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Effects of Elementary and Secondary School Emergency Relief Grants on Math and English Language Arts Standardized Test Scores in Connecticut

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This is to certify that the doctoral study by

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MS, Walden University, 2010

BS, Brooklyn College, 2002

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Educational Leadership

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Abstract

The problem addressed through this study was the decrease in proficiency levels in math and English Language Arts (ELA) of 3rd- to 8th-grade students on standardized tests following the COVID-19 pandemic in Connecticut (CT). The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of the Elementary and Secondary School Emergency Relief (ESSER) grant funding in CT, while controlling for all other funds received. The theory that supported this study was Lezotte's school effectiveness and improvement theory. For this quasi-experimental, causal-comparative, between-groups research design, ESSER grant funding as well as ELA and math test performance scores for CT were retrieved from EDSIGHT, the publicly accessible website of educational data for CT. While the descriptive statistics indicate a decline in the ELA test scores and an increase in the math proficiency test scores, the ANCOVA revealed that these differences were not statistically significant. The findings in this study have the potential for positive social change by helping both school leaders and lawmakers better understand the relationship between emergency funding and student performance, providing a foundation for more targeted and effective allocation of resources. The effective use of financial resources in education might potentially benefit students.

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Chapter 1: Introduction to the Study

The COVID-19 pandemic created changes in education instruction, the delivery of such instruction, and how students learn from a new instructional platform (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). The shift from traditional to online instruction created challenges for student populations, affecting the learning abilities of many students. Experts claimed that online education prompted a decrease in student learning and performance due to multiple factors such as the extended closures and lockdowns creating a lack of socialization, failure to adapt to online learning environments, difficulties navigating the online environment, and problems receiving necessary tools for participating in online education (Clark et al., 2021; Gonzalez et al., 2020; Middleton, 2020; Tan, 2021). Students from families with low socioeconomic backgrounds were found unable to afford the necessary resources to connect to this new academic environment.

Background

The educational disruption during the COVID-19 pandemic raised concerns for educational leaders due to a significant and distinct drop in test scores, much of which was caused by students' lack of equipment and resources necessary for online learning. Researchers further examined how federal aid, such as the Elementary and Secondary School Emergency Relief (ESSER) grant funds available for underprivileged areas, did not provide sufficient amounts for obtaining the necessary equipment and services for online learning (Christopoulos & Sprangers, 2021; Gordon & Reber, 2021). The result was that many students fail to learn and pass the required standardized tests, which hinders their progress in their educational endeavors. Funding was allocated to assist many low-income families with equipment and Internet connections during the COVID-19 pandemic. However, the funding, while providing immediate assistance for addressing education gaps and disparities in access among this student population, did not significantly impact long-term outcomes for student academic achievement (Dorn et al., 2021).

Problem Statement

The problem addressed in this study was the decrease in proficiency levels in math and English Language Arts (ELA) among 3rd- to 8th-grade students on standardized tests following the COVID-19 pandemic in Connecticut (CT). Jackson (2020) concluded that while the relationship between school district resources and student outcomes has been established by prior research, future work must focus on the extent to which changes in spending are associated with student performance. Specifically, according to Jackson (2020), “by and large, the question of whether money matters [to academic performance] is essentially settled. Researchers should now focus on understanding what kinds of spending increases matter the most” (p. 14). Prior research also focused on the adequacy of school district spending in the United States in the 2017-2018 school year. The results included evidence of a few states with generally high levels of spending (such as Massachusetts and CT), specifically in CT. At the same time, few districts underspent; those districts had a larger population than other districts, and the relationship between per-student spending and performance was reflected in student outcomes (Baker, 2021). The findings from Baker (2021) were evidence supporting the existence of a critical scholarly gap that needs to be filled. Baker identified gaps between student achievement and funding resources, noting that capital funds were not being applied to meet the needs of teacher resources or student educational improvements. Furthermore, Baker (2021) acknowledged the need for more research on this phenomenon.

Purpose of the Study

The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received.

Research Questions and Hypotheses

RQ1: What is the difference between the mean change in math standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0$1: There is no significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_1$1: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

RQ2: What is the difference between the mean change in ELA standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0 2$: There is no significant difference between the mean change in ELA standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_2 2$: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

Theoretical Foundation

The theory that supported the study was school effectiveness and improvement theory (SEIT). First developed by Hargreaves (2001), SEIT is a framework designed to support the understanding and enhancement of the effectiveness of educational institutions, as well as the improvement of student outcomes. The theory serves as a conceptual lens through which researchers can examine the relationships between education policy and students' academic achievement (Lezotte, 1991). The SEIT was grounded in the premise that school leadership and administrators can achieve high levels of effectiveness when resources align with the establishment of an environment conducive to quality teaching and learning (Leithwood & Jantzi, 2000). Leithwood and Jantzi (2000) posited that internal and external factors influence school effectiveness. The external factor of funding was the focus of this study. They focused on federal and state monies as resources contributed to the school through state and federal education policy. Leithwood and Jantzi also concluded that schools and districts can continuously improve by assessing their practices and making targeted changes to enhance student learning outcomes.

A crucial element of SEIT was the inclusion of resource allocation in school districts (Cheng, 2013). The purpose of the study involved the examination of per-student federal and state spending changes. Changes to per-student federal and state spending involve adjustments in resource allocation at the state and local levels, as well as changes in policy. As equitable and sufficient funding has been found in prior research to have a positive association with student performance (Hanushek, 2003), evidence exists supporting SEIT as a theoretical framework in research focused on the relationship between spending and outcomes in education. The study focused on the dynamics of educational policy in relation to changes in educational spending and the extent to which these changes were related to outcomes for student performance in math and ELA. Insights from scholars who have contributed to the body of peer-reviewed research, as well as the application of SEIT, support the importance of further research. Jackson (2020) conducted extensive research on factors influencing student achievement, emphasizing the importance of teacher effectiveness. Jackson’s (2020) research aligns with SEIT's focus on the role of teachers in creating effective schools and suggested that money has an implication to academic performance. Such is related to the goal of investigating the effects of funding on teacher quality and student outcomes.

Nature of the Study

The research methodology was quantitative. The research design employed a between-groups, causal-comparative, quasi-experimental design, given the "before and after" nature of the research questions and hypotheses (Thomas & Thomas, 2021). Therefore, the research design was aligned with the research questions and hypotheses (Barroga & Matanguihan, 2022). Because the purpose statement included the same word choice and verbiage as the research questions and hypotheses, the research design was aligned with the purpose statement (Barroga & Matanguihan, 2022). The design was aligned with the problem as far as the extent to which funding changes from different sources were statistically related to math and ELA standardized test scores was not known (Baker, 2021; Jackson, 2020).

The data gathered was aggregated information from 180 schools in CT. The dependent variable was the mean change in math scores, calculated as the average of year-over-year score changes over the 3 years of the ESSER grant program and the 3 years preceding it, excluding the COVID years of 2020, during which there was no data. The dependent variable was the mean change in ELA scores, calculated as the average of year-over-year score changes over the 3 years of the ESSER grant program and the 3 years preceding it, excluding the COVID-19 years of 2020, during which there was no data. The independent variable was a binary variable coded 1 for years during which the school district receives ESSER funds and 0 for years during which the district was not in receipt of ESSER funds. ANCOVA was completed for hypothesis testing after post-assumption testing.

Definitions

ELA Standardized Scores: English Language Learning Scores are standardized scores that indicate grade level scores specific to K-12 learning systems (Christopoulos & Sprangers, 2021).

ESSER Grant Funding: ESSER grant funding is supplied on a year-to-year basis for assessing appropriate funding dependent on Math and ELA standardized scores (Gordon & Reber, 2021).

Math Standardized Scores: Math standardized scores refer to the specific grade level scores that students submit and complete within the K-12 learning system (Christopoulos & Sprangers, 2021).

Assumptions

Several assumptions existed for the study. One key assumption was that data collection was performed in earnest and accurately. The assumption was that the secondary data used in this study were collected and recorded. Another assumption was that external economic factors were not variant to the degree that it would have had a material effect on the purchasing power of funds. The data was accumulated over several years. It was also assumed that external social factors, such as differences in parental involvement or the application of social media to facilitate learning, made a material difference in math and ELA knowledge for third- to eighth-grade children over the eight years for which data were analyzed.

Scope and Delimitations

Multiple delimitations existed for the study. CT was selected because it is one of the few states where data concerning each of the variables could be collected feasibly. Another delimitation was that the population included only students from the third to eighth grade range. The study was also delimited to ELA and math performance.

Limitations

The study included several limitations. One key limitation was the inclusion of secondary data. Secondary data were data collected by an entity or group other than the primary researcher for a study. The role of inflation on the purchasing power of funds was not considered in the study. The use of secondary data was a limitation because the researcher cannot entirely ensure the veracity of the data collection activities undertaken by the original data collectors. Another limitation was that the measurement of math and ELA was based on the results of standardized state examinations. I did not hold a role in the development of those tools.

Significance

The quantitative study extended beyond analyzing the relationship between per-student federal and state spending and math and ELA performance in CT school districts from 2016 to 2023. I designed the study to support a critical evaluation of the effectiveness of educational funding, which is essential for policymakers and educational leaders. The study may inform strategic decision-makers concerning educational investments, as the findings may highlight specific effects of spending on key subjects.

The highlight of spending on math and ELA can lead to significant improvements in student outcomes.

I uncovered deeper insights into the CT education system. The study may support the researcher in revealing previously unnoticed inequities and inefficiencies in the vestiges of state policy concerning the expenditure of state and federal funds on education, particularly in ELA and mathematics. Bringing these issues to light can support educational leadership in conversations with policymakers and the public concerning how to address and rectify critical economic disparities, leading to policies and interventions aimed at uplifting underperforming or neglected districts and fostering an equitable educational environment.

The study's implications have the potential to affect wider society positively. The improvement of educational outcomes in areas such as math and ELA shall prepare individuals for successful futures and contribute to an informed and productive citizenry. The benefits range from a more dynamic economy to a more engaged public. Understanding how education funding affects student success contributes to academic literature and lays the groundwork for positive change that can benefit individuals, communities, and broader society.

Summary

The COVID-19 pandemic altered the delivery level of educational content but also raised potential concerns about student proficiency levels in math and ELA scores (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). The problem addressed in this study was the decrease in proficiency levels in math and ELA among

3rd- to 8th-grade students on standardized tests following the COVID-19 pandemic in CT. The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of the ESSER grant funding CT, while controlling for all other funds received. The theory that supported the study was SEIT. The research methodology was quantitative. The research design was a between-groups, causal-comparative, quasi-experimental design. The following chapter presents a review of the literature. In Chapter 2, the key literature and theoretical framework are reviewed.

Chapter 2: Literature Review

The effects of the COVID-19 pandemic on education institutions in the United States and around the globe are far reaching and multifaceted. Specifically, in K-12 education contexts, many researchers have suggested that the effects of the COVID-19 pandemic were and continue to be long-lasting and harmful to student outcomes, student learning, and teacher professional development and preparedness (e.g., Jack et al., 2023; Nwokocha & Elijah Etukudo, 2022; Rosenweig, 2022). Socioeconomically disadvantaged students and students of many marginalized minority populations faced compounded challenges resulting from the COVID-19 pandemic, due to a lack of accessibility to resources, funding, support, and financial opportunities (Rosenweig, 2022). Rosenweig (2022) speculated that the effects of the COVID-19 pandemic on K-12 education outcomes, specifically resulting from the rapid shift to virtual learning environments, loss of resources and human capital, and other dramatic changes that arose during the COVID-19 pandemic, may continue to be an issue moving forward, that educators must address to maintain the sustainability and success of today's public education institutions. Some research findings have shown that academic outcomes and standardized test scores have dropped dramatically during the COVID-19 pandemic and continue to lag far behind pre-COVID pandemic levels across literacy and STEM subjects (Jack et al., 2023; Nwokocha & Elijah Etukudo, 2022).

More specifically, the study addressed the problem of a decrease in proficiency levels in math and English language arts among third to eighth-grade students on standardized tests following the COVID-19 pandemic in CT (Halloran et al., 2023).

Boughton et al. (2021) suggested that federal grant and rescue funding, such as the ESSER grant interventions, were intended to minimize poor test outcomes and mitigate the long-term detrimental effects of COVID-19 pandemic on achievement scores by providing supplementary financial resources and support to schools, allowing them to recuperate more resiliently. Unfortunately, per-pupil funding amounts received varied dramatically between geographic contexts, further highlighting the pre-existing socioeconomic disparities affecting school districts across the states (Gordon & Reber, 2021). Consequently, Gordon and Reber (2021) suggested that although the ESSER grant funds provided considerable relief averaging $500 per median income student and $1,000 per student living in poverty using proportional distribution of federal aid, extremely low poverty districts were found to face extreme budget shortfalls still, while affluent districts had an excess of funds.

Gordon and Reber's (2021) highlighted that a doubled amount of grant funding allocated to students living in poverty, on average, was likely not sufficient to maintain or encourage academic growth, especially considering significant gaps and disparities continue to be observed between socioeconomically privileged versus underprivileged areas (Halloran et al., 2023; Jack et al., 2023; Nwokocha & Elijah Etukudo, 2022). However, research remained inconclusive concerning the specific efficacy of ESSER grant funds in encouraging improved student outcomes. Hence, with specific regard to CT, a gap in research existed concerning the change in math standardized test scores for elementary school students before versus after the introduction of ESSER grant funding while controlling for all other funds (Lewis & Kuhfeld, 2023). To contribute to filling this research gap, the purpose of this quantitative study was to examine the difference in the mean change in math standardized test scores for Grades 3-8 over 4 years before and 4 years after the introduction of ESSER grant funding, while controlling for all other funding sources. Chapter Two, the literature review, synthesizes the findings of research regarding how COVID-19 pandemic affected elementary school outcomes and the influence of grant-funded programs on school resilience and success. The literature reviewed in this chapter also supported the need for future research and provided a basis for contextualizing the findings of this study. First, I describe the search strategy used to identify literature for inclusion in this chapter. Next, I include a discussion of this study's guiding theoretical framework, the SEIT (see Townsend, 2007). Finally, the bulk of the literature review was divided into three primary sections, concluding with a summary of the need for future research and a transition to Chapter 3. These primary sections include the effects of COVID-19 pandemic on education, the role of funding, and educational recovery, and theoretical perspectives on school improvement.

Literature Search Strategy

A Boolean search of literature was conducted by inputting the following numbered search terms and phrases into the Educational Resource Information Center (ERIC), Google Scholar, ORCID, PsycINFO, Scopus, and ScienceDirect. The first number that follows each search term or phrase indicates the total number of search results that populated the search phrase, for all time, when averaged across databases. The second number indicates the total number of search results populating each church phrase, averaged across databases, but after results were constrained to research published during and after 2020. Only recent literature published during and after 2020 was chosen for inclusion in this literature review, except for seminal work that related to and informed the origin of the studies guiding the theoretical framework. Also, only peer-reviewed literature, including journal articles and books, or government database publications, was chosen for inclusion.

1. “School Effectiveness and Improvement Theory”
2. “Effects” + “COVID-19 Pandemic” + “Education “
3. “Role” + “Funding” + “Educational Recovery”
4. “Theoretical Perspectives” + “School Improvement”

Based on the search results listed above, there is a lack of literature concerning the SEIT. Hence, when discussing the applications of this theoretical framework in practical school settings, research was also reviewed that includes components or assumptions of the theory, even when the theory was not formally named. Additionally, a relative lack of literature was found concerning the role of funding in educational recovery, despite the wealth of literature published on the effects of COVID-19 pandemic on education. Hence, the study made essential contributions to filling the gap regarding the intersection of school effectiveness and improvement theory, as well as the role of funding in COVID-19 pandemic educational recovery.

Theoretical Foundation

The SEIT was selected as the most suitable theoretical framework to guide the study. The SEIT (Townsend, 2007) was developed based on key assumptions that describe how school improvement ought to be effectively carried out, especially following significant change or challenge (Porter, 1996; Townsend, 1996). These assumptions specify aspects that were thought to be essential to emphasize and focus on with regard to school improvement and include contextual understanding, a focus on efficacy, and commitment toward continual improvement, he focused on school leadership, the necessity of teacher collaboration, the leveraging of data-informed decision making, community engagement, and a commitment to inclusivity and equity (Cheng, 2013; Townsend, 2007). The importance of contextual understanding is based on the assumptions that schools operate most effectively and efficiently when all stakeholders involved, including administrators, board members, teachers, and students, have a holistic and contextual understanding of the economic, cultural, social, and political factors influencing school functioning. A holistic understanding enables all stakeholders to make informed decisions and most effectively leverage resources, thereby focusing on efficacy and continuous improvement that is specific to the school's context, rather than merely keeping up with an ambiguous status quo (Porter, 1996; Townsend, 2007).

Furthermore, the SEIT theory is a framework that also emphasizes the importance of school leadership and teacher collaboration. Effective leadership is considered paramount for school improvement, as it is a critical component of effective change management and the development of trusting relationships between leaders and subordinates, such as teachers and students, as well as between administrators, board members, executives, and teachers (Porter, 1996; Townsend, 2007). Additionally, school leadership is believed to foster a positive school culture, where students from diverse backgrounds can learn equitably and effectively utilize available resources. Also, through collaboration, teachers have the chance to learn from one another and thus support one another through the process of change and access to resources (Cheng, 2013; Townsend, 2007). Data-informed decision-making is thought to be important so that decisions can be guided and made based on real-time data and the continuous changes or evolution characterizing student progress, and the school's needs, or teachers' needs regarding professional development and support. Also, because big data and machine learning are increasingly being incorporated into today's industries, including education settings, leveraging the capacities of big data and machine learning can help education institutions remain competitive (Creemers et al., 2022).

Finally, community engagement, inclusivity, and equity are concepts considered fundamental to the success of any school, as viewed through the lens of the SEIT (Creemers et al., 2022; Townsend, 2007). Community engagement is critical because not only are schools' integral components of the community, but also, the economic and social health and growth of the surrounding community and families participating in and attending the school are fundamental to the school's success. Hence, community engagement involves focusing on educating parents and students, as well as involving them in decisions regarding the use of school funding, curriculum changes, and learning contexts (Creemers et al., 2022). For instance, as many schools permanently shift to hybrid or virtual environments, the SEIT can be applied to explain the importance of involving families in these decisions and to validate whether hybrid or virtual environments best serve the needs and capacities of the enrolled students. By including families and community members, schools can move toward more equitable processes and policies that make education more accessible to students of diverse backgrounds, and therefore, theoretically, result in optimized and sustained academic improvement scores (Cheng, 2013; Townsend, 2007).

A lack of literature was found that specifically discusses the applications of the EIT in today's educational context, particularly surrounding the effects of the COVID-19 pandemic on K-12 schools. However, since the theory's origination, some research has applied the framework to justify the importance of stakeholder collaboration and community professional development programs in schools (Sims & Fletcher-Wood, 2020). Also, Lasaiba (2023) applied the theory to contribute to explaining the efficacy of the 5e learning cycle model in optimizing student learning outcomes. Moreover, Pettersson (2020) used the SEIT to contextualize an understanding of the role and position of digital technologies in supporting data-informed decision-making and school progress and sustainability amid change. Finally, Mintrop (2020) recently published a practical guide for school leaders on how to implement school improvement initiatives using the SEIT framework effectively. The study contributed to the existing but limited pool of empirical literature that describes the relevance of the SEIT when applied to modern-day educational contexts.

Literature Review Related to Key Variables and Concepts

The literature reviewed through the following three primary sections explores the effects of COVID-19 pandemic on education according to changes in student learning and performance, and according to responses to educational disruption during the

COVID-19 pandemic (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). The second primary section explores and synthesizes research concerning the role of funding in educational recovery, first according to the influence of ESSER grant funding on school recovery, and next, by describing and comparing the effects of ESSER grant funding with other educational funds, both private and public (Nelson et al., 2021; Stella, 2020). The influence of technology, both in education recovery and in how effectively grant funds are used, is a predominant theme arising throughout the literature reviewed, likely because exponential expansions in technological tools are rapidly shifting education contexts and how education is delivered, as well as how institutions evolve and adapt (Rangone, 2023).

Finally, the third section of this literature review describes the practical application of various theoretical perspectives and ideas in the context of school improvement. The third section first includes a subsection concerning the SEIT and addressing educational gaps, while the second subsection explores the application of the SEIT in post- COVID-19 pandemic recovery (Delcker & Ifenthaler, 2020; Grooms & Childs, 2021; Townsend, 2007). The sections and subsections of this literature review were developed in alignment with the study's research questions, which include: RQ1: What is the difference between the mean change in math standardized test scores for Grades 3-8 (lumped) scores for before and after the introduction of ESSER grant funding while controlling for all other funds, measured as mean per-student funding across the same periods? RQ2: What is the difference between the mean change in ELA standardized test scores for Grades 3-8 (lumped) scores for before and after the introduction of ESSER grant funding while controlling for all other funds, measured as mean per-student funding across the same periods?

Effect of the COVID-19 Pandemic on Education

The COVID-19 pandemic had tremendous effects on multiple facets of educational institutions and student learning around the globe (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). Traditional learning models were disrupted, and teachers and students were forced to shift to online, digital environments rapidly, which highlighted and exacerbated disparities for populations already lacking access to technology, financial funding, or other resources necessary to navigate the transition with ease. Many teachers faced difficulty effectively engaging students in online settings, and others faced technology literacy gaps that compromised the quality of instructional delivery (Nickerson & Sulkowski, 2021). Because of the complex ways in which lockdowns and closures detrimentally affected education settings and instigated rapid change, many Students suffered significant declines in standardized test scores and academic outcomes. K-12 settings were most heavily affected concerning academic outcomes (Middleton, 2020).

Many researchers speculate that the personal stress navigated during the COVID-19 pandemic made engaging in academics more difficult for some students who were heavily affected (e.g., Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). Hence, the challenges arising from COVID-19 pandemic point to the need for schools to develop more resilient models of change management going forward (Kaffenberger, 2020). The first subsection herein describes the resulting changes in student learning and performance, and the second subsection describes responses to educational disruption during the COVID-19 pandemic.

Changes in Student Learning and Performance

Significant changes in student learning and performance can be seen by comparing pre-COVID-19 pandemic student outcomes with post- COVID-19 pandemic outcomes among similar, comparable populations. These changes in learning and performance are attributed to the challenges presented by remote learning, digital literacy gaps, learning loss, assessment and evaluation challenges, emotional stress, and social distancing and isolation, closures, lockdowns, and logistic disruptions, to name only a few (Chisadza et al., 2021). Many students, especially those from socioeconomically underprivileged backgrounds, lacked the hardware and technology tools with which to adapt to new learning environments adequately (Clark et al., 2021; Gonzalez et al., 2020; Tan, 2021). Others lacked digital literacy skills (Tan, 2021). Similarly, many teachers marked the digital literacy skills with which to help students adapt or successfully deliver instruction through virtual settings. To compound matters, many teachers and students suffering from digital literacy gaps lack administrative support, resources, and funding to overcome these gaps due to the context of poor neighborhoods or rural settings in which they reside (Tan, 2021). Also, extended closures and lockdowns resulted in learning loss and stalled curriculum progress.

A lack of face-to-face instruction in combination with inconsistent and difficult-to-navigate access to educational resources contribute to skill and learning gaps across subjects and grade levels, especially for students without consistent or stable access to wi-fi, up-to-date technology, or students with special learning needs or challenges (Clark et al., 2021; Gonzalez et al., 2020; Middleton, 2020). Some students, such as those who are neurodiverse, also struggled to maintain engagement and skill acquisition with a lack of face-to-face interaction and the demonstration, modeling, and mentorship that often accompany face-to-face instruction (Limniou et al., 2021; Zheng et al., 2021). For example, Chisadza et al. (2021) found that students' engagement and performance dropped significantly in correlation with online learning as a result of the COVID-19 pandemic. Similarly, Nazempour et al. (2022) showed that students in remote settings performed more optimally than face-to-face students.

However, whether lowered engagement and test scores report the results of online learning alone, or the compounded stress of the COVID-19 pandemic and the rapid shift to a new learning environment remains unspecified. Research findings regarding the effects of online education are inconclusive. Zheng et al. (2021) highlighted the benefits arising as a result of online education, such as greater logistical flexibility and the ability to use software and artificial intelligence (AI) interfaces to adapt instructional delivery to the specific learning styles and individual needs of diverse students. For instance, Zheng et al. (2021) presented survey results indicating that 80% of the students surveyed expressed a preference for continuing with online instruction and learning. These same students perceived course engagement and engagement with faculty and classmates positively in online environments.

One of the consequences of the effects of school closures and lockdowns on student learning and education outcomes is that many researchers speculated that the learning losses and drops in academic achievement scores correlating with school closures during the COVID-19 pandemic could continue for years to come if educators do not effectively identify new strategies for navigating change and facilitating student learning in the 21st, digitally saturated, century (Clark et al., 2021; Kaffenberger, 2020). Based on recent evidence, lags in student achievement scores have continued for the past 3 years, following the COVID-19 pandemic, which remains most pronounced in K- 12 settings (Gonzalez et al., 2020; Kaffenberger, 2020). However, Gonzalez et al. (2020) call attention to the fact that students' learning outcomes were not analyzed as acutely and consistently in many contexts, prior to the effects of the COVID-19 pandemic, which is causing some scholars question the degree to which the COVID-19 pandemic was solely responsible for detrimentally effecting student learnings, or the degree to which an increase in analysis highlights pre-existing disparities.

Still, research findings remain inconclusive, as Jia et al. (2021) found no statistically significant difference in student achievement between online and face-to-face environments based on an analysis of 2021 data. Conversely, Tan (2021) found face-to-face social presence to be the most cited and most important factor in affecting students' learning performance. Students who lacked face-to-face social interaction with peers and teachers were found to lose motivation and perform more poorly (Tan, 2021). The conflicting and diverse findings of research point to the multifaceted and complex nature of the way the COVID-19 pandemic affected and continues to affect schools. As a result of the complexity of the effects, teachers, board members, families, and administrators have responded in a variety of ways (Wyse et al., 2020) Wyse et al. (2020) suggested the need for educators to adopt more effective decision-making frameworks and tools moving forward.

Responses to Educational Disruption during the COVID-19 Pandemic

The responses of educators during and following the COVID-19 pandemic varied dramatically depending on factors such as available resources, training, funding, socioeconomic and cultural context, and other demographic factors (El Masri & Sabzalieva, 2020). Many schools, especially public schools operating under state and federal mandates, were forced to respond by closing for a set period, indefinitely or until further notice, and/or shifting classroom contexts to online, virtual learning (Williamson et al., 2020). The rapid shift to online learning and the closures navigated were ridden with the complexities of conflicting political views between and among parents and teachers, and often conflicting pressure from federal and state regulators as opposed to parents and community members with differing views, which made responding equitably and diplomatically challenging (Williamson et al., 2020).

Parents and educators alike disagreed about how education should be delivered, and many school districts struggled to afford and adopt technology rapidly enough to avoid significant curriculum delivery and learning losses (Okoye et al., 2021). Okoye et al. (2021) suggested that hybrid models were and are more effective at meeting the demands of adaptation while preserving the benefits of face-to-face learning. Moreover, Christopoulos and Sprangers (2021) found that although technology was and continues to be tremendously helpful in bridging the physical distancing gaps and geographic barriers created by the COVID-19 pandemic, the degree to which technology resulted in benefits for student outcomes varied dramatically depending on context. Furthermore, the degree to which educators responded by adopting robust technology depended on pre-existing digital literacy skills and funding (Christopoulos & Sprangers, 2021). While federal aid such as the ESSER grant funds became available, for underprivileged areas, these funds were not always sufficient to meet the challenges faced and the resources required to remain resilient (Gordon & Reber, 2021).

Also, the level and nature of response that varying districts experienced depended on teachers' pre-existing training and level of development. Novice teachers were found, in some instances, to experience greater struggle navigating shifts in pedagogical approach resulting from online formats, while younger teachers, considered digital natives, were sometimes able to more efficiently and quickly learn new digital platforms and interfaces (El Masri & Sabzalieva, 2020; Kalloo et al., 2020; Rahayu & Suprina, 2021; Reuge et al., 2021). Schools with adequate funding were more easily able to implement specialized and rapid training and professional development for teachers, to help them quickly shift from traditional learning formats to virtual platforms (El Masri & Sabzalieva, 2020; Kalloo et al., 2020; Rahayu & Suprina, 2021). For example, Kalloo et al. (2020) evaluated the challenges and opportunities teachers faced when shifting to virtual environments during the COVID-19 pandemic and found that educators who were more deeply connected to other community stakeholders, such as parents, third-party supportive organizations, and who had positive relationships with other colleagues exhibited more creativity and agility in responding to the challenges and shifting classroom formats. The findings of Kalloo et al.'s (2020) study attest to the importance of community support and informal connection as potentially as important as formal professional development training in fostering resilient responses.

Several other themes arose through the literature reviewed concerning the way in which educators responded to the disruptions caused by the COVID-19 pandemic. These themes included an increased focus on equity measures, the implementation of alternative instructional models, and the provision of support for vulnerable students (Elangovan et al., 2020; Reuge et al., 2021; Woolliscroft, 2020). Although students of vulnerable populations were found to face greater academic outcome disparities in education gaps as a result of preexisting systemic inequities, the challenges arising during the COVID-19 pandemic called educators' focus on the need for greater equity and instructional models that specifically tailored learning to the individualized needs of students, especially marginalized populations (Elangovan et al., 2020). For instance, some schools, especially those with greater relative funding levels, implemented higher Internet bandwidth to increase Internet connectivity for students, or distributed free devices such as laptops and tablets, to allow students to learn and log into class virtually (Woolliscroft, 2020; Y. Zhang, 2022).

Alternative instructional models most included virtual learning, with some schools pursuing hybrid learning and allowing students to continue learning in person, with certain distancing and safety precautions and regulations followed (Reuge et al., 2021; Woolliscroft, 2020; Y. Zhang, 2022). Furthermore, some schools adopted asynchronous learning approaches, wherein students were allowed to access course materials and complete assignments at their own pace. In contrast, others were required to attend class by logging in synchronously (Y. Zhang, 2022). The success of asynchronous versus synchronous education, and virtual versus in-person versus hybrid formats varies depending upon the school's funding and cultural context. As described previously, socioeconomically impoverished schools were provided with an average of $1,000 per student because of the ESSER grant funding, while students from affluent neighborhoods were provided with an average of $500 per student (Gordon & Reber, 2021). However, the doubled average funding for students living below the poverty line was found in most instances not to be sufficient to cover the needs of these schools (Gordon & Reber, 2021). Students from underprivileged populations required $3,000 to $4,000 per student to make a significant effect in bridging caps in resource needs, technology provisions, teacher preparation and development, special support services, and improvements in student learning outcomes (Gordon & Reber, 2021; Reuge et al., 2021; Woolliscroft, 2020). Hence, across the various responses initiated by districts, a synthesis of the literature reveals the need for greater support for vulnerable students, such as neurodiverse students, and those facing intersectional disparities and identifying with one or more minority identities (Nickerson & Sulkowski, 2021).

The first section of this literature review describes the findings and conclusions of data concerning the effects of COVID-19 pandemic on education, beginning with the discussion of changes in student learning and performance, and following, describing responses to educational disruptions during the COVID-19 pandemic. The findings of the literature review overwhelmingly indicated that the rapid shift to online learning presented multifaceted challenges for educators and students alike. Although online learning formats presented logistic advantages and advantages concerning tailored learning and instructional models, many teachers and students faced challenges adapting due to a lack of resources or digital literacy gaps (Kaffenberger, 2020). Challenges such as this resulted in significant student learning and outcome disparities, with K through 12 students most heavily affected by statistically significant drops in standardized test score outcomes during and post- COVID-19 pandemic as opposed to pre- COVID-19 pandemic (Middleton, 2020). Moreover, the nature and type of responses to the COVID-19 pandemic also varied across geographic regions, according to the economic and cultural environment, and according to the resources accessible to educators, with most schools shifting to some type of virtual or hybrid learning format (Nickerson & Sulkowski, 2021). The varied nature of the effects of the COVID-19 pandemic and the types of responses initiated naturally raise questions concerning the role of funding and educational recovery.

Role of Funding in Educational Recovery

Although various types of federal, state, and private funding were initiated during the COVID-19 pandemic to facilitate a more rapid and seamless education recovery, the effect of funding varied according to the characteristics of different districts, and the specific intents of different funding types also varied (Stella, 2020). For instance, some funds were intended to be used for different purposes, such as for technology tools, teacher training, student tutoring support, or general purposes (Nelson et al., 2021; Rangone, 2023; Stella, 2020). In summary, funding was found to play a critical role in the educational recovery process, however, the efficacy of various types of funding measures according to the district was found to vary, raising questions about potential alternative recovery models, and the types of funding most appropriate for various contexts (Nelson et al., 2021; Rangone, 2023). The first subsection here describes the effects of the ESSER grant funding, and the second subsection describes a comparison of ESSER grant funds with other funding models.

Analysis of ESSER Grant Funding Effect

As described, the effects of the Elementary and Secondary School Emergency Relief (ESSER) grant funds varied dramatically depending on multifaceted factors such as district, cultural context, pre-existing available resources, teacher training, and other factors (Nelson et al., 2021; Stella, 2020). The ESSER funds were federally distributed during the COVID-19 pandemic to help support K through 12 schools and respond effectively to the challenges presented, in a more resilient manner. The funds were allocated as a component of the Coronavirus Aid, Relief, and Economic Security (CARES) Act (Nelson et al., 2021; Shores & Steinberg, 2022). The ESSER funds were intended to help schools upgrade technology for remote learning, purchase and implement the use of personal protective equipment, and minimize the effects of learning losses as a result of the COVID-19 pandemic (Stella, 2020).

The amount and distribution of funds varied across states and school districts, based on qualifying factors such as student enrollment numbers, poverty levels, and various other demographic indicators. Each state education agency was deemed responsible for appropriately allocating the funds to underlying local education agencies (Shores & Steinberg, 2022). Each local education agency then distributed the funds to individual schools. The specific distribution amounts of ESSER grant funds varied over time alongside the distribution and allocation of additional rounds of funding (Shores & Steinberg, 2022). Each additional round of funding was released as schools used the funds for various purposes. Nonetheless, billions of dollars were allocated to K through 12 schools throughout the United States (Nelson et al., 2021; Stella, 2020).

Also, many states afforded board discretion as to how funds would be used, requiring documentation. Yarrel (2023) found that many socioeconomically compromised schools with underprivileged student populations used funding more quickly than schools in affluent areas, which aligns with the findings of Gordon and Reber (2021), describing the significantly higher need for funding experienced by schools serving marginalized populations. However, the findings of researchers remain inconclusive concerning the efficiency or efficacy with which grant funds were used between underprivileged and privileged schools. Whether underprivileged schools would leverage or use available funds more efficiently if additional training, education, or management resources were provided remains unknown (Gordon & Reber, 2021; Shores & Steinberg, 2022).

As described, each district and each underlying individual school used funds differently. Researchers indicate that some school boards implemented explicit processes for evaluating expenditures and assessing needs before implementing expenditures (Cramer & Little, 2023; Hawaii State Department of Education, 2021). As ESSER grant funds were spent on technology infrastructure, the purchasing of instructional materials, professional development programs for educators, the implementation of mental health services, and even facility upgrades to support safety measures during COVID-19 pandemic (Brooks, 2024). In some instances, ESSER grant funds were even used for the implementation of arts education, which progressive researchers believe contributes to fostering mental health and positive culture in schools, thereby building resilience (Brooks, 2024; Dik et al., 2021; Shaw, 2021). The effects of grant funding varied according to district and pre-existing resources and training. For instance, Brooks (2024) shows that some districts were more equipped to efficiently implement resources, while other districts gained far less of an ROI concerning learning outcomes and student achievement, relative to funding received.

Schools receiving greater funding due to disparities and socioeconomic oppression often experienced fewer effects correlated with funding measures, specifically regarding student learning outcomes, than schools receiving less funding, but contextualized in socioeconomically privileged areas (Cramer & Little, 2023; Gordon & Reber, 2021). Thus, while statistically significant effects on learning outcomes do correlate with some instances of ESSER grant funding use, the significant gap in achievement between economically privileged and underprivileged populations despite greater ESSER grant funding allocated to underprivileged populations highlights the potential greater influence of factors other than funding on student outcomes and educational progress (Brooks, 2024; Cramer & Little, 2023; Gordon & Reber, 2021). Thus, it seems imperative for educators to explore alternative models of fostering resilience, alternative funding models, and alternative approaches to education recovery.

Comparative Analysis with Other Educational Funds

Due to the complex and multifaceted nature of factors influencing the ROI experienced as a result of ESSER and other grant funds received, the lack of available research was found specifically concerning a comparison of the outcomes of ESSER grant funding versus other relief funding. However, concerning multiple types of private and federal COVID pandemic relief funding received by education institutions, many researchers conclude that the ROI and effects experienced very dramatically across districts and educational contexts, in relation to factors including but not limited to cultural differences, socioeconomic disparities, and available resources (Kelchen et al., 2021; Rangone, 2023; Willse, 2023).

After reviewing research concerning the potential effects of ESSER grant funds, in comparison to the potential effects of other federal and private funds received, intended to provide educational relief from the challenges arising due to COVID-19 pandemic, several factors emerged as characterizing differences between the effects of types of funding. Such factors were found to be related to the purpose of funding, the flexibility with which funding could be used, the duration of distribution and amount of funding allocated, reporting requirements and accountability, and the degree of equitable considerations entailed in funding models (Rangone, 2023). For example, some researchers found that funding allocated only toward technology purchases and not including funding allocation for training or development was correlated with a lesser effect on improved student outcomes in impoverished areas, thus suggesting the need for increased development and training in socioeconomically compromised areas (Muftahu, 2020; OECD, 2020; Rangone, 2023).

For districts with sufficient management and training resources, providing greater autonomy of funding use may be beneficial (OECD, 2020). The ESSER grant funds were intended to be a one-time distribution of funding for specific use in emergency educational relief (Kelchen et al., 2021). Although some ESSER grant funds were distributed in phases according to use, the ESSER grant funds were not intended to be a long-term funding model. Therefore, some researchers speculate this may explain why the ESSER grant funds were associated with fewer effects in bridging academic outcome disparities between marginalized and non-marginalized populations (Kelchen et al., 2021; Neofotistos & Kaxiras, 2020) since the ESSER grant funds were not necessarily designed to comprehensively and holistically address equity gaps and provide long-term, sustained training, development, cultural competence initiatives, and equitable interventions (Neofotistos & Kaxiras, 2020).

Although a variety of emergency relief and long-term funding allocated to schools during the COVID-19 pandemic was intended to bridge education gaps and disparities, for many districts, the inequities remained exacerbated and highlighted during shutdowns and as schools continued to reopen (Kelchen et al., 2021; Neofotistos & Kaxiras, 2020). El Masri and Sabzalieva (2020) describe that many federal and private actions and grant funds allocated that were intended to support education resilience and recovery, were unfortunately largely uncoordinated during the initial months of the COVID-19 pandemic and that colleges and universities demonstrated the most flexibility and agility in responding swiftly and proactively to the COVID-19 pandemic through shifts to virtual formats, and allocations for diverse students' accessibility measures.

Globally, some researchers contend that understanding and evaluating differences in the effects between types of funding is highly challenging, since multiple, complex factors influence how funding is used and its effects (Muftahu, 2020; OECD, 2020). Such factors included but not limited to national regulations, socioeconomic context, cultural framework, pedagogical approaches, pre-existing resources available to teachers and students, and pre-existing socioeconomic and learning disparities or gaps (OECD, 2020). In an effort to make the accessibility and availability of educational resilience and recuperation efforts more effective for multiple contexts across the globe, the OECD (2020) set forth various guidelines and best practice recommendations to inform educators' development of grant funds and education recovery strategies.

Makin and Layton (2021) provided a comparison of various government responses to the COVID-19 pandemic across the globe, finding that the nature of fiscal response varied according to government and that despite the good intentions of many government bodies, many fiscal responses were delivered in the inappropriate form, and too expansive for the capacities of overarching government bodies, thus resulting in long term debt and economic oppression between 2020 and 2024, despite initial short term gains realized during 2020 (Makin & Layton, 2021). Garcia's (2020) findings also support the findings of Makin and Layton (2021), showing that increases in short-term funding did not always pay off with respect to holistic, sociological long-term returns on investment.

Another key aspect uncovered throughout the literature explored concerning and comparison of the effect of ESSER grant funds and other types of funding was the intersection of indirect, or private funds allocated, including non-educational funds. The level of government-provided, household debt relief received by individuals during the COVID-19 pandemic likely also affected the degree to which students were able to succeed in school (Ahrens & Ferry, 2021; Oleksiyenko, 2021) However, a gap in understanding remains, considering that the allocation of private and non-educational funds to socioeconomically disadvantaged families did not always correlate with improved academic outcomes among these populations.

The second section of this literature review explored research related to the role of funding and educational recovery, beginning with a discussion of the effects of ESSER grant funds on education institutions and student outcomes, and concluding with a discussion of a comparison between ESSER grant funds and other funding models (Nelson et al., 2021; Rangone, 2023; Stella, 2020). Overall, a review of the findings of the research indicated that the effects of ESSER grant funds were significant in many instances, but not in relation to the amount of funding received. In other words, schools receiving more funding due to socioeconomic status did not necessarily demonstrate higher levels of recovery or resilience, thus raising questions about what factors were and continue to be most influential in fostering education recovery. Also, the findings reviewed indicated that concluding the effect of ESSER grant funds in comparison to other funding models was difficult, considering the complex and multifaceted nature of variables affecting the effect of funds. However, a review of the research revealed that multiple other factors influence the degree to which funding was adequate in achieving education improvement goals. These factors were explored in greater depth in the following section concerning theoretical perspectives on school improvement.

Theoretical Perspectives on School Improvement

The challenges arising as a result of the COVID-19 pandemic undoubtedly significantly reshaped education approaches and prompted many educational leaders to reconsider the theoretical perspectives used to guide and implement education programs, approaches, and recovery initiatives. Also, the COVID-19 pandemic prompted many education leaders to consider more effective ways of fostering education resilience and adaptability in future settings (Grooms & Childs, 2021). The SEIT is considered a traditional theoretical framework. As a result of the COVID-19 pandemic, aspects of the SEIT (Townsend, 2007) are being reshaped and reconsidered through a more progressive lens, including crisis management, the integration of technology, and trauma-informed approaches. Concepts within the framework, such as community partnerships, distributed leadership, and social-emotional well-being, are gaining greater recognition and emphasis concerning implementation approaches, and the prioritization of student learning equity across diverse populations (Delcker & Ifenthaler, 2020). The first subsection of this final section of the literature review discussed research findings related to SEIT in addressing educational gaps, and the second subsection described an application of the SEIT in post-COVID-19 pandemic recovery contexts.

SEIT in Addressing Educational Gaps

As described, the SEIT is a framework traditionally used to address educational gaps affected by socioeconomic, institutional, and cultural disparities. However, progressive movements in academia guided and informed by frameworks such as the critical race theory, intersectionality, and trauma-informed training led educators to reconsider traditional tenets and assumptions of the SEIT and adapt the framework to a more modern context (Muenks & Miele, 2020; Qablan et al., 2023). A cohesive review of the literature selected for inclusion in this chapter highlighted several ways in which the SEIT was used historically and is currently used to address educational gaps. First, the SEIT emphasizes understanding contextual factors influencing education outcomes.

Understanding contextual factors that influence the academic, social, emotional, and other education-related outcomes of students is imperative, considering the interdisciplinary nature of aspects influencing student success (Gilmour, 2021; Muenks & Miele, 2020). The COVID-19 pandemic undoubtedly highlighted the fact that multiple educational and personal factors contribute to fostering student success. Such factors include mental health, family context, social support systems, financial status, access to resources, pedagogical approach, school funding, and educational approach, to name a few (Gilmour, 2021). Therefore, the SEIT framework continues to be helpful in guiding the understanding and development of education recovery programs that consider the intersection of interdisciplinary factors in fostering student success. Such a perspective seems especially crucial and helpful, especially considering that funding models, though often correlated with effects on student learning, failed to bridge achievement gaps between pre-existing educational disparities, such that many groups receiving greater amounts of funding still lagged behind populations receiving lesser funding amounts (Gilmour, 2021). Hence, the SEIT is helpful in providing a context and framework within which to evaluate the potential influence of other, non-funding variables that may have a greater influence on student outcomes and learning. Similarly, the SEIT may be used to understand better how funding could be leveraged or applied to bridge such gaps (Muenks & Miele, 2020; Qablan et al., 2023).

Also, because the SEIT is a framework that includes emphasis on data-informed decision-making, the framework is beneficial in modern contexts characterized by rapid advances in machine learning and technological development (Grooms & Childs, 2021). The use of machine learning, AI, and other digital tools that rapidly collect and analyze student data can be used to minimize administrative overhead, thereby improving the efficiency and cost efficacy of evaluation and monitoring measures concerning student outcomes (Grooms & Childs, 2021; Heisig & Matthewes, 2022). Furthermore, the SEIT is also a framework that can be used to emphasize the importance of fostering community engagement, stakeholder participation, and school improvement initiatives. Engaging community partners other than direct school stakeholders could be an approach used to increase and leverage the ROI of funding experienced by socioeconomically compromised schools (Paulus et al., 2021). As community partners work together, gaps in funding or other resources can be overcome through pooled knowledge, support, and innovation (Grooms & Childs, 2021).

As described previously, a significant gap was found concerning the application of the SEIT in education and recovery approaches. However, some research, such as Delcker and Ifenthaler (2020), report research findings showing that economic recovery strategies, such as community support mechanisms, which align with the assumptions and concepts included in the SEIT, were positively correlated with improved measures of educational resilience. Such findings also apply to a global setting. For example, Xiang and Yan (2020) highlight the importance of an integrated approach to education recovery and resilience, as also specified in the SEIT framework, calling education the foundation of a society's future economic health and growth. The acceptance and integration of the SEIT framework and similar educational models globally also seem to be closely correlated with cultural, ontological perspectives (Bloch et al., 2021; Bulgarelli & Weiss, 2021). Said differently, research shows that democratic culture and those embracing progressive education concepts prioritizing trauma-informed education, inclusivity, and diversity, tend to gravitate toward the implementation of educational models similar to the SEIT that prioritize comprehensive, holistic evaluations of education resilience (Bloch et al., 2021). Similar models implemented include those emphasizing the importance of cooperative learning (Niti Widari, 2021; Segundo-Marcos et al., 2022), applied learning, and those emphasizing the importance of positive technology interventions (Bulgarelli & Weiss, 2021).

Application of SEIT in Post- COVID-19 Pandemic Recovery

Literature concerning the explicit application of the SEIT in post- COVID-19 pandemic education recovery settings was found to be lacking. Therefore, this final section of the literature review describes the findings and conclusions of researchers that were related, in some way, to applying tenets or concepts of the SEIT in post- COVID-19 pandemic education recovery, thereby attesting to the potential relevance of the framework in emergency response, education resilience, and education and emergency recovery. Through reviewing the literature, it became evident that certain aspects of the SEIT framework seemed to be most prominently and successfully applied in post-COVID-19 pandemic recovery initiatives, such as engagement in community and education partnerships, and the importance of equity and inclusivity (Aleria & Villocino, 2023; Townsend, 2007; Z. Zhang & Wasie, 2023).

The SEIT framework emphasizes the importance of engaging with community stakeholders and partners to develop innovative solutions to economic crises and educational challenges (Townsend, 2007). The framework also emphasizes the importance of developing equitable, inclusive interventions and pedagogical approaches that meet the specific learning needs and challenges of neurodiverse, racially diverse, and linguistically diverse populations (Campbell, 2021). Technology innovations were being used to develop more equitable, inclusive solutions for diverse classrooms while relieving teachers of administrative burdens by individually and manually tailoring instruction to meet students' individualized needs (Z. Zhang & Wasie, 2023). Furthermore, Aleria and Villocino's (2023) findings of a phenomenological study concerning the recovery of education skills showed that teachers' professional relationships with colleagues were cited as most impactful in helping them develop the skills needed to meet challenging demands presented by the COVID-19 pandemic, and as a result of diverse students' learning needs. Such findings show the importance of appropriately pairing funding and relief measures with frameworks and approaches that work to leverage funds properly. Conversely, Aleria and Villocino's (2023) findings also suggest that if not leveraged appropriately, or in the absence of community and professional support, funding may have little effect on fostering educational resilience.

Other findings show support and attest to the importance of community partnerships and social support in properly leveraging funding, thereby supporting the assumptions inherent in the SEIT (Aldosemani & Al Khateeb, 2022; Setyaningrum et al., 2023; Sofia Amriza et al., 2022). For example, through one study, the researcher described the quality of an improvement strategy leveraging aspects of the SEIT (Setyaningrum et al., 2023). The improvement strategy encompassed technological upgrades, emphasizing and encouraging student collaboration, and the implementation of routine observation and documentation by teachers. Such implementations align with aspects of the SEIT, which encourage the use of technology, stakeholder collaboration, and routine monitoring in conducting education improvements and recovery initiatives (Townsend, 2007). The researchers' findings indicated that collectively, the intervention was found to be correlated with improved learning outcomes as measured through standardized test scores, post- COVID-19 pandemic, as opposed to pre-intervention and pre- COVID-19 pandemic (Setyaningrum et al., 2023).

Although a variety of confounding variables may have affected the outcomes, the findings nonetheless point to the importance of and usefulness of holistic education recovery approaches. Similarly, Aldosemani and Al Khateeb (2022) designed an intervention aimed at minimizing learning losses and tested the efficacy in an LA school setting during the COVID-19 pandemic. The intervention leveraged various components of the SEIT framework in its approach, including the use of technology, collaborative learning, and data-informed decision-making. Specifically concerning data-informed decision-making, student test scores were routinely collected, analyzed, and used to adapt learning models and approaches monthly (Aldosemani & Al Khateeb, 2022). The results indicated positive outcomes associated with the intervention which suggested that SEIT-driven interventions that take a holistic and comprehensive approach to evaluating multiple aspects of education recovery and student outcomes may be more successful than approaches that merely allocate funding and leave funding use up to the discretion of relative districts without recommending a specific education recovery and change model.

Further describing and evidencing the usefulness of technology and technology-driven educational recovery approaches, researchers' findings show the importance of leveraging machine learning, data-informed decision-making, and AI in meeting the specific and diverse learning needs of students, especially in emergency response settings (Chatzipanagiotou & Katsarou, 2023; Sofia Amriza et al., 2022). E-learning can be engaged in synchronously or asynchronously. In either case, software modalities that routinely collect student use performance and engagement data can be implemented through online learning interfaces, which can significantly assist educators in evaluating the efficacy of these interfaces (Sofia Amriza et al., 2022).

Thus, with proper training and direction, the use of technology can be used to drive the adaptation of instructional and pedagogical approaches to foster improved student outcomes (Sofia Amriza et al., 2022). Moreover, Chatzipanagiotou and Katsarou (2023) suggested that as educators are better informed and prepared to understand how to implement such technological interventions and assistive tools, schools become more efficient, and funds can be used more efficiently to be allocated to leadership and cultural aspects of school improvement, such as cultural competence training, trauma-informed leadership, and other valuable tools aside from mere administrative overhead expenses (Jones et al., 2023; Reimers et al., 2022; Sokal & Eblie Trudel, 2023). Such adaptations and implementations of SEIT framework components may have national and global effects on revolutionizing the way in which education is approached in both non-emergent and emergency response contexts (Dzingirai & Ndava, 2022; Zancajo et al., 2022).

This final subsection of the literature review described theoretical perspectives on school improvement, including how the SEIT can be used to address educational gaps, and how the SEIT and components of the SEIT were used in post- COVID-19 pandemic recovery initiatives (Delcker & Ifenthaler, 2020; Grooms & Childs, 2021; Townsend, 2007). A lack of literature was explicitly found concerning the explicit application of the SEIT framework in education settings. However, considerable literature was found that described the application of some concept or component, or multiple components of, the SEIT framework in education settings, including post- COVID-19 pandemic recovery. Overall, the literature reviewed overwhelmingly supports the efficacy of SEIT framework-driven approaches in building academic recovery and resilience, despite the need to update the SEIT to include greater emphasis on inclusivity, equity, and trauma-informed education.

The Need for Further Research

The literature explored in this chapter was contextualized and synthesized through the lens of and concerning the SEIT framework (Townsend, 2007). The SEIT framework offers a context and lens through which education recovery programs can be designed using a holistic understanding of the multi-faceted, interdisciplinary factors that effects student success, learning outcomes, and education sustainability (Townsend, 2007). Although the framework represents a traditional approach to learning, and the COVID-19 pandemic initiated updated and progressive framework approaches and considerations among educators, research evidence shows that the application of components of the SEIT in education recovery showed that the SEIT is nonetheless a valuable approach to fostering education recovery and resilience. However, education concerning the intersection of the SEIT in post- COVID-19 pandemic contexts, and as related to improving the success scores of K-12 students, remains lacking (Delcker & Ifenthaler, 2020; Grooms & Childs, 2021).

Furthermore, the literature reviewed in this chapter overwhelmingly evidenced the extreme and pervasive effects of COVID-19 pandemic on education settings across the globe, and throughout different populations, specifically concerning changes in student learning and performance, and the varied responses educators exercised (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). Finally, the research reviewed showed that funding plays a vital role in education recovery, but that likely, how funding is used and the way in which funding allocations are distributed relatively and paired with other factors may be more influential in determining recovery outcomes (Nelson et al., 2021; Rangone, 2023; Stella, 2020). Moreover, the effects of ESSER grant funds remain inconclusive. Hence, a need exists for future research specifically identifying differences between changes in math standardized test scores among elementary schoolers concerning ESSER grant funds.

Summary and Conclusion

The purpose of this quantitative study was to examine the difference between the mean change in math standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of ESSER grant funding while controlling for all other funds. Chapter two, the literature review, provided a synthesis of research related to the purpose of this study. A Boolean search of the literature was conducted to identify articles for inclusion in this chapter. Literature was chosen that was published during or after 2020, except for seminal work informing the theoretical framework, the SEIT (Townsend, 2007). Only peer-reviewed literature was included. The SEIT is an educational framework that prioritizes a holistic, comprehensive approach to education improvement and recovery (Townsend, 2007).

After describing the theoretical framework, chapter two provided a synthesis of research concerning the effects of COVID-19 pandemic on education, including changes in student learning and performance and responses to educational disruption (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021), the role of funding and educational recovery, related to ESSER grant and other funding (Nelson et al., 2021; Rangone, 2023; Stella, 2020), and finally, theoretical perspectives on school improvement with a specific focus on SEIT-related and driven initiatives (Delcker & Ifenthaler, 2020; Grooms & Childs, 2021; Townsend, 2007). The review of literature emphasized and supported the need for future research concerning the existing gap in practical and empirical knowledge that remains regarding the change in math standardized test scores for elementary school students before versus after the introduction of ESSER grant funding, while controlling for all other funds (Lewis & Kuhfeld, 2023). Thus, the quantitative causal-comparative study used secondary data to conduct an ANOVA analysis aimed at contributing to filling this gap in research. Chapter three, the methods chapter, describes the study's methodology, design, data collection, and analysis methods.

Chapter 3: Research Method

The COVID-19 pandemic disrupted the educational K-12 environment for students across the United States (Kaffenberger, 2020; Middleton, 2020; Nickerson & Sulkowski, 2021). The abrupt change from traditional face-to-face to online learning was difficult for students, parents, and educators (Middleton, 2020; Tan, 2021). Researchers showed that online learning abated student outcomes, particularly in terms of academic achievement (Clark et al., 2021; Gonzalez et al., 2020). Yet, a gap existed regarding proficiency across standardized testing, specific to ELA students. The problem addressed through this study was the decrease in proficiency levels in math and ELA of 3rd- to 8th-grade students on standardized tests following the COVID-19 pandemic in CT.

The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of ESSER grant funding in CT, while controlling for all other funds received. In Chapter 3, I explain the methodology for data collection processes. Data collection procedures are described. The quantitative methods of data collection, data analysis, and threats to validity are also discussed.

The following research questions and hypotheses guided the study:

RQ1: What is the difference between the mean change in math standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0$1: There is no significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_1$1: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

RQ2: What is the difference between the mean change in ELA standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0$2: There is no significant difference between the mean change in ELA standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_1$2: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

Research Design and Rationale

A quantitative methodology was chosen for their study. My aim was to understand differences in terms of mean change across math and ELA-standardized scores. In a quantitative methodology, Bauer et al. (2021) examined measurable data to understand the effects on specific variables related to the hypothesis and research questions. Numerical and testable data are inherent components of a qualitative methodology (Mohajan, 2020). Conversely, a qualitative methodology allowed me to gather participants' perceptions, opinions, and lived experiences to understand shared and constructed social meaning (Sardana et al., 2023).

Data specific to qualitative methodologies were embedded within textual information gathered directly from participants (Sardana et al., 2023). I aimed not to understand textual data specific to participants, but to address the gap, the problem, and the purpose, which involved exploring differences using mean change information following a statistical model. Furthermore, the hypothesis required testable and numerical data to address, which was appropriate for the quantitative methodology (Mohajan, 2020). As a result, the quantitative methodology was considered ideal for the study in terms of gathering information specific to variables, exploring, and understanding testable data, and addressing the hypothesis.

The chosen research design was a causal-comparative quasi-experimental approach. Bauer et al. (2021) explored group differences in a quasi-experimental casual comparative study. Specifically, exploring the before and aftereffects through mean data was an inherent component of a causal comparative study (Sardana et al., 2023). In this study, the hypothesis and purpose related to before-and-after-based questions required a methodology and design that allowed for the comparison of secondary data. In both the research questions, hypothesis, and the purpose, my aim was to understand these differences and the relationship to mean change in math standardized test scores before and after ESSER grant funding and when considering other funds measured as mean per-student funding. As such, the casual comparative quasi-experimental design was considered appropriate for understanding the problem, exploring statistical changes, and evaluating before-and-aftereffects using statistical methods.

An alternative experimental design was considered but not chosen for the study. In an experimental design, the researcher would use control and test groups to explore differences while manipulating the environment, variables, or specific context (Xuan et al., 2020). As my aim was to use secondary data and not manipulate information, an experimental design was considered inappropriate for the purpose and problem statement. The secondary design was considered but deemed inappropriate for the observational study. In an observational study, data would be gathered by directly observing individuals, collecting numerical information, and testing hypotheses specific to the observations conducted with participants (see Ewing & Park, 2020). An observational design was considered inappropriate for the study, as the aim was not to observe students, teachers, or other stakeholders but to use the information obtained from students to explore before-and-aftereffects when considering specific funding sources. As a result, the causal-comparative quasi-experimental study was considered an ideal method for the study to address my study's hypotheses and purpose.

Methodology

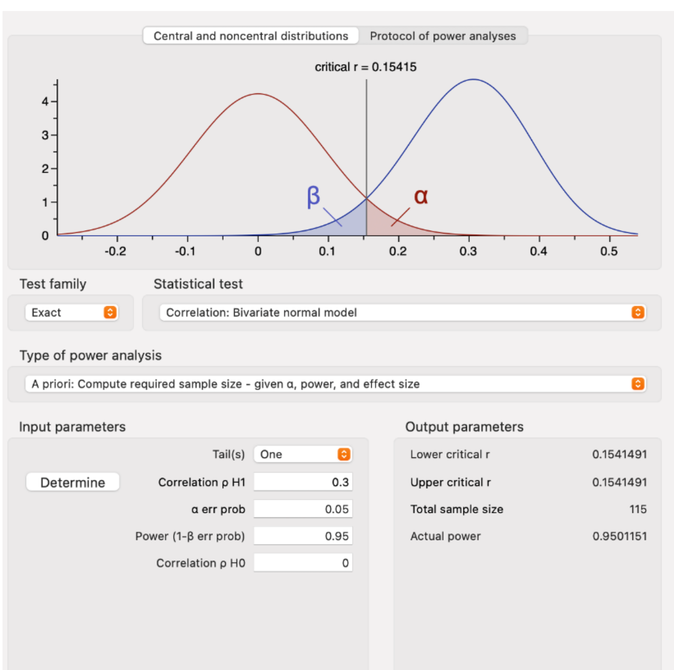
In this section, I discuss the details related to population selection and sample size. The methods for gathering archival data and analyzing the selected information are also reviewed. First, the population and sample are discussed in the following section.

Population and Sample

The population selected for the study consisted of students enrolled in ELA courses across the United States. The sample included student data across 108 CT school districts from 2016 to 2023. The sample comprises explicit test scores for Grades 3-8, specifically for ELA standardized testing scores and math scores, before and after the introduction of state and federal funding. A G*Power analysis (see Figure 1) was conducted to determine the required sample size for the quasi-experimental causal comparative study. At $p < 0.05$ and a power of 0.95, the total required sample size was a minimum of 115 samples. Next, the methods for gathering the archival data, which served as the primary source of information for the quantitative study, were discussed. Figure 1 shows the output of the G*Power analysis.

Figure 1

*G*Power*



Instrumentation and Operationalization of Constructs

The data gathered for the study were secondary. Based on the secondary data and the study's purpose, instrumentation was not employed. Instead, the following variables, discussed in Table 1, represented the constructs tested using statistical methods in this causal-comparative quasi-experimental study.

Table 1

Key Study Constructs and Variables

Dependent Variable	*Independent Variable*	*Covariate*
DV: Mean change in math scores, calculated as the average of year-over-year score change over the three years of the ESSER grant program and three years before, excluding COVID-19 pandemic years of 2020, where there was no data.	IV: A binary variable coded 1 for years during which the school district receives ESSER funds and 0 for years during which the district is not in receipt of ESSER funds	COVARIATE: federal and local funding (measured in dollar amounts).
DV: Mean change in ELA scores, calculated as the average of year-over-year score change over the three years of the ESSER grant program and three years before, excluding COVID-19 pandemic years of 2020, where there was no data.		

This study had two dependent variables, one independent variable, and one covariate. The first dependent variable referred to mean changes in math scores, which was calculated as the average of year-over-year score changes over the three years of the ESSER grant program and the three years preceding it, excluding the COVID-19 pandemic years of 2020, during which no data were publicly available. The second dependent variable referred to the mean change in ELA scores, which was calculated as the average of year-over-year score changes over the three years of the ESSER grant program and the three years preceding it, excluding the COVID-19 pandemic year of 2020 due to the absence of data. The independent variable was a binary variable coded for the years during which the school district received ESSER funds. A code of 0 signified years during which the district has not received the ESR funds. Finally, the covariate referred to federal and local funding. The publicly available aggregated data was ideal for understanding the extent to which funding changes from different sources were statistically related to math and ELA standardized test scores.

Archival Data

The study's data were publicly available secondary data. As such, site authorization was not necessary. The quasi-experimental causal-comparative study retrieved secondary data across 108 school districts in CT from *EDSIGHT Data*. Figure 2 provides an overview of the archival data, highlighting the specific outputs received upon download.

Figure 2

EDSIGHT Data Example

District	Subject	School Year 2015-16		2016-17		2017-18		2018-19		2021-22		2022-23	
		Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %	Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %	Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %	Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %	Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %	Total Number with Scored Tests	Percentage Level 3 or 4 (Met or Exceeded) %
State of Connecticut	ELA	234,884	55.6	234,595	54.2	233,297	55.3	230,952	55.7	220,491	49.1	219,604	48.5
	Math	234,284	44.0	233,844	45.6	232,806	46.8	230,334	48.1	219,466	40.0	218,699	42.5

Note. From *Smarter Balanced Achievement/Participation*, by EDSIGHT, 2020 (https://public-edsight.ct.gov/performance/smarter-balanced-achievement-participation?language=en_US). © 2020 by EDSIGHT.

After downloading, the data were cleaned and prepared for analysis. Cleaning and data preparation ensured that each Excel file obtained was appropriately prepared for data analysis procedures. Each key entry was reviewed for missing or incomplete entries for this process. Missing or incomplete entries were removed to ensure all data prepared and uploaded into the analysis was appropriately aligned and complete (Ewing & Park, 2020). The data analysis plan proceeded after downloading and preparing the archival data. First, an overview of the operationalization of constructs as related to each of the hypotheses was discussed.

Data Analysis Plan

The key components of the data analysis plan included descriptive statistics, assumption testing, and hypothesis testing using ANCOVA. Table 2 presents the data analysis procedures for this study.

Table 2

Data Analysis Steps

Step:	*Process:*
Testing of Outliers	Tested using +/- 1.5(IQR).
Testing of ANCOVA assumptions.	Only tests for homoscedasticity and normality are needed. All other assumptions are met
Testing of Normality	Shapiro-Wilk
Testing of Homoscedasticity	Breusch-Pagan
Testing of Homogeneity of Variances/ Covariances	Levene's Test
Hypothesis Testing	ANCOVA

Before ANCOVA analysis, outliers were tested using +/- 1.5(IQR). Any observations outside the fences were removed (Xuan et al., 2020). Subsequently, the assumptions of ANCOVA were considered met, except for testing for outliers. The remaining assumption was that ANCOVA did not require testing, as they had already been met due to the nature of the archival data. For example, the first assumption of ANCOVA was that the dependent and covariate variables were measured on continuous scales, either intervals or ratios. The scales and numbers obtained from the archival data were already proven as continuous scales. Thus, the assumption was met. The independent variable must have consisted of categorical or independent groups (Ewing & Park, 2020), which was met in this study based on the binary variables of 0 for years. The final tests included statistical tests for normality and homoscedasticity, which were employed. Specifically, the Shapiro-Wilk test was used to assess normality, and the Breusch-Pagan test was used to test homoscedasticity.

After assumption testing, ANCOVA analysis proceeded using the SPSS statistical software package. The cleaned and prepared Excel data files were uploaded into the SPSS statistical package. The results of the ANCOVA analysis were used to test the hypotheses at *a significance level of* $p < 0.05$. The results of the hypothesis testing were presented in Chapter 4. Associated outputs regarding normality and homoscedasticity were presented in Chapter 4. Chapter 5, the final component of presenting the data, comprised the recommendations and implications for practice based on the results of the hypothesis testing.

Threats to Validity

The study's validity threats were primarily internal. Regarding internal validity, the threats presented include limited available data on variations in per-student spending using State and federal monies that were not randomly assigned across school districts (Shadish, 2011). A secondary threat to internal validity was the lack of knowledge about teacher-student ratio, tax base, and facility differences when considering variations across school districts in CT. The inability to assess random assignments may lead to difficulties in examining systematic differences across school districts, particularly when relying on secondary data. Secondly, the resultant findings provide information inherent to causal-comparative relationships, but not specific to causal relationships, due to the lack of randomization. Regarding external validity, data for CT population of school districts were publicly available and considered ideal to prevent threats to external validity. Finally, measurement validity was not considered a threat in the study, given the self-reported nature of the gathered data.

Ethical Procedures

Ethical procedures are key components of research methodologies (Bauer et al., 2021). For the study, all gathered data was secondary, which, in short, does not include collecting information from participants. However, institutional review board (IRB) approval was required prior to any form of data collection in this study. The IRB permission was sought and obtained (IRB approval number: 08-13-24-0037267) as the first step in the data collection process. All gathered information was anonymous, specifically represented as anonymized, encrypted data that cannot be directly traced or linked to the participant’s identifiers. In relation to the gathered secondary data, informed consent, site authorization, and other procedures relevant to ethical assurances did not apply to the quantitative study. However, considering how data was stored and managed was a key component of ethical assurances and procedures (Sardana et al., 2023). The study saved all data gathered on a password-protected computer and a backup hard drive. These devices were protected with passwords and kept in the researcher's office. Only the researcher and the dissertation committee accessed the statistical findings.

Summary

In Chapter 3, the quantitative methodology and causal-comparative quasi-experimental design were considered and justified in relation to prior research. The study's setting, along with a discussion of the population and participants (based on secondary data), was reviewed. The study's methodology, including data collection and analysis, was reviewed. Ethical assurances, specifically related to anonymity, which were offered in this study, were discussed. Chapter 4 discusses a review of the findings in relation to the statistical outputs and hypothesis testing. The findings discussed throughout Chapter 4 were further reviewed in terms of implications and recommendations in Chapter 5.

Chapter 4: Results

The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of ESSER grant funding for CT, while controlling for all other funds received. The research questions were designed to examine archival quantitative data to determine if the differences were statistically significant between the mean change in ELA and math standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding. Chapter 4 includes a discussion of the activities undertaken to collect and analyze data. Further, the chapter includes the results of the study.

Data Collection

I started data collection with data extraction on ESSER grant funding and ELA and math test performance for CT from EDSIGHT Data. The data was extracted in a comma-separated values (.csv) format. The .csv file contained several columns of metadata that were removed. The data itself was deidentified from identifying students who had participated in the math or ELA tests, with the only distinguishing characteristic being the school district names, which were removed from the dataset. I then explored the dataset to detect if there were instances of anomalous data. Evidence of anomalous data would include data where the standardized test scores appear out of range from what would be expected. The data did not require further preparation. Following preparation of the data, the .csv file was then imported into SPSS version 29.0.0.0 for analysis.

Statistical Assumptions

Prior to hypothesis testing, I had to test the statistical assumptions for ANCOVA. The statistical assumptions for ANCOVA which I tested included the homogeneity of variance, homoscedasticity, and normality of variables by group. Levene's test was applied to test for homogeneity of variance. Table 3 includes the results of Levene's test for each of the four hypotheses. The results for the tests for homogeneity of variance lacked statistical significance for each hypothesis at $p < 0.05$. The lack of statistical significance supported the assumption of homogeneity of variance.

Table 3

Levene's Test of the Homogeneity of Variance

	F	*df*1	*df*2	sig.
ELABeyond	1.47	1	368	0.23
ELA	0.27	1	368	0.61
Math	0.07	1	368	0.81
MathBeyond	1.78	1	368	0.18

Homoscedasticity was tested for using the Breusch-Pagan test. The Breusch-Pagan test was performed for each of the four hypotheses in the study. The results of ANCOVA for hypotheses 1-3 were statistically significant at $p < 0.05$. When testing for ELABeyond as the dependent variable in RQ1, the result was $\chi^2 = 12.57$, while $\chi^2 = 78.97$ was the result when testing for ELA as the dependent variable in RQ2 and $\chi^2 = 738.93$ was the result when testing for Math as the dependent variable in Research Question 3. The ANCOVA model for Research Question 4 when testing for the dependent variable of MathBeyond was $\chi^2 = 0.50$ ($p = 0.48$). Thus, the results of the Breusch-Pagan test (see Table 4) were evidence of a violation to the assumption of homoscedasticity for

Hypotheses 1-3 and support of acceptance of the assumption of homoscedasticity for Hypothesis 4.

Table 4

Results of the Breusch-Pagan Test

	χ^2	*df*	sig.
ELABeyond	12.57	1	0.00
ELA	279.97	1	0.00
Math	738.93	1	0.00
MathBeyond	0.5	1	0.48

Normality was tested using the Shapiro-Wilk test. Like the results of Levene's test and the Breusch-Pagan test, a statistically significant finding at $p < 0.05$ would be recognized as evidence of a violation of a statistical assumption. The specific statistical assumption tested in Table 5 was normality of the dependent variable for the hypotheses (ELABeyond, ELA, Math, and MathBeyond) for groups before and after ESSER funding. The results were evidence that the statistical assumption of normality was violated for each of the four hypotheses. My results of assumptions testing supported decisions concerning testing the hypotheses of the study, where Quade's ANCOVA was performed in RQ1-3 and ANCOVA was performed for RQ4.

Table 5

Results of the Shapiro-Wilk Test

		S-W	*df*	Sig.
ELABeyond	After ESSER No	0.37	185	0.00
	After ESSER Yes	0.58	185	0.00
ELA	After ESSER No	0.36	185	0.00
	After ESSER Yes	0.19	185	0.00
Math	After ESSER No	0.36	185	0.00
	After ESSER Yes	0.24	185	0.00
MathBeyond	After ESSER No	0.43	185	0.00
	After ESSER Yes	0.71	185	0.00

Data Analysis

My data analysis plan for the study involved the application of ANCOVA to test hypotheses. Data analysis commenced with the calculation of the descriptive statistics. These included the mean (*M*), standard deviation (*SD*), range, skewness, and kurtosis. The data analysis involved ANCOVA to examine the differences in mean standardized test scores for Grades 3–8 in Math and ELA before and after the introduction of ESSER grant funding. The ANCOVA model included covariates of mean ESSER per-student funding (PP) and mean non-ESSER PP to control for additional funding sources. The analysis tested the hypotheses for both dependent variables, with statistical significance set at $p < 0.05$. Results were assessed for the main effect of ESSER funding and the influence of covariates, with findings presented in detailed ANCOVA tables for each dependent variable. Despite the corrected models being statistically significant, the effects of ESSER funding on the changes in scores were not statistically significant after accounting for covariates.

Results

The following sections include the results of the study. I begin the results section with the descriptive statistics for the study. The descriptive statistics are presented and discussed. The results of the hypothesis testing are as follows. The results for RQ1 and RQ2 are included in the section. The results were interpreted based on a statistical significance threshold of $a < 0.05$.

Descriptive Statistics

Table 6 presents descriptive statistics for educational performance metrics across 186 school districts before and after receiving ESSER funding. The variables included average scores in ELA and Math, the percentages of students meeting or exceeding standards in these subjects, and the differences in these metrics before and after the funding. Additionally, it showed the ESSER funding amount each district received. Before ESSER funding, the mean "Average ELA before" score was 6.06 with a *SD* of 155.65, and the mean "Average Math before" score was 1.04 with an *SD* of 218.83. The large *SD* relative to the means indicated significant variability in performance among the districts. The wide ranges (2,497.40 for ELA and 3,702.20 for Math) suggested disparities in educational outcomes prior to funding. Skewness and kurtosis values were extreme for most variables, indicating non-normal distributions with potential outliers. For instance, the "Average ELA before" showed a skewness of 1.93 and kurtosis of 53.50, signifying a right-skewed distribution with heavy tails. Conversely, "Average Math before" had a skewness of -5.67, pointing to a left-skewed distribution.

Table 6

Descriptive Statistics

Variable	*N*	Mean	*SD*	Range	Skewness	Kurtosis
Average ELA before	186	6.06	155.65	2497.40	1.93	53.50
Average Math before	186	1.04	218.83	3702.20	-5.67	89.86
Average ELA meeting or exceeding before	186	-0.96	7.81	106.47	7.71	83.52
Average Math meeting or exceeding before	186	-0.41	7.03	100.45	6.16	65.96
Average ELA after	186	-27.92	261.59	2638.00	-9.46	90.62
Average Math after	186	-22.89	261.50	2633.50	-9.45	90.56
Average ELA meeting or exceeding after	186	-1.17	7.16	74.34	-4.95	37.62
Average Math meeting or exceeding after	186	1.90	6.33	78.81	-3.40	33.66
ESSER Amount	186	7780904	2220000 0	1540000 0	5.18	31.33
Average ELA before-after difference	186	-33.98	302.22	3779.83	-6.2	53.94
Average Math before-after difference	186	-23.93	33970	4983.78	-2.69	47.64
Average ELA meeting or exceedingly before-after difference	186	-0.21	11.02	111.47	-4.55	32.50
Average Math meeting or exceedingly before-after difference	186	2.31	9.92	99.15	-3.66	26.40

After ESSER funding, the mean scores for both “Average ELA after” and “Average Math after” decreased to -27.92 and -22.89, respectively. The negative means suggested that, on average, student performance in both subjects declined following the funding, which was initiated 4-years from the respective performance data. The highly negative skewness values (-9.46 for both ELA and Math) indicated that more districts experienced substantial decreases in scores. The differences between before and after scores further confirmed this trend. The mean “Average ELA before-after difference” was -33.98, and the mean “Average Math before-after difference” was -23.93, both negative, highlighting overall declines in performance post-funding. The negative skewness in these different variables suggested that the declines were more pronounced in certain districts. Regarding the percentages of students meeting or exceeding standards, the mean “Average ELA meeting or exceeding after” slightly decreased compared to before, from -0.96 to -1.17. In contrast, the mean “Average Math meeting or exceeding after” increased from -0.41 to 1.90, suggesting a slight improvement in Math proficiency rates despite the overall score decline. The “ESSER Amount” variable showed that districts received an average of $7,780,904 in funding, with a substantial *SD* of $22,200,000 and a range of $15,400,000. The positive skewness of 5.18 and kurtosis of 31.33 indicated that while most districts received smaller amounts, a few received significantly higher funding, leading to a right-skewed distribution. The data indicated that despite the infusion of ESSER funding, the average performance in ELA and Math scores across the school districts declined.

These findings suggested that the ESSER funding did not have the intended positive effect on student performance on average. The high variability and presence of extreme values implied that the effects of the funding varied widely among districts. Some districts may have improved or maintained performance, while others experienced significant declines. Further investigation is needed to identify the factors contributing to these declines and to assess the effectiveness of ESSER funding in enhancing educational outcomes across different districts.

RQ1: What is the difference between the mean change in math standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

RQ1: What is the difference between the mean change in math standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0$1: There is no significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_1$1: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

Table 7 presents the results from Quade's ANCOVA, where the dependent variable was Math score and AfterESSER was the covariate. The corrected model lacked statistical significance at $p < 0.05$ ($F_{(1, 368)} = 2.69$, $p = .10$). The result was evidence that the AfterESSER covariate was not a significant predictor of Math scores. The *adj.* $R^2 = 0.005$ was evidence of the explanatory power of the model, with 0.5% of variance in Math scores attributed to the covariate. The result of Type III *SS* = 3,590,544.97 relative to the corrected model Type III *SS* = 26,219.87 was evidence of the unexplained variability in scores. Thus, the findings implied that AfterESSER holds a negligible and non-significant effect on Math score outcomes.

Table 7

An ANCOVA Table for the Dependent Variable Math Score

Source	Type III *SS*	*df*	MS	*F*	*p-value*
Corrected model	26219.87	1	26219.87	2.69	0.10
Intercept	0.00	1	0.00	0.00	1.00
After ESSER	26219.87	1	26219.87	2.69	0.10
Error	3590544.97	368	9756.92		
Total	3616764.84	370			
Corrected total	3616764.84	369			

Note: $n = 185$. *Adj.* $R^2 = 0.005$.

Table 8 includes the ANCOVA results concerning the dependent variable Math Beyond score. AfterESSER was applied as the covariate. The analysis showed that the corrected model was not statistically significant ($F_{(1, 368)} = 2.97$, $p = .09$). There was no meaningful relationship between the covariate and Math Beyond scores. The *adj.* $R^2 = 0.005$. The *adj.* R^2 was further evidence concerning the explanatory capability of AfterESSER. AfterESSER accounted for 0.5% of the variance in Math Beyond scores.

The error variance included Type III *SS* = 3,541,178.61 was evidence that other factors, not considered in this analysis, may play a larger role in influencing Math Beyond scores. The results were evidence that AfterESSER holds little predictive value concerning the performance of students on the Math Beyond assessment.

Table 8

An ANCOVA Table for the Dependent Variable Math Beyond Score

Source	Type III *SS*	*df*	MS	*F*	*p*-value
Corrected model	28584.99	1	28584.99	2.97	0.09
Intercept	0.00	1	0.00	0.00	1.00
After ESSER	28584.99	1	28584.99	2.97	0.09
Error	3541178.61	368	9622.77		
Total	3569763.60	370			
Corrected total	3569763.60	369			

Note: n = 185. *Adj.* R^2 = 0.005.

RQ2: What is the difference between the mean change in ELA standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding?

$H_0$2: There is no significant difference between the mean change in ELA standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

$H_2$2: There is a significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding.

Table 9 includes evidence concerning the ANCOVA results for the dependent variable, ELA score. The model included examination of the effect of the AfterESSER covariate. The analysis included a lack of a statistically significant relationship between AfterESSER and the ELA scores of students ($F_{(1, 368)} = 0.06$, $p = .81$). The F-score was evidence that the AfterESSER covariate did not have an effect on student performance in English Language Arts. Additionally, *adj.* $R^2 = -0.003$. The adjusted R^2 was evidence that the covariate did not hold a statistically significant influence in explaining differences in scores. Student ELA scores were influenced more by other factors that were not part of this analysis.

Table 9

An ANCOVA Table for the Dependent Variable ELA Score

Source	Type III SS	*df*	MS	*F*	*p*-value
Corrected model	655.35	1	655.35	0.06	0.81
Intercept	0.00	1	0.00	0.00	1.00
After ESSER	655.35	1	655.35	0.06	0.81
Error	4150051.77	368	11277.32		
Total	4150707.12	370			
Corrected total	4150707.12	369			

Note: $n = 185$. *Adj.* $R^2 = -0.003$.

Table 10 provides a similar ANCOVA analysis for the dependent variable, ELA Beyond score. The analysis entailed testing the effects of AfterESSER. The covariate AfterESSER did not significantly predict student performance. The results included a low F-value and a non-significant p-value ($F_{(1, 368)} = 0.54$, $p = .46$).

Table 10

An ANCOVA Table for the Dependent Variable ELA BeyondScore

Source	Type III SS	*df*	MS	*F*	*p*-value
Corrected model	5997.93	1	5997.93	0.54	0.46
Intercept	0.00	1	0.00	0.00	1.00
After ESSER	5997.93	1	5997.93	0.54	0.46
Error	4113911.33	368	11179.11		
Total	4119909.26	370			
Corrected total	4119909.26	369			

Note: $n = 185$. *Adj.* $R^2 = -0.001$.

The *adj.* $R^2 = -0.001$ further emphasized that the covariate provided no meaningful contribution to explaining variations in ELA Beyond score. Student performance on the ELA Beyond assessment was unrelated to the AfterESSER measure included in this model.

Summary

The effects of ESSER grant funding on standardized math and ELA test scores among Grades 3-8 in CT were examined, with a focus placed on comparing data from 4 years before and 4 years after funding implementation. Data were collected across 186 districts, anonymized, and analyzed using ANCOVA, accounting for descriptive statistics and key assumptions such as homogeneity of variance, homoscedasticity, and normality. Descriptive statistics revealed variance in test scores, with overall declines in performance following ESSER funding, despite some improvement in math proficiency rates. ANCOVA results indicated no statistically significant relationship between ESSER funding and improvements in student test scores, suggesting that ESSER funds did not yield the intended positive educational outcomes. Violations of homoscedasticity and normality assumptions further supported the finding that other unmeasured factors influenced these results.

Chapter 5: Discussion, Conclusions, and Recommendations

The problem I addressed through this study was the decrease in proficiency levels in math and ELA of 3rd- to 8th-grade students on standardized tests following the COVID-19 pandemic in CT. The purpose of this quantitative study was to examine the difference between the mean change in math and ELA standardized test scores for Grades 3-8 for 4 years before and 4 years after the introduction of ESSER grant funding in CT, while controlling for all other funds received. I collected archival data across 108 school districts in CT from EDSIGHT Data, which included student data across 108 CT school districts from 2016 to 2023 for Grades 3- 8, specific to ELA standardized testing scores and math scores, before and after the introduction of state and federal funding. I then analyzed this data for descriptive statistics, assumption testing, and hypothesis testing using ANCOVA, testing the two dependent variables of mean change in math scores and mean change in ELA scores against a binary independent variable of the school district that received ESSER funding, and the covariate of federal and local funding measured in dollar amounts.

The findings showed the test for the significance of ESSER funding on Math tests was not significant at $p < 0.05$. Additionally, the test for the significance of ESSER funding on Math Beyond tests was not significant at $p < 0.05$. The statistical testing also showed that the test for the significance of ESSER funding on ELA tests was not significant at $p < 0.05$. The test for the significance of ESSER funding on ELA tests was not significant at $p < 0.05$.

In Chapter 5, I present these findings and my interpretations of the findings in conjunction to the literature and theoretical framework. The limitations found within this research are discussed and recommendations for future research are presented. I conclude the chapter with the implications for positive social practices and an overall statement of the final research.

Interpretation of the Findings

The findings were established using the nonparametric test of Quade's ANCOVA, which treats data as rank-order rather than continuous. Both research questions are discussed against the findings from the hypotheses testing, and these results are compared to the existing research discussed in Chapter 2. Each section was also reviewed against the SEIT, discussing how this theory was applied to these findings. The findings supported the null hypothesis, stating there was no significant difference between the mean change in math standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding. This hypothesis testing suggested no significant change in ESSER findings when MathBeyond test scores showed a change in math scores, calculated as the average of year-over-year score change over the 4 years of the ESSER grant program and 4 years before, excluding COVID-19 pandemic years of 2020. Thus, the resulting evidence was that the AfterESSER covariate did not significantly predict math scores. These findings further imply that AfterESSER holds a negligible and nonsignificant effect on Math score outcomes.

The second research question asked, what was the difference between the mean change in ELA standardized test scores for Grades 3-8 (lumped) for 4 years before and 4 years after the introduction of the ESSER grant funding in CT, while controlling for all other funds received as measured by mean per-student funding. The findings related to this research question were also tested. They supported the null hypothesis of no significant difference between the mean change in ELA standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding. Testing of the hypothesis also supported the null hypothesis of no significant difference between the mean change in ELA standardized test scores for Grades 3-8 before and after the introduction of ESSER grant funding. Thus, the test for the significance of ESSER funding on ELA tests was also found not significant.

The literature reviewed in Chapter 1 found that test scores significantly affect the role of funding in educational recovery. The existing research showed that funding played a critical role in the educational recovery process, however, researchers claimed that the efficacy of various types of funding measures according to the district was found to vary, raising questions about potential alternative recovery models and the types of funding most appropriate for various contexts (Nelson et al., 2021; Rangone, 2023). Focus on the ESSER grant funding and its effects was noted among past researchers, with such findings suggesting that the amount and distribution of funds varied across states and school districts based on qualifying factors such as student enrollment numbers, poverty levels, and various other demographic indicators (Shores & Steinberg, 2022; Stella, 2020).

However, studies found that many socioeconomically compromised schools with underprivileged student populations used funding more quickly than schools in affluent areas (Gordon & Reber, 2021; Yarrel, 2023). These studies showed a significantly higher need for funding experienced by schools serving marginalized populations. However, researchers' findings remain inconclusive concerning the efficiency or efficacy with which grant funds were used between underprivileged versus privileged schools. Whether underprivileged schools would leverage or use available funds more efficiently if additional training, education, and management resources were provided remains unknown (Gordon & Reber, 2021; Shores & Steinberg, 2022).

While I focused on the ESSER grant funding in relation to mathematics and ELA testing separately, much of the existing research did not differentiate funding by subject. Further, much of the research discussed how ESSER grant monies were spent on technology infrastructure, the purchasing of instructional materials, professional development programs for educators, the implementation of mental health services, and even facility upgrades to support safety measures during COVID-19 pandemic (Brooks, 2024; Dik et al., 2021; Shaw, 2021). Other studies focusing on ESSER grant funds did recognize how this funding was used for the implementation of arts education, which was believed by progressive researchers to contribute to fostering mental health and positive culture in schools, thereby building resilience; however, a large amount of the reviewed research discussed the overall use of this emergency relief monies in terms of general assistance for school-based needs and not directed towards any one subject or based on testing scores for such (Gordon & Reber, 2021; Nwokocha & Elijah Etukudo, 2022).

Researchers confirmed that disparities and socioeconomic oppression often result in receiving less funding, which was correlated with funding measures rather than student learning outcomes (Cramer & Little, 2023; Gordon & Reber, 2021). Such findings suggested that schools receiving less funding were located in socioeconomically privileged areas (Brooks, 2024; Cramer & Little, 2023; Gordon & Reber, 2021).

The reviewed scholarship also noted the complex and multifaceted nature of factors influencing the return on investment (ROI) experienced due to ESSER and other grant funds received. Researchers noted that a lack of available research was found specifically concerning a comparison of the outcomes of ESSER grant funding versus other relief funding (Muftahu, 2020; Rangone, 2023). Based on focused research related to private and federal COVID-19 pandemic relief funding received by education institutions, many researchers conclude that the ROI and effects experienced across districts and educational contexts concerning factors including but not limited to cultural differences, socioeconomic disparities, and available resources (Kelchen et al., 2021; Rangone, 2023; Willse, 2023).

Researchers also noted that ESSER grant funds were distributed in phases according to use, as this funding was not intended to serve as a long-term funding model (Kelchen et al., 2021; Neofotistos & Kaxiras, 2020). Other experts considered this was the reason for ESSER grant funds associated with having a lesser effect on overcoming academic outcome disparities between marginalized and non-marginalized populations (Kelchen et al., 2021; Neofotistos & Kaxiras, 2020) However, these studies noted that ESSER grant funds were not designed to comprehensively and holistically address equity gaps and provide long term, sustained training, development, cultural competence initiatives, and equitable interventions (Neofotistos & Kaxiras, 2020).

Researchers recognized a need to compare the effects of ESSER grant funds and other types of funding, including private funds allocated, as well as non-educational funds. The level of government-provided household debt relief received by individuals during the COVID-19 pandemic also influenced the degree to which students were able to succeed in school (Ahrens & Ferry, 2021; Oleksiyenko, 2021). Socioeconomically impoverished families were more likely to receive debt relief, which could be used to pay for expenses such as childcare or the purchase of technology and other factors indirectly influencing student success.

Other scholarship reviewed in Chapter 2 further explored the relationship between funding and educational recovery. Researchers discussed the effects of ESSER grant funds on educational institutions, finding a need for a comparison between ESSER grant funds and other funding models (Nelson et al., 2021; Rangone, 2023; Stella, 2020). Such research indicated that the effects of ESSER grant funds were significant in many instances but did not concern the amount of funding received. These researchers suggested that, in receiving more funding due to socioeconomic status, there were no considerable or demonstrated higher levels of recovery or resilience, thus raising questions about what factors were and continue to be most influential in fostering education recovery (Ahrens & Ferry, 2021; Oleksiyenko, 2021). Such findings were reviewed and suggested that the effect of ESSER grant funds compared to other funding models was difficult considering the complex and multifaceted nature of variables effecting the effect of funds (Nelson et al., 2021; Rangone, 2023; Stella, 2020). However, it was also revealed that multiple other factors influence the degree to which funding effectively achieves education improvement goals.

Comparing the literature to this study's findings was also grounded in the guiding theory underpinning this study. The SEIT was supportive of this study's results as the construct of the theory was based on the ability to reshape education approaches and prompted many educational leaders to reconsider the theoretical perspectives used to guide and implement education programs, strategies, and recovery initiatives. Additionally, concepts within this framework, consisting of community partnerships, distributed leadership, and social-emotional well-being, are gaining greater recognition and emphasis concerning implementation approaches and the prioritization of student learning equity across diverse populations (Delcker & Ifenthaler, 2020).

This study's findings suggested no significance in the relationship between ESSER funding and academic testing scores for math or ELA. However, SEIT emphasizes understanding contextual factors influencing education outcomes. Understanding contextual factors that affect students' educational, social, emotional, and other education-related outcomes is imperative, considering the interdisciplinary nature of aspects influencing student success (Gilmour, 2021; Muenks & Miele, 2020). The COVID-19 pandemic prompted an understanding of how multiple educational and personal factors could contribute to fostering student success, which further involved mental health, family context, social support systems, financial status, access to resources, pedagogical approach, school funding, and educational approaches (Gilmour, 2021). Thus, in comparison to supporting the findings of this study, it was noted that SEIT used as a foundational framework could be helpful in guiding the understanding and development of education recovery programs that consider the intersection of interdisciplinary factors in fostering student success.

Limitations of the Study

There were several limitations requiring notation for this study. First, using secondary data limited the findings as such data were collected by an entity or group other than the primary researcher for a study. Specifically, data was collected for some other reason other than the study at hand. The use of this secondary data was also limited by being district-level, thus failing to account for characteristics of individual schools and limiting the findings.

Limitations were noted based on the data's time constraints. This study's focus was on data collected 4 years before and 4 years after the COVID-19 pandemic. Such a limiting period, therefore, fails to account for foundational knowledge that could have supported success in subsequent tests. However, controlling prior knowledge would be necessary but unfeasible for such future research.

A methodological limitation was considered based on extreme posterior distribution. Most of this data showed extreme negative skewness, except for the average scores for ELA, ELABeyond, MathBeyond, and the ESSER amount, which had positive skewness. Even so, these results were limited due to the data being found to be extremely leptokurtic. Additional problems with posterior distribution were considered to be based on non-normal data, which was found for all dependent variables, and all dependent variables except for MathBeyond showed evidence of heteroscedasticity.

Another limitation was that the measurement of math and ELA was assessed based on the results of standardized state examinations. As I did not develop these instruments, any potential limitations in development are unknown. A final limitation was based on the use of Quade's ANCOVA. Quade's ANCOVA treats data as rank-order rather than continuous, as it was a non-parametric test, which limited the findings, as this test may not be as powerful as parametric methods. Quade's test has specific assumptions that, if violated, can lead to inaccurate results. Further, specific design constraints are found with the use of Quade's ANCOVA with the application for testing covariate-adjusted treatment effects only in a one-way design.

Recommendations

Based on this study's results, several recommendations for future research were suggested. First, the expansion of this study could provide expanded results if a larger geographic area were used. Funding for schools throughout the U.S. during and after the COVID-19 pandemic could be compared state by state to determine the most productive manner in which such funding was used and its success in application. Comparing school districts could further provide more detailed results based on academic achievement and not solely socioeconomic need. Additionally, a mixed methods approach …whereby a more comprehensive understanding of how emergency funding can successfully be applied to school districts could be examined. As funding effects based on comparing academic achievement versus socioeconomic need is a complex issue, future researchers could compare the needs of students based on academic achievement versus socioeconomic and educational need per student.

Implications

The findings have potential effects for positive social change at the organizational level with school districts focusing on student outcomes based on funding abilities, which could improve academic achievement for the student population. At the society level, such changes in funding that affect student outcomes overtly could provide needed recognition of a problem that requires attention at the policy level. Such implications can be considered and helpful as funding models could be found correlated with effects on student learning, failing to bridge achievement gaps between pre-existing educational disparities, such that many groups receiving greater amounts of funding still lag populations receiving ESSER funding amounts.

The implications of this research study could have a positive impact in a broader society. The improvement of educational outcomes in areas such as math and ELA shall prepare individuals for successful futures and contribute to an informed and productive citizenry. The benefits range from a more dynamic economy to a more engaged public. Understanding how education funding affects student success contributes to academic literature and lays the groundwork for positive change that can benefit individuals, communities, and broader society.

The implication of ESSER funding, applied for the benefit of students, consists of its importance in fostering community engagement, stakeholder participation, and school improvement initiatives. Engaging community partners beyond direct school stakeholders can be a potentially practical approach to increase and leverage the return on investment (ROI) of funding experienced by socioeconomically disadvantaged schools. As community partners collaborate, gaps in funding or other resources can be addressed through pooled knowledge, support, and innovation.

Conclusion

This study's findings explain the outcomes of assessing funding based on academic testing scores, such as in math and ESL. The implications of this research have the potential to impact a wider society positively. The benefits range from a more dynamic economy to a more engaged public. Understanding how education funding affects student success contributes to academic literature and lays the groundwork for positive change that can benefit individuals, communities, and broader society. The ability to effectively support student progress through the funding processes is integral to ensuring the effectiveness of student education. The intersection between funding and student progress must be determined to understand how student progress is achieved through the efforts of educational stakeholders.

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