall response rate of 45% or greater were included in the survey results. These data were compiled from survey items TC_17a through TC_17d which ask the participants to select the one modality that has been the primary way they have taught during the 2020-2021 school year. The researcher also used publicly available school-level ACT achievement data, TCAP success rate data, and TVAAS growth data retrieved from the Tennessee Department of Education's public data downloads webpage.

Data Analysis

To determine the prominent modality of instruction used within schools during the 2020-2021 school year, the researcher categorized responses for TES survey items TC_17a through TC_17d into two categories (in-person, virtual/hybrid/remote) where the response of "Fully in person: I taught lessons in person with all students physically in school" was categorized within the in-person category and all other responses were categorized within the virtual/hybrid/remote category. To determine the predominant modality used within a school, the researcher totaled the number of responses for each category (in-person, virtual/hybrid/remote) for each school

represented in the data and divided the category totals by the total number of respondents. The modality used by 51% or more of the respondents within the school was used to identify the predominant instructional modality used within the school.

To address Research Question 1, the researcher used a two-tailed t-test for paired samples to compare ACT school-wide composite scores earned by Tennessee public high school students during the 2018-2019 school year and ACT school-wide composite scores earned by Tennessee public high school students during the 2020-2021 school year. The purpose for comparing 2018-2019 school-wide ACT composite data to 2020-2021 school-wide ACT composite data was to determine if there was a significant difference in school-wide ACT composite scores from before the shift from in-person schooling due to the COVID-19 Pandemic as compared to after.

To address Research Question 2, the researcher used a two-tailed t-test for independent samples to compare the 2020-2021 school-wide ACT composite scores earned by Tennessee public high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year as compared to the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional modality in the 2020-2021 school year.

To address Research Question 3, the researcher used a chi-squared test to determine if there was a significant relationship between the predominant modality of instruction used within a Tennessee public school in the 2020-2021 school year and the category of the school's school-wide ACT composite score (school-wide composite of 19.1 or greater, school-wide composite score lower than 19.1). The purpose of this analysis was to determine if additional research was

needed comparing ACT assessment scores between students who engaged in the different modalities of instruction.

To address Research Question 4, the researcher used a two-tailed t-test for paired samples to determine if there was a significant difference in school-wide TVAAS growth-measure scores earned by Tennessee public school students between the 2018-2019 and the 2020-2021 school year. The purpose of this analysis was to determine if there was a significant difference between the school-wide TVAAS growth-measure scores from before the shift from in-person schooling due to the COVID-19 Pandemic compared to after.

To address Research Question 5, the researcher used a chi-squared test to determine if there was a statistically significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the school's category of student growth as indicated by school-wide TCAP growth level in the 2020-2021 school year (showed growth, showed no growth). The purpose of this analysis was to determine if additional research was needed when comparing school-level student academic growth rates between instructional modalities.

To address Research Question 6, the researcher used a two-tailed t-test for paired samples to determine if there was a significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year. The purpose of this analysis was to determine if there was a significant difference between the school-wide TCAP one-year success rates before the shift from in-person schooling due to the COVID-19 Pandemic as compared to after.

To address Research Question 7, the researcher used a chi-squared test to determine if there was a statistically significant relationship between the predominant modality of instruction

used within a school in the 2020-2021 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year (majority of students on-track or mastered, majority of students below or approaching). The purpose of this analysis was to determine if there was a statistically significant relationship between school-level TCAP one-year success rates and the instructional modality used.

To address Research Question 8, the researcher used a chi-squared test to determine if there was a statistically significant relationship between the predominant modality of instruction used within a school in the 2021-2022 school year and the school's category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year (majority of students on-track or mastered, majority of students below or approaching). The purpose of this analysis was to determine if there was a statistically significant relationship between school-level TCAP one-year success rates and the instructional modality used during the 2021-2022 school year which marked the first year since the COVID-19 Pandemic that traditional, public schools in Tennessee were not permitted to use virtual/hybrid/remote instruction. During the 2021-2022 school year, only public virtual schools were permitted by the Tennessee State Board of Education to utilize a virtual/hybrid/remote instructional modality.

To address Research Question 9 and 10, the researcher used a two-tailed t-test for paired samples to determine if there was a significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates of Tennessee public schools that used either a virtual/hybrid/remote (Research Question 9) or in-person modality of instruction (Research Question 10) during the 2020-2021 school year. The 2021-2022 school year marked the first year since the COVID-19 Pandemic that traditional, public schools in Tennessee were not permitted to use virtual/hybrid/remote instruction. Therefore, these analysis aimed to identify if changing

modality of instruction caused a significant difference in school-wide academic outcomes during the 2021-2022 school year.

Chapter Summary

This study determined if there was a significant relationship between modality of instruction used within Tennessee public schools in the 2020-2022 school years and the school-wide academic outcomes during the same school years. This study also determined if there was a significant difference in school-wide academic outcomes before and after the shift from in-person instruction caused by the COVID-19 Pandemic during the 2019-2022 school years. This study used a quantitative methodology, enabling the researcher to determine if significant relationships and differences exist by analyzing American College Testing (ACT) school-wide composite scores, school-level Tennessee Comprehensive Assessment Program (TCAP) achievement and growth data, and the instructional modalities, as reported in the Tennessee Educator Survey, used in the 2020-2021 school year. The researcher utilized publicly available data to perform statistical analysis relative to questions posed in this study.

Chapter 4. Findings

This chapter presents findings regarding the relationship between instructional modality and school-wide academic outcomes during the 2019-2022 school years. The analysis involved a comparison of Tennessee Comprehensive Assessment Program Test (TCAP) and the American College Test (ACT) administrations as benchmarks. The results of this study have implications for educators, school leaders, and policymakers in understanding the impact of instructional modalities on student performance during the unprecedented shift from in-person learning due to the COVID-19 pandemic. The following sections provide a detailed account of the data analysis, statistical tests conducted, and the interpretation of the results.

Research Question 1

RQ₁: Is there a significant difference in school-wide ACT composite scores between the 2018-2019 school year and the 2020-2021 school year?

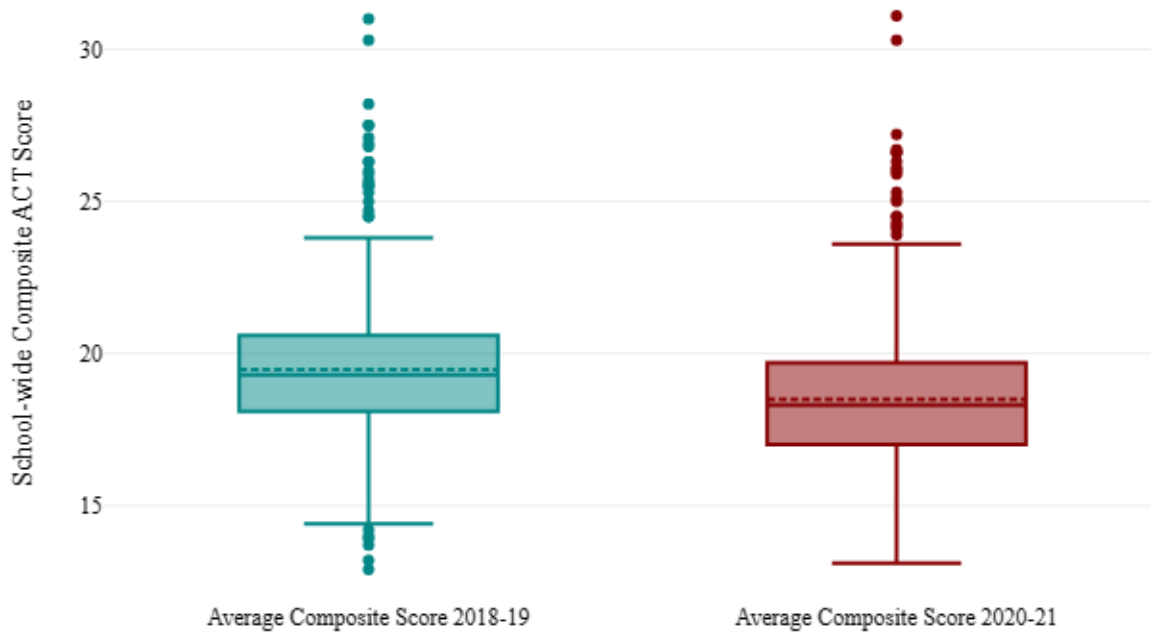
H₀₁: There is no significant difference in school-wide ACT composite scores between the 2018-2019 school year and the 2020-2021 school year.

A two-tailed t-test for paired samples was conducted to determine if there was a significant difference in school-wide ACT composite scores between the 2018-2019 and the 2020-2021 school years. Results indicated a statistically significant difference in school-wide ACT composite scores between the two academic years, $t(355) = 20.65$, $p < .001$, 95% CI [0.88, 1.06]. Consequently, the null hypothesis was rejected. The mean ACT composite scores earned by Tennessee students during the 2018-2019 school year ($M = 19.5$, $SD = 2.7$) were higher than those earned during the 2020-2021 school year ($M = 18.53$, $SD = 2.83$). The distribution of school-level ACT composite scores for both academic years is illustrated in Figure 1. Findings

indicated a significant difference in school-wide ACT composite scores between the 2018-2019 and 2020-2021 school years, with higher scores observed in the 2018-2019 academic year.

Figure 1

School-wide Composite ACT Scores for the 2018-19 and 2020-2021 School Years



Research Question 2

RQ₂: Is there a significant difference in the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year and the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional model in the 2020-2021 school year?

H₀₂: There is no significant difference in the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly virtual/hybrid/remote instructional modality in the 2020-2021 school year and the school-wide ACT composite scores earned by Tennessee high school students who attended a school that utilized a predominantly in-person instructional model in the 2020-2021 school year.

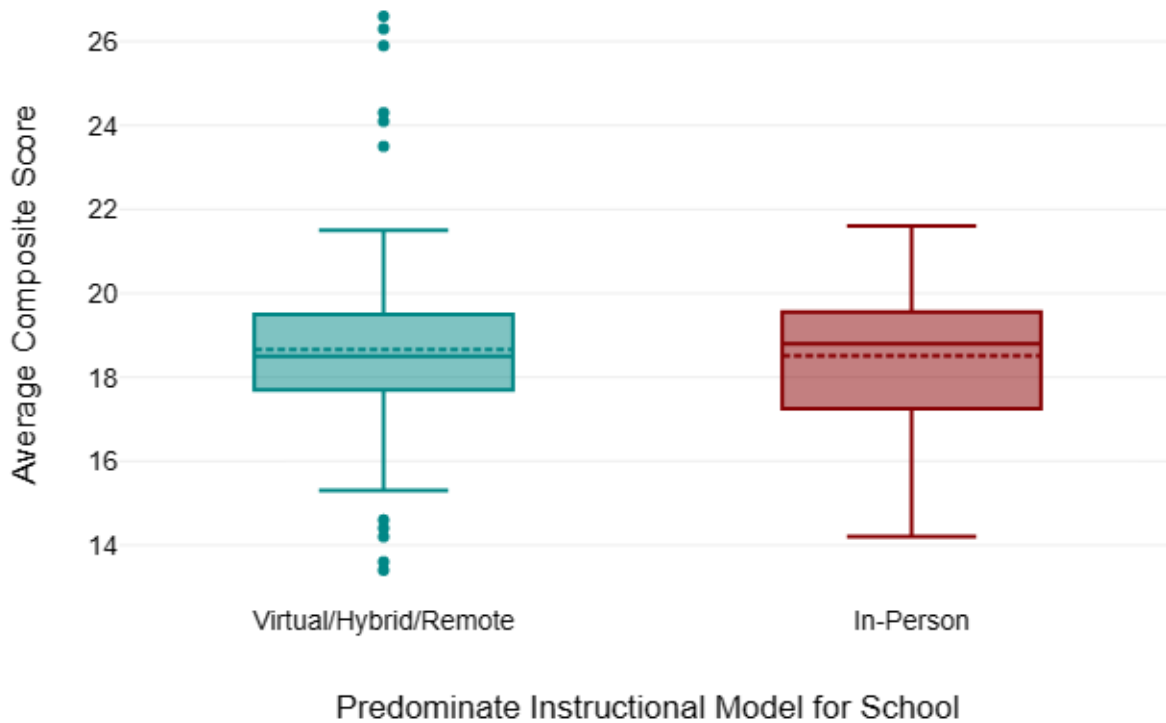
A two-tailed t-test for independent samples was conducted to determine if there was a significant difference in school-wide ACT composite scores of Tennessee high school students who attended schools with predominantly virtual/hybrid/remote instructional modalities and those attending schools with predominantly in-person instructional modalities during the 2020-2021 school year. The results indicated that there was no statistically significant difference in school-wide ACT composite scores between the two groups, $t(181) = 0.45$, $p = .653$, 95% CI [-0.52, 0.83]. Consequently, the null hypothesis was not rejected.

The Levene test for equality of variance produced a p-value of .942, which exceeded the 5% significance level. Thus, the Levene test was not significant, and the null hypothesis stating equal variances across groups was retained, indicating variance equality in the samples. Descriptive statistics revealed that the virtual/hybrid/remote group had a slightly, but not significantly, higher mean school-wide ACT composite score ($M = 18.66$, $SD = 2.04$) than the in-person group ($M = 18.51$, $SD = 1.7$). The distribution of school-level ACT composite scores for both instructional modalities is illustrated in Figure 2. Findings indicated no significant differences in school-wide ACT composite scores between Tennessee high school students attending schools with predominantly virtual/hybrid/remote instructional modalities and those

attending schools with predominantly in-person instructional modalities during the 2020-2021 school year.

Figure 2

School-wide Composite Act Scores by Instructional Modality for the 2020-2021 School Year



Research Question 3

RQ₃: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the category of the school’s school-wide ACT composite score (school-wide composite of 19.1 or greater, school-wide composite score lower than 19.1)?

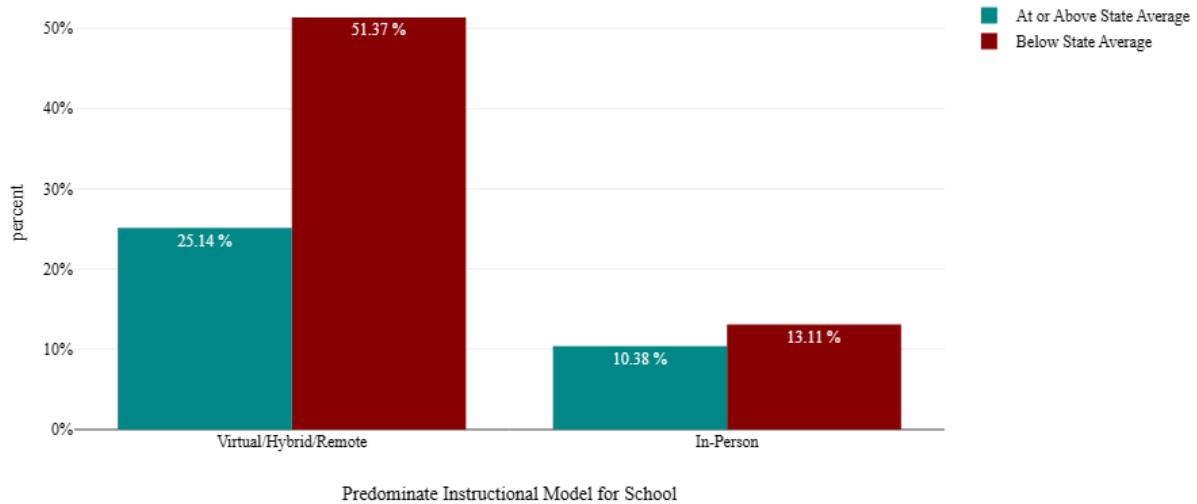
H₀₃: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the category of

the school's school-wide ACT composite score (school-wide composite of 19.1 or greater, school-wide composite score lower than 19.1).

A chi-square test was performed to determine if there was a statistically significant relationship between the predominant modality of instruction utilized within a school during the 2020-2021 academic year and the category of the school's school-wide ACT composite score. The results of the statistical analysis indicated that there was no statistically significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the category of the school's school-wide ACT composite score, $\chi^2(1) = 1.84$, $p = .175$, Cramér's $V = 0.1$. The resulting p-value of .175 exceeded the predetermined significance level of .05; thus, the chi-square test was not significant. Consequently, the researcher failed to reject the null hypothesis. Findings suggested that there is no significant relationship between the predominant instructional modality employed within a school during the 2020-2021 academic year and the category of the school's school-wide ACT composite score.

Figure 3

Percentages of Schools within Category of ACT Composite Score by Instruction Modality for the 2020-2021 School Year



Research Question 4

RQ4: Is there a significant difference in the school-wide TVAAS growth-measure earned by Tennessee public school students in the 2018-2019 school year and the 2020-2021 school year?

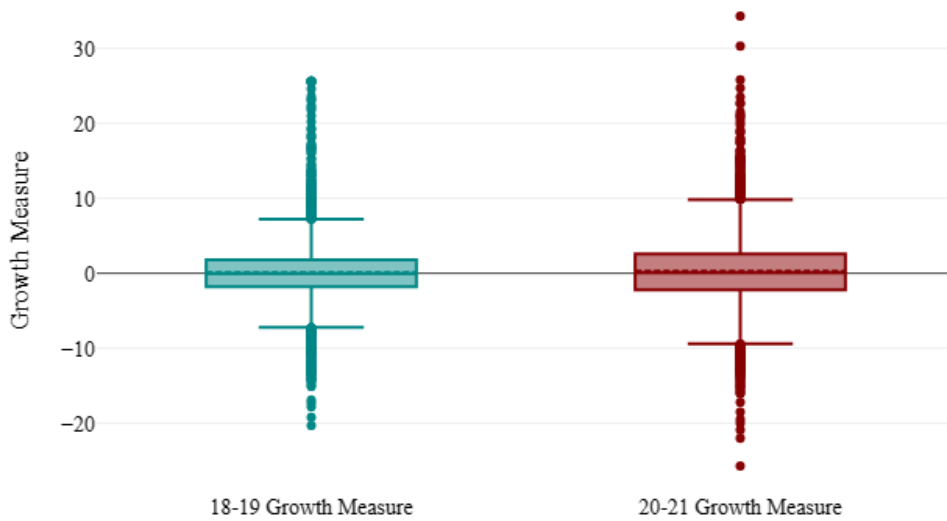
H₀₄: There is no significant difference in the school-wide TVAAS growth-measure earned by Tennessee public school students in the 2018-2019 school year and the 2020-2021 school year.

A two-tailed t-test for paired samples was conducted to investigate whether a significant difference existed in the school-wide TVAAS growth-measure scores earned by Tennessee public school students between the 2018-2019 and 2020-2021 academic years. The results of the t-test indicated that the difference between the two academic years was not statistically significant, $t(4547) = 1.7, p = .089, 95\% \text{ CI } [-0.27, 0.02]$. Consequently, the researcher failed to

reject the null hypothesis. The analysis revealed that the 2018-2019 school-wide TVAAS growth-measure scores ($M = 0.16$, $SD = 3.71$) were slightly, but not significantly, lower than the 2020-2021 school-wide TVAAS growth-measure scores ($M = 0.29$, $SD = 4.77$). Figure 3 illustrates the distribution of school-wide TVAAS growth-measure scores for both the 2018-2019 and 2020-2021 academic years. Findings suggested that there was no significant difference in the school-wide TVAAS growth-measure scores earned by Tennessee public school students between the 2018-2019 and 2020-2021 school years.

Figure 4

School-wide TVAAS Growth-Measure Scores for the 2018-2019 and 2020-2021 School Years



Research Question 5

RQ5: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the school’s category of student growth as indicated by school-wide

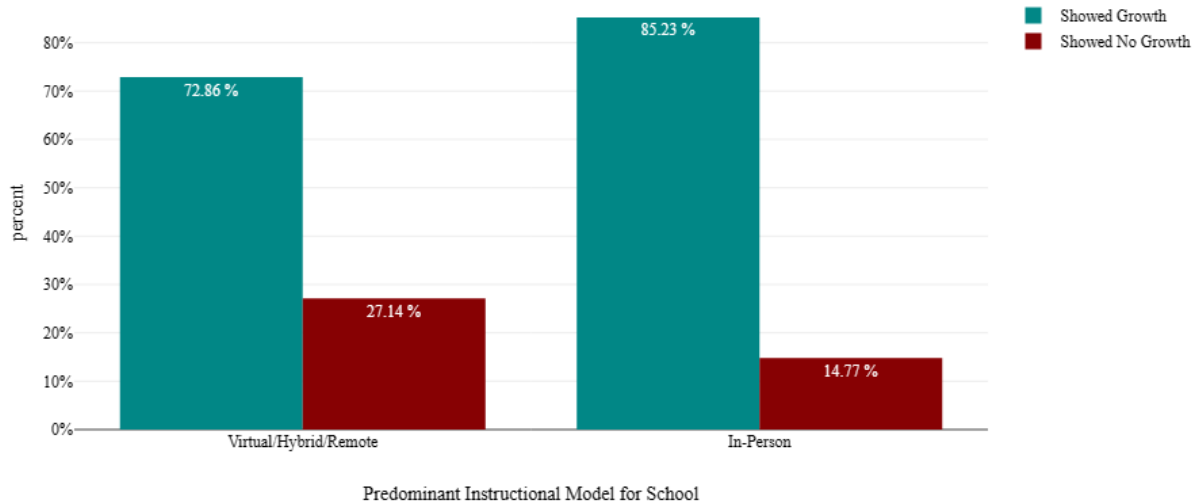
TCAP growth level in the 2020-2021 school year (showed growth, showed no growth)?

H₀₅: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the school's category of student growth as indicated by school-wide TCAP growth level in the 2020-2021 school year (showed growth, showed no growth).

A chi-square test was performed to determine if there was a statistically significant relationship between the predominant modality of instruction employed within a school during the 2020-2021 academic year and the school's category of student growth as indicated by school-wide TCAP growth level in the same academic year. The results of the chi-square test revealed a statistically significant relationship between the predominant modality of instruction used within a school during the 2020-2021 academic year and the school's category of student growth as indicated by school-wide TCAP growth level, $\chi^2(1) = 16.01$, $p < .001$, Cramér's $V = 0.15$. Consequently, the researcher rejected the null hypothesis. Schools that predominantly utilized in-person instructional models had a significantly higher proportion of schools within the category of showed-growth (85.23%) as compared to the proportion of schools that utilized predominantly virtual/hybrid/remote instruction within the same category of growth (72.86%). Figure 5 illustrates the percentages of schools within a category of academic growth by modality of instruction during the 2020-2021 school year.

Figure 5

Percentages of Schools Within Student Growth Category by Instructional Modality for the 2020-2021 School Year



Research Question 6

RQ₆: Is there a significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year?

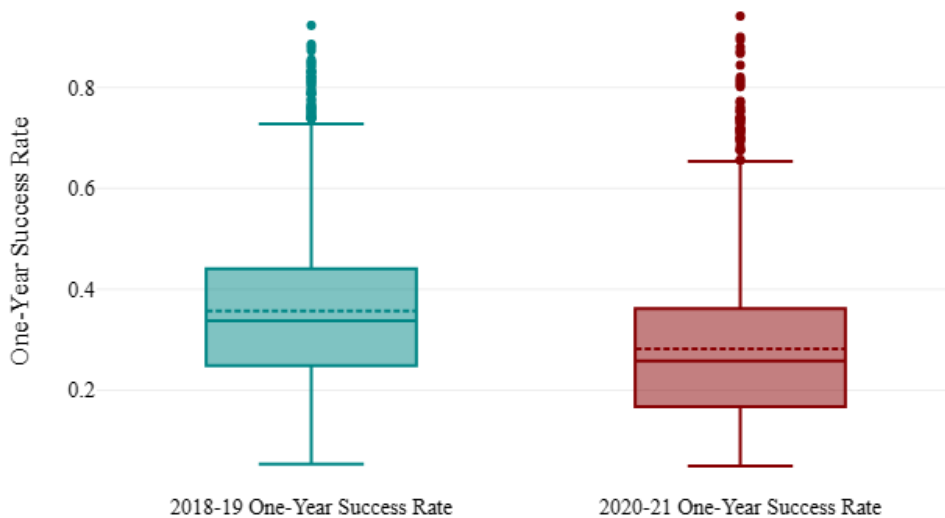
H₀₆: There is no significant difference in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 school year and the 2020-2021 school year.

A two-tailed t-test for paired samples was conducted to determine if a significant difference existed in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 and 2020-2021 school years. The results of the t-test demonstrated a statistically significant difference in school-wide TCAP one-year success rates between the two academic years, $t(1508) = 46.01, p < .001, 95\% \text{ CI } [0.08, 0.08]$. Given the

obtained p-value of $<.001$, which was lower than the pre-established significance level of $.05$, the researcher rejected the null hypothesis. The analysis revealed that the average one-year success rate for the 2018-2019 school year ($M = 0.37$, $SD = 0.16$) was significantly higher than the average one-year success rate for the 2020-2021 school year ($M = 0.29$, $SD = 0.15$). Figure 6 illustrates the distribution of school-wide TCAP one-year success rates for both academic years.

Figure 6

School-wide TCAP One-year Success Rates for the 2018-2019 and 2020-2021 School Years



Research Question 7

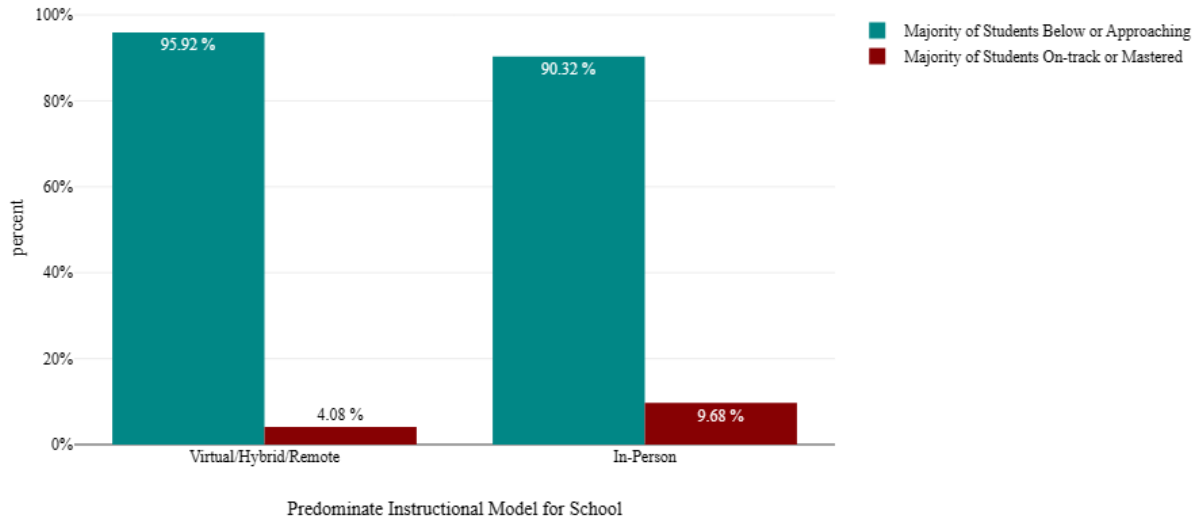
RQ7: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2020-2021 school year and the category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year (majority of students were classified as on-track or mastered, majority of students were classified as below or approaching)?

H₀₇: There is no significant relationship between the predominant modality of instruction used within a school in the 2020-2021 school year and the category of student achievement as indicated by TCAP one-year success rates in the 2020-2021 school year.

A chi-square test was performed to determine if a statistically significant relationship existed between the predominant modality of instruction utilized within a school during the 2020-2021 academic year and the category of student achievement, as indicated by the TCAP one-year success rates in the 2020-2021 school year. The results of the chi-square test revealed a statistically significant relationship between the predominant modality of instruction employed in a school during the 2020-2021 academic year and the category of student achievement as determined by TCAP one-year success rates in the same academic year, $\chi^2(1) = 10.64$, $p = .001$, Cramér's $V = 0.11$. The p-value obtained from the analysis was .001, which is lower than the pre-established significance level of .05. The chi-square test results led to the rejection of the null hypothesis. Schools that predominantly utilized the virtual/hybrid/remote instructional modality had a significantly higher proportion of students within the Below or Approaching TCAP success rate category (95.92%) than schools that predominantly utilized in-person instruction (90.32%) in the 2020-2021 school year. Figure 7 illustrates the percentages of schools within each defined category of student achievement by instructional modality.

Figure 7

Percentages of Schools Within Category of Student Achievement by Instructional Modality for the 2020-2021 School Year



Research Question 8

RQ8: Is there a significant relationship between the predominant modality of instruction used within a school (in-person, virtual/hybrid/remote) in the 2021-2022 school year and the school’s category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year (majority of students on-track or mastered, majority of students below or approaching)?

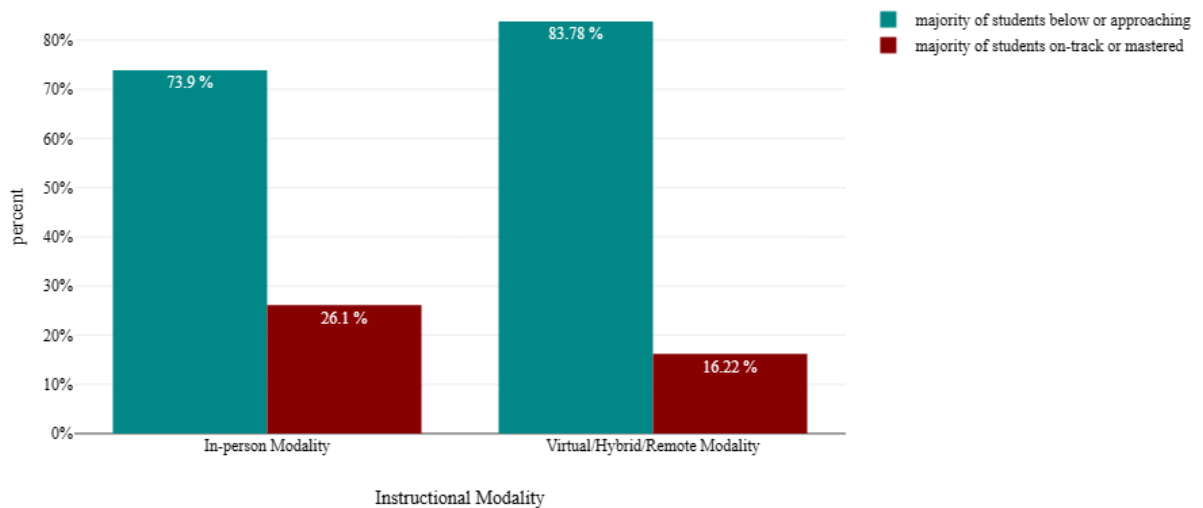
H08: There is no significant relationship between the predominant modality of instruction used within a school in the 2021-2022 school year and the school’s category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year.

A chi-square test was performed to determine if a statistically significant relationship existed between the predominant modality of instruction used within a school in the 2021-2022

school year and the school’s category of student achievement as indicated by TCAP one-year success rates in the 2021-2022 school year (majority of students on-track or mastered, majority of students below or approaching). The results of the chi-square test revealed no statistically significant relationship between the predominant modality of instruction utilized in a school during the 2021-2022 academic year and the category of student achievement as determined by TCAP one-year success rates in the same academic year, $\chi^2(1) = 1.83$, $p = .176$, Cramér’s $V = 0.04$. The p-value obtained from the analysis was .176, which is greater than the pre-established significance level of .05. The researcher failed to reject the null hypothesis based on these results. Findings showed that a majority of student underperformed on TCAP assessments within approximately 74% of schools that utilized predominantly in-person instruction in the 2021-2022 school year as compared to approximately 84% of virtual/hybrid/remote schools, a difference that is not significant.

Figure 8

Percentages of Schools within Category of Student Achievement by Instructional Modality for the 2021-2022 School Year



Research Question 9

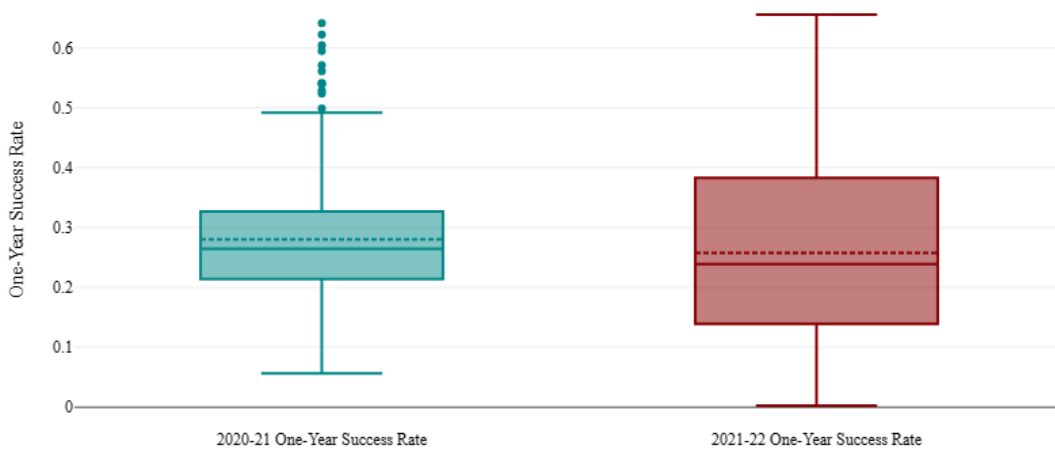
RQ₉: Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year?

H₀₉: There is no significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year.

A two-tailed t-test for paired samples was conducted to determine if there was a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used a virtual/hybrid/remote modality of instruction during the 2020-2021 school year, $t(292) = 3.81, p = <.001, 95\% \text{ CI } [0.01, 0.03]$. Findings from this analysis established that there was a significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates. Given the obtained p-value of .004, which was lower than the pre-established significance level of .05, the researcher rejected the null hypothesis. The analysis revealed that schools that utilized a predominantly virtual/hybrid/remote modality of instruction during the 2020-2021 school year had a significantly higher success rate ($M = 0.28, SD = 0.1$) during the 2020-2021 school year than success rates earned in the 2021-2022 school year ($M = 0.26, SD = 0.15$). Figure 9 illustrates the distribution of school-wide TCAP one-year success rates for both academic years.

Figure 9

School-wide TCAP One-year Success Rates for Schools that Utilized a Virtual/Hybrid/Remote Modality in the 2020-2021 School Year



Research Question 10

RQ₁₀: Is there a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years within Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year?

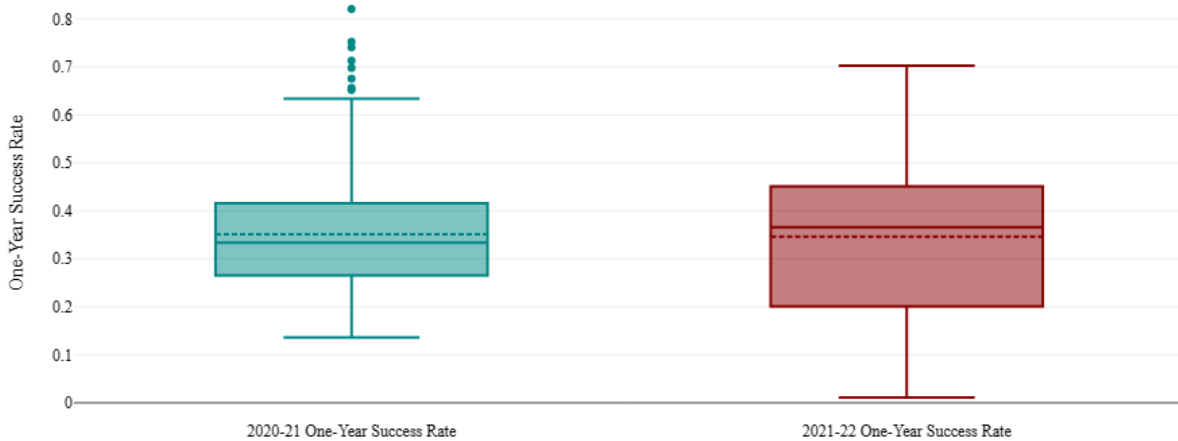
H₀₁₀: There is no significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year.

A two-tailed t-test for paired samples was conducted to determine if there was a significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for Tennessee public schools that used an in-person modality of

instruction during the 2020-2021 school year, $t(382) = 1.02$, $p = .311$, 95% CI [0, 0.01]. Findings from this analysis established that there was not a significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates. Given the obtained p-value of .311, which was greater than the pre-established significance level of .05, the researcher failed to reject the null hypothesis. Findings showed that schools that utilized a predominantly in-person modality of instruction during the 2020-2021 school year had a similar success rates during the 2020-2021 school year ($M = 0.35$, $SD = 0.12$) and the 2021-2022 school year ($M = 0.35$, $SD = 0.15$). Figure 10 illustrates the distribution of school-wide TCAP one-year success rates for both academic years.

Figure 10

School-wide TCAP One-year Success Rates for Schools that Utilized an In-Person Modality in the 2020-2021 School Year



Chapter Summary

Findings from Research Question 1 revealed a significant decrease in average ACT composite scores between the 2018-2019 and 2020-2021 school years, corresponding to the shift

to remote learning due to COVID-19. Findings from Research Question 2 showed no significant difference in ACT composite scores between students attending schools with predominantly virtual/hybrid/remote instruction and those with in-person instruction during 2020-2021. Findings gathered from Research Question 3 indicated there was no significant relationship between the instructional modality and the school's ACT composite score category relative to Tennessee's state average ACT composite score of 19.1. Findings garnered from Research Question 4 highlighted that there was no significant difference in school-wide TVAAS growth measure scores between the 2018-2019 and 2020-2021 school years. Research Question 5 revealed a significant relationship between the predominant instructional modality and the established category of student growth (showed growth, showed no growth), as indicated by TCAP growth levels within the 2020-2021 school year. Findings from Research Question 6 revealed a significant difference in school-wide TCAP one-year success rates between the 2018-2019 and 2020-2021 school years with higher success rates in the 2018-2019 school year. Findings from Research Question 7 showed a significant relationship between the predominant instructional modality and the school's category of student achievement, as indicated by TCAP one-year success rates during 2020-2021. Findings from Research Question 8 revealed no statistically significant relationship between the predominant modality of instruction utilized in a school during the 2021-2022 academic year and the category of student achievement as determined by TCAP one-year success rates in the same academic year. Findings from Research Question 9 established that there was a significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates. The analysis revealed that schools that utilized a predominantly virtual/hybrid/remote modality of instruction during the 2020-2021 school year had a higher success rate during the 2020-2021 school year as compared to success rates earned

in the 2021-2022 school year. Findings from Research Question 10 established that there was no significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates of Tennessee public schools that used an in-person modality of instruction during the 2020-2021 school year.

Chapter 5. Discussion, Conclusions, and Recommendations

In this non-experimental, quantitative study, the researcher used an ex post facto quantitative research design to explore the relationship between modality of instruction and school-wide academic outcomes. The study analyzed publicly available school-level data from the Tennessee Comprehensive Assessment Program Test (TCAP) and the American College Test (ACT). These data were used to compare academic achievement and growth outcomes of Tennessee students in relation to the modality of instruction used during the pivot from in person instruction caused by the COVID-19 Pandemic. This chapter presents the discussion, conclusion, and recommendations of the study.

Discussion of Findings

This study addressed research questions focused on the relationship between instructional modalities used by public schools in Tennessee and school-wide academic outcomes for the 2020-2022 school years. Furthermore, the purpose of this study was to assess differences in school-wide academic outcomes between the 2018-2019, 2020-2021, and 2021-2022 school years. The following section provides a summary of the key findings for each research question.

Research Question 1 sought to determine if there was a significant difference in school-wide ACT composite scores between the 2018-2019 and 2020-2021 school years. The findings revealed a statistically significant difference, with higher scores observed in the 2018-2019 academic year. Research Question 2 aimed to identify significant differences in school-wide ACT composite scores between students attending schools with predominantly virtual/hybrid/remote instructional modalities and those attending schools with predominantly in-person instructional modalities during the 2020-2021 school year. The findings showed no

significant differences. This result suggests that the modality of instruction did not significantly impact school-wide ACT composite scores during the 2020-2021 academic year.

Research Question 3 investigated the potential relationship between the predominant instructional modality employed within a school during the 2020-2021 academic year and the category of the school's school-wide ACT composite score. The findings showed no significant relationship, similar to the results of Research Question 2. Research Question 4 explored the potential difference in the school-wide TVAAS growth-measure scores earned by Tennessee public school students between the 2018-2019 and 2020-2021 school years. The findings indicated no significant difference in the school-wide TVAAS growth-measure scores. Research Question 5 led the researcher to explore the relationship between modality of instruction and school-wide TCAP growth level. The analysis revealed that there was a significant relationship between the predominant modality of instruction used within a school in the 2020-2021 academic year and the school's category of student growth as assessed by school-wide TCAP growth rates during the same academic year. Findings showed that schools that predominantly utilized in-person instructional models had a significantly higher proportion of schools within the category of "showed-growth" (85.23%) as compared to the proportion of schools that utilized predominantly virtual/hybrid/remote instruction within the same category of growth (72.86%).

Research Question 6 aimed to determine if a significant difference existed in school-wide TCAP one-year success rates earned by Tennessee public school students between the 2018-2019 and 2020-2021 school years. The findings showed a statistically significant difference with student academic success rates being higher in the 2018-2019 academic year. Research Question 7 sought to identify a relationship between the predominant modality of instruction used within a school during the 2020-2021 academic year and the category of student achievement, as

indicated by TCAP one-year success rates. The findings revealed a statistically significant relationship showing that a larger percentage of students were classified as on-track or mastered that used an in-person modality of instruction (10%) as compared to schools that used a virtual/hybrid/remote modality of instruction (4%). Research Question 8 revealed no statistically significant relationship between the predominant modality of instruction utilized in a school during the 2021-2022 academic year and the category of student achievement as determined by TCAP one-year success rates in the same academic year. Research Question 9 established that there was a significant difference between 2020-2021 and 2021-2022 school-wide TCAP one-year success rates. The analysis revealed that schools that utilized a predominantly virtual/hybrid/remote modality of instruction during the 2020-2021 school year had a higher success rate during the 2020-2021 school year as compared to success rates earned in the 2021-2022 school year. Research Question 10 established that there was no significant difference in TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for schools that predominantly utilized in-person instruction in both years.

Conclusions

The findings within this study showed mixed results relative to school-wide academic outcomes before, during, and after the pivot from in-person instruction caused by the COVID-19 Pandemic in the 2019-2022 school years. Findings showed that the pivot from in-person instruction did have a significant impact on school-level TCAP one-year success rates but did not have a significant impact on school-wide academic growth rates between the 2018-2019 and 2020-2021 school years. Furthermore, findings showed that modality of instruction did not have a statistically significant relationship to the alignment of a school's average ACT composite score to the Tennessee state-wide average ACT composite score of 19.1. However, findings

showed that there was a significant relationship between instructional modality and school-level academic growth and achievement with schools that utilized predominantly in-person instruction during the 2020-2021 school year having higher rates of student growth and achievement within that same year. When comparing TCAP success rates across school years, findings suggested that schools that utilized a predominantly virtual/hybrid/remote modality of instruction during the 2020-2021 and 2021-2022 school years had significantly higher TCAP success rates during the 2020-2021 school year. Additionally, findings revealed that there was no significant difference in school-wide TCAP one-year success rates between the 2020-2021 and 2021-2022 school years for schools that utilized predominantly in-person instruction for both school years.

Findings within this study that suggest instructional modality does have a significant impact on student's academic outcomes somewhat align with findings from previously released studies related to the impact of instructional modality on student academic success (Engzell et al., 2021; Goldhaber et al., 2022; Kuhfeld et al., 2022; Streich et al., 2021); however, some research related to efficacy of virtual/remote/hybrid instructional modalities conducted prior to the COVID-19 Pandemic posit that modality of instruction has no significant impact on student academic success (Carrol & Burke, 2010; Paul & Jefferson, 2019). Therefore, one could argue that modality is only one attribute of instruction that impacts student academic outcomes and that quality of instruction, regardless of modality, is a key-lever to determine a student's academic outcome.

The mixed results of this study suggest that the relationship between instructional modality and student performance is complex and may be influenced by various factors, including subject matter, student demographics, and the quality of instruction within the instructional modality. This research supports the notion that instructional modality is not the

sole determinant of student success, and other factors, such as student engagement, teacher effectiveness, and curriculum quality, also play crucial roles in shaping academic outcomes. Findings within this research provide valuable insights related to the impact of instructional modalities on student academic outcomes, with implications for policy, practice, and future research. As schools and districts continue to adapt to an ever-changing educational landscape, this study offers a foundation for understanding the complex relationship between instructional modality and student performance, emphasizing the need for ongoing evaluation, support, and innovation to ensure student success.

Recommendations for Practice

Findings within this study suggest that educational practitioners should critically analyze virtual and remote instructional practices to ensure that students receive high-quality educational opportunities regardless of teaching modality. Additionally, educational leaders should invest in additional, ongoing professional development for teachers who utilize virtual or remote modalities of instruction. Expanded professional development opportunities should focus on student engagement (Nguyen et al., 2021), developing strong teacher and student relationships (Quin, 2017), and how to provide quality instruction regardless of instructional modality (Farley, 2020). Lastly, educational practitioners who use virtual or remote instructional modalities should regularly monitor student progress to ensure mastery of materials and standards and to ensure that students do not fall behind in pacing or skill attainment.

Recommendations for Future Research

Future researchers should focus on identifying attributes of each instructional modality that drives positive academic outcomes. Moreover, future studies should refine the categorization of instructional modalities, this will help to more granularly determine which modalities provide

positive academic outcomes. Additionally, future researchers should explore how the frequency and duration of specific instructional modalities impact student academic outcomes.

Furthermore, conducting longitudinal analyses will be crucial for understanding the long-term effects of various instructional modalities on student academic outcomes. Tracking the performance of students who experienced different instructional modalities over multiple years can provide insights into the lasting impact of these teaching methods on student learning and growth. Future research should also examine external factors, such as differences in testing populations, test mode administration, and changes in assessments themselves, to understand their impact on the relationship between instructional modality and student academic outcomes.

Researchers should also investigate the relationship between instructional modality and student academic outcomes while accounting for additional variables, such as teacher quality, student engagement, and access to educational resources. Expansions of this study can offer a more holistic view of the factors that contribute to student performance and help identify the specific aspects of instructional modalities that may be most beneficial for student learning.

Finally, future research should employ qualitative approaches to gain valuable insights.

Researchers can use qualitative methodologies, such as case studies, interviews, or focus groups, to gain a deeper understanding of the experiences of students, teachers, and administrators who engage with different modalities of instruction. This approach can help identify best practices and strategies for implementing different instructional modalities and provide insights into the factors that contribute to the successes or challenges faced by schools.

Addressing these recommendations will allow future research to build upon the findings of this study and continue exploring the complex relationship between instructional modality and student academic outcomes. This ongoing exploration will ultimately help inform educational

policy and practice, ensuring that students receive the most effective instruction possible, regardless of the teaching modality employed.

Summary

The findings within this study suggest that the pivot from in-person instruction during the 2019-2020 and 2020-2021 school years contributed to undesirable academic outcomes for Tennessee students. Furthermore, this study showed that there was a statistically significant relationship between instructional modality and student academic outcomes, but findings suggest that the relationship had little practical impact on student academic outcomes. Therefore, instructional modality may not be a key determiner of student performance and practitioners should focus on providing quality instruction regardless of modality. Additionally, practitioners should identify attributes of various instructional modalities that provide positive student academic outcomes to ensure that students who engage in alternative modalities receive quality instruction. This information is crucial for educators, policymakers, and researchers as they strive to adapt and refine instructional practices in response to the evolving needs of students and the ever-changing educational system. Despite the limitations of the study, its results offer a solid foundation for future research that aims to explore the nuanced impacts of different instructional modalities on student learning. By building upon these findings and addressing the recommendations for future research, researchers can continue to investigate the complex relationship between teaching methods and student performance, ultimately guiding the development of effective educational policies and practices.

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VITA

MATTHEW BOWSER

Education: Ed.D. Educational Leadership East Tennessee State
University, Johnson City, TN, 2023
Ed.S. Educational Leadership Arkansas State University,
Jonesboro, Arkansas, 2017
M.S. Educational Leadership, Arkansas State University,
Jonesboro, Arkansas, 2015
B.S. History and Psychology, Crichton College, Memphis,
Tennessee, 2007

Professional Experience: Director of Virtual Schools, Tennessee Department of
Education, Nashville, Tennessee, 2021
Director of IT and Communications, Millington Municipal
Schools, Millington, Tennessee, 2017-2021
Manager of Employee Performance and Support, Shelby
County Schools, Memphis, Tennessee, 2014-2017
Performance Coach, Shelby County Schools, Memphis,
Tennessee, 2013-2014
Teacher, Shelby County Schools, Memphis, Tennessee, 2006-
2013