Academic Trajectories of Students with Disabilities and Caregiver Perspectives on Distance Learning in the COVID-19 Pandemic

Charlene Lee
San Jose State University

Follow this and additional works at: https://scholarworks.sjsu.edu/etd_dissertations

Recommended Citation
DOI: https://doi.org/10.31979/etd.fk65-2t35
https://scholarworks.sjsu.edu/etd_dissertations/63

This Dissertation is brought to you for free and open access by the Master's Theses and Graduate Research at SJSU ScholarWorks. It has been accepted for inclusion in Dissertations by an authorized administrator of SJSU ScholarWorks. For more information, please contact scholarworks@sjsu.edu.
ACADEMIC TRAJECTORIES OF STUDENTS WITH DISABILITIES AND CAREGIVER PERSPECTIVES ON DISTANCE LEARNING IN THE COVID-19 PANDEMIC

A Dissertation
Presented to
The Faculty of the Educational Doctoral Program in Educational Leadership
San José State University

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
Charlene Lee
May 2022
The Designated Thesis Committee Approves the Dissertation Titled

ACADEMIC TRAJECTORIES OF STUDENTS WITH DISABILITIES AND CAREGIVER PERSPECTIVES ON DISTANCE LEARNING IN THE COVID-19 PANDEMIC

by

Charlene Lee

APPROVED FOR THE EDUCATIONAL DOCTORAL PROGRAM IN EDUCATIONAL LEADERSHIP

SAN JOSÉ STATE UNIVERSITY

May 2022

Paul W. Cascella, Ph.D. Department of Communicative Disorders and Sciences
Trudy Gross, Ph.D. Fremont Union High School District
Matthew Love, Ph.D. Department of Special Education
Emily Slusser, Ph.D. Department of Child and Adolescent Development
ABSTRACT

ACADEMIC TRAJECTORIES OF STUDENTS WITH DISABILITIES AND CAREGIVER PERSPECTIVES OF DISTANCE LEARNING IN THE COVID-19 PANDEMIC

by Charlene Lee

As research on student learning during the COVID-19 pandemic continue to emerge, there remains a dearth of research on students with IEPs and how their caregivers experienced remote learning in a pandemic school year. This study examined the academic trajectories of students with IEPs and their caregivers’ perspectives towards distance learning during the COVID-19 pandemic. Measures included academic data extracted from the 2018–2019 school year and 2020–2021 school year and a survey of parental and caregiver opinions of the pandemic’s impact. Student academic data (N = 270) revealed a significant decrease in reading but not math trajectories. Notable differences were found after disaggregating demographic factors, specifically ethnicity (Hispanic or not Hispanic), English learner status, socioeconomic status, Title I school status, disability category, and percentage in the general education setting. Survey findings (N = 46) indicated diverse positive and negative opinions about the pandemic’s specific impact on families, children, and schools, along with technology, children’s socialization, teachers and school staff actions, and caregivers’ knowledge and abilities to address their children’s needs. Implications are discussed along with recommendations for district administrators and educators and future directions for research.
DEDICATION

To my daughters, Gemma and Isabel. Every day you bring me so much joy. You were my inspiration for this research and have taught me so much as a mother and an educator. I hope to inspire you to be lifelong learners and to pursue your goals and dreams.
ACKNOWLEDGEMENTS

This dissertation would not have been possible without the guidance, support, and encouragement from a number of individuals. First and foremost, I would like to thank my dissertation chair, Dr. Paul Cascella, for all the guidance and advising he has provided me from the onset of the pandemic to the final stages of this doctoral program. From working closely with him, I have deepened my research and data analytic skills, and I am grateful for all the time he has invested in me. I have also been fortunate to have worked with Dr. Emily Slusser who provided me with much insight on the quantitative methods and data analysis. I would also like to thank Dr. Matthew Love for challenging me by asking critical questions of issues in Special Education and how my research findings contribute to the work of educators and administrators. I am also very grateful to have worked with Dr. Trudy Gross for her guidance and focus on the implications for educators based on my research findings.

I thank my cohort members whom I have learned so much from, have gotten to know personally, and encouraged me throughout the program. In addition, I thank the school district in this study for its partnership with me, as this research would not have existed without them. I also thank my parents for all of their support in my education. Last but not least, I thank my husband, Steven, for encouraging me to pursue a doctoral degree and for continually supporting me throughout my studies and dissertation research.
# TABLE OF CONTENTS

List of Tables ........................................................................................................................................... x

List of Figures ............................................................................................................................................ xii

Introduction and Statement of the Problem ................................................................. 1
  Children with Disabilities ................................................................. 2
  Current Research Project ........................................................................... 8
  Delimitations ......................................................................................... 9
  Positionality ......................................................................................... 10
  Organization of Paper ........................................................................... 10
  Research Questions ............................................................................... 11

Literature Review .............................................................................................................................. 15
  FAPE and Virtual Learning in the COVID-19 Pandemic ...................... 16
  Student Demographics and Academic Growth Trajectories of Students with Disabilities ................................................................. 17
    Reading Achievement ........................................................................... 17
    Mathematics Achievement .................................................................. 20
  Academic Trajectories in Specific Disability Classifications .............. 21
    Attention Deficit Hyperactivity Disorder ........................................... 21
    Autism Spectrum Disorder ............................................................... 22
  Special Education Status, Educational Placement, and Academic Outcomes ......................................................... 23
    Impact of Special Education on Academic Outcomes ..................... 23
    Educational Placement and Academic Outcomes ......................... 24
  Online and Blended Learning and Students with Disabilities ............. 26
    Learning Loss, Lag, and Regression .................................................. 27
    Academic Outcomes Among General Education Students During COVID-19 ................................................................. 28
  Academic Outcomes During the COVID-19 Pandemic Among Students With IEPs ................................................................. 32
  Shift to Family Involvement During the COVID-19 Pandemic ............. 33
    Families and School Systems ............................................................. 34
    Parental and Caregiver Involvement .................................................. 35
    Parental Involvement Among Students Without Disabilities ........... 36
    Parental Involvement and Students with Disabilities ....................... 38
    Parental Beliefs and Children’s Academic Outcomes ..................... 39
    Parental Involvement in the Pandemic Context ............................... 40
  The Impact of School Closures on Children’s and Caregivers’ Mental Health ......................................................... 41

Methodology and Research Design ......................................................................................... 43
  Research Methodology and Study Design ............................................ 43
  Data Sources ........................................................................................ 44
## Table of Contents

- Research Question 2B ........................................................................................................104
- Conclusions, Recommendations, and Implications ..........................................................106
  - Introduction ..................................................................................................................106
  - Summary of Study .......................................................................................................106
  - Summary of Findings and Conclusions .........................................................................107
  - Discussion .....................................................................................................................112
  - Limitations ....................................................................................................................115
  - Recommendations for Future Research .........................................................................116
  - Recommendations for Practice .....................................................................................118
  - Implications ..................................................................................................................122
  - Conclusion ....................................................................................................................125
- References .......................................................................................................................127
- Appendices
  - A EMAILS ...................................................................................................................138
    - Recruitment Email - Date: January 5th and 6th, 2021 ..................................................138
    - Follow Up Email - Date January 12th and 13th, 2021 ................................................140
  - B SURVEY INSTRUMENT (ENGLISH) ....................................................................141
  - C SURVEY INSTRUMENT (SPANISH) ....................................................................171
  - D THEMES ..................................................................................................................200
  - E INFERENTIAL STATISTICS—PARENT EDUCATION AND LIKERT SCALE ITEMS ........................................................................................................204
  - F INFERENTIAL STATISTICS—INCOME LEVEL AND LIKERT SCALE ITEMS ........................................................................................................206
LIST OF TABLES

Table 1. Terms and Definitions ........................................................................................................12
Table 2. Summary of Academic Assessments ..................................................................................45
Table 3. Data Analysis Summary ....................................................................................................58
Table 4. Student Sample Demographic Variables ...........................................................................60
Table 5. Time Predicting Reading Parameter Estimates ...................................................................65
Table 6. Difference in Math Scores Between 2019 and 2021 Parameter Estimates .......................66
Table 7. Reading Model 1 Parameter Estimates ..............................................................................71
Table 8. Math Model 1 Parameter Estimates ...................................................................................74
Table 9. Reading Model 2 Primary Disability Diagnosis, Title I Status, Grade, and General Ed % Predicting Reading ..........................................................78
Table 10. Math Model 2 Primary Disability Diagnosis, Title I Status, Gen. Ed., and Grade Predicting Math Scores ...........................................................................83
Table 11. Post Hoc Low vs. High Performers Predicting Reading Scores ....................................87
Table 12. Post Hoc Low vs. High Performers Predicting Math Scores ...........................................88
Table 13. Survey Demographic Data About the Children ...............................................................90
Table 14. Survey Demographic Data About the Children’s Main Disability and Learning Option .........................................................................................................................91
Table 15. Survey Respondents’ Household Demographics .............................................................92
Table 16. Distance Learning Being a Good Match .........................................................................94
Table 17. Factors Promoting Child’s Distance Learning .................................................................95
Table 18. Nontechnological Factors Hindering Child’s Distance Learning .....................................96
Table 19. Technological Factors Hindering Child’s Distance Learning .........................................97
Table 20. Summary Table of Coded Quotes From Open-Ended Questions ..................................98
Table 21. Primary Race from Student Sample (Record Review) ....................................................201
Table 22. Languages from Student Sample (Record Review).................................202
Table 23. Primary Disability From Student Sample (Record Review).........................203
Table 24. Chi-Square Tests of Independence Parent Education ..................................204
Table 25. Technology and Academic Subscale Measures of Central Tendency ...........205
Table 26. Technology and Academic Scale Measures of Central Tendency by Parent Education ........................................................................................................205
Table 27. Income by Survey Item Crosstabs ...............................................................206
Table 28. Technology and Academic Scale Measures of Central Tendency by Income ....207
LIST OF FIGURES

Figure 1. Concept Map ...........................................................................................................16

Figure 2. Standardized Mean Percentile Rank Reading Scores by Year .........................65

Figure 3. Mean Standardized Math Scores by Year ...............................................................66

Figure 4. Standardized Mean Percentile Rank Reading Scores by Year and Ethnicity ......72

Figure 5. Standardized Mean Percentile Rank Reading Scores by Year and
Free/Reduced-Price Lunch Qualification...........................................................................73

Figure 6. Standardized Mean Percentile Rank Reading Scores by Year and EL Status ......74

Figure 7. Standardized Mean Math Percentile Rank Scores by Ethnicity and Year ..........76

Figure 8. Standardized Mean Math Percentile Rank Scores by Free Lunch/Reduced-
Price Lunch .....................................................................................................................77

Figure 9. EL Status and Math .................................................................................................77

Figure 10. Standardized Mean Reading Percentile Rank Scores by Disability Type
and Year ............................................................................................................................79

Figure 11. Standardized Mean Reading Percentile Rank Score for Title I School
Status by Year ....................................................................................................................80

Figure 12. Variations in Trajectory Based on Grade Level................................................81

Figure 13. Mean Standardized Reading Score Across Year by Percentage of General
Education ............................................................................................................................82

Figure 14. Standardized Mean Math Percentile Rank Score for Disability Type by
Year ...................................................................................................................................84

Figure 15. Standardized Mean Math Percentile Rank Score for Title I School Status
by Year .................................................................................................................................85

Figure 16. Mean Math Scores Between Years Across Grade .............................................85

Figure 17. Math Scores From Prepandemic to Interpandemic .........................................86

Figure 18. Reading Score Across Time for Initially Lower vs. Higher Performing
Students .............................................................................................................................87
Figure 19. *Math Scores Across Time for Initially Lower and Higher Performing Students* ........................................................................................................................................88

Figure 20. *Distance Learning Being a Good Match* ........................................................................................................................................93

Figure 21. *Distance Learning Factors That Promote Learning* ......................................................................................................................................95

Figure 22. *Technological Factors Hindering Child’s Distance Learning* ...............................................................................................................96

Figure 23. *Technological Factors Hindering Child’s Distance Learning* .........................................................................................................97
Introduction and Statement of the Problem

The COVID-19 pandemic was an unprecedented event for the United States and across the world that resulted in school closures, impacting more than 1.2 billion students and their families (United Nations Sustainable Development Group, 2020). At the pandemic’s onset, U.S. federal law and state laws did not have any existing guidance on how public schools should operate during emergency conditions. Researchers initially predicted that school closures could result in a loss of between 0.3 to 1.1 years of schooling, resulting in a decrease in yearly income of $366 to $1,776 and lost earnings between $6,680 and $32,397 in a student’s lifetime (Azevedo et al., 2021). Worldwide school closures of 5 months could mean losses of $10 trillion (Azevedo et al., 2021). Nearly 2 years later, research is emerging on how the pandemic’s disruptive nature has impacted students with and without individual education programs (IEPs).

According to the National Center for Education Statistics (2021), approximately 7.3 million students (or 14% of all public school districts) from ages 3 to 21 received special education services under the Individuals with Disabilities Education Act in the 2019–2020 school year. Starting in March 2020, this student population experienced a disruption of their learning and the school-based services that they needed to make educational progress. Virtually all students experienced school closures, and many of them were expected to transition to virtual learning without much notice or preparation. For students with IEPs, their services (e.g., specialized academic instruction, speech-language therapy, behavioral services, occupational and adaptive physical education therapy) were modified (e.g., on pause, decreased, or changed to consultation time), placing more responsibility on parents,
caregivers, and any adults available at home to facilitate their learning. Concurrently, students with IEPs needed special assistance navigating their devices and educational platforms because many of their disabilities prevented them from learning in the distance format. Furthermore, inequitable differences began to be apparent, with some households struggling with technology access and internet connectivity, housing and food security, and employment loss (Pier et al., 2021; Tomasik et al., 2020). According to Mervosh (2021), the public education system became “plagued by racial and socioeconomic inequities that have only gotten worse during the coronavirus pandemic.”

With the COVID-19 pandemic and transition to distance learning into students’ homes, parents and caregivers became more direct facilitators of their children’s education. Parents and caregivers needed to ensure their children were accessing their learning opportunities in these virtual conditions. This shift was compounded by inequities among families across different occupations, households, and socioeconomic status (SES) backgrounds. Families varied on whether they could work from home, have flexible work schedules, coordinate pods, and/or hire outside resources (e.g., tutors) to facilitate their children’s learning.

**Children with Disabilities**

During school closures, children participated in virtual learning and parents and guardians received consultation time to support their children at home; however, most, if not all, students with IEPs were not receiving in-person specialized services by the late spring of 2020. As this was occurring, several news stories described anecdotal reports suggesting a regression of academic, physical, occupational, and speech-language skills for students with disabilities who were struggling with distance learning (Graham, 2020; Kohli, 2020; Levine,
Consequently, students with disabilities were more likely to struggle more in the virtual learning format, given that they were receiving less individualized attention from their teacher(s) in a whole group setting and any online supports that teachers offered were less accessible to students with disabilities in the new platform. As a result, the academic areas in which students struggled prior to the school closures became more difficult to address in the virtual learning context, as task demands changed and students were required to adapt, navigate, and learn through new platforms. Similarly, Pier et al. (2021) found that English language learners and students of low-income backgrounds tended to show less growth. In addition, little is known about children with chronic absences with and without disabilities (Goodnough, 2020). The impact of their learning loss remains unknown, but may indicate an even more serious problem or issue that is yet to be discovered.

**Families of Children with Disabilities**

Despite the unprecedented nature of the pandemic, there is collateral research literature with guidance from family-centered healthcare and education practice models that highlights the importance of family autonomy and decision-making as central elements to intervention and service delivery for students with disabilities (Antill, 2020; Kokorelias et al., 2019; Mandak & Light, 2017). Additionally, there is considerable research on the value of family–school partnerships for children with special needs (Aouad & Bento, 2019; Burke, 2017; Burke et al., 2018; Goldman & Burke, 2017). Borrowing from both models, this research project explores family member’s opinions (via anonymous and voluntary surveys) about the pandemic’s impact on students with IEPs and objective data (via deidentified educational record reviews) about children’s academic skills in the pre- and interpandemic environments.
More than ever before and with limited notice, families with school-aged children with disabilities carried the educational responsibility of facilitating their children’s access to instruction, participation in class (via synchronous and asynchronous formats), and carrying out their children’s therapies, educational activities, behavioral objectives, and time management. Some families also kept their full-time or part-time careers working from home and/or a work location, sometimes with job flexibility and other times without (Algar, 2020; Kohli, 2020; Perelman, 2021). In addition, families may have faced many additional challenges, including, for example, language barriers with school personnel, having multiple children with different schedules and needs, a lack of understanding on how to use technology, difficulty navigating online classes and platforms, needing to care for other household members, and having an increase in stress from balancing work and family demands (Diament, 2020; Grose, 2020; Kohli, 2020; Rani, 2020; Savage, 2020). Families of students with IEPs took on the additional responsibilities of facilitating their children’s distance learning while also having to manage their own jobs at home and unique family circumstances (Algar, 2020; Kohli, 2020). Consequently, families experienced an overall increase in chronic stress and fatigue in the home, particularly those who did not have outside help from family members or the financial means for daycare, or tutoring services (Diament, 2020; Savage, 2020).

After a full school year into the pandemic, some families believed that their school districts owed them for the disruption in specialized services, including instruction, behavioral supports, and speech-language and physical therapy, due to remote learning conditions and students’ lack of progress (Turner & Klein, 2021). Families with financial
resources and knowledge about the IEP processes have been able to advocate at IEP meetings, hire advocates and attorneys, and be granted more intensive services for their children if they were not making adequate progress. In contrast, vulnerable and historically marginalized populations have been less familiar with their parental rights under special education law and knowing how to best advocate for their children’s specific services and needs (Rossetti et al., 2020).

**Importance of Academic Outcomes Particularly for Students with Disabilities**

Prior to the pandemic, many students experienced learning difficulties that impacted their educational performance in school and needed specialized instruction to develop academic skills as well as other areas of needs to access their grade-level curriculum and content. Such specialized instruction and services are guaranteed by an IEP, a legal document developed by a team of special educators, a general education teacher, specialists, parents or guardians, administrators, and the child (when appropriate) that would ensure opportunities for the student to make adequate educational progress on their individualized goals. Academic skills are critical IEP elements that support high school graduation, access to postsecondary education, and future employment. For example, reading comprehension is critical to educational attainment, social engagement, societal participation, and decision-making. Reading comprehension skills are also linked to accessing current news sources and voting. Similarly, math skills are needed for daily living (such as cooking or shopping) and managing finances (including budgeting) (Hendricks & Wehman, 2009; Zeedyk et al., 2016).

The COVID-19 pandemic exacerbated many academic achievement inequities for families and students (Pier et al., 2021). Student learning has particularly been disrupted and
impacted, as the achievement and opportunity gaps were widened. Families with resources could find tutoring or form pods to continue their children’s learning (Moyer, 2020). However, other families such as those with low income or those of color, experienced conditions affecting their children’s academic outcomes, such as having difficulty securing stable internet access, having limited knowledge on technology use, being less likely to support their children’s remote learning during school hours (due to work schedules), and being more at risk of getting COVID-19 from working outside the home (Pier et al., 2021).

According to California’s Legislative Analyst’s Office (LAO, 2019), the average prepandemic 2017–2018 test scores on an academic assessment for students with disabilities was in the 18th percentile. Compared to the general education population, the special education population performed much lower than other student groups, including EL (23rd percentile) and those from low-income families (36th percentile) (LAO). The report also found that students with disabilities tended to have lower 4-year graduation rates than typically developing students.

Given these academic outcomes, students with IEPs may experience more difficulties with seeking employment after high school graduation. These students may have difficulty with the five broad areas of workplace skills (contextual factors, skill acquisition, skill requirements, skill mismatch, and economic and social outcomes) identified by the Organisation for Economic Co-operation and Development (2020). According to their conceptual framework, reading, math (numeracy), and writing abilities impact skill acquisition and skill requirements, which in turn influence job earnings. These basic academic skills, as well as application of those skills in real-life situations, are fundamental
in improving students’ outcomes in life and increasing their independence after high school. Similarly, a report from the National Longitudinal Transition Study-2 indicated that young adults with disabilities were less likely to enroll and complete postsecondary education, live independently, and earn comparable income to people without disabilities (Newman et al., 2011). This report also found that students who completed high school were 3 times as likely than peers who did not complete high school to have enrolled in postsecondary school, and those who received a postsecondary education or certificate were more likely to be employed (Newman et al., 2011). Therefore, more attention is needed to provide academically oriented instruction and transition supports to school-aged students with disabilities to enroll and complete postsecondary education so that they can increase their chances of finding employment.

Academic outcomes are likely affected by many factors. Reading and math achievement scores of students in earlier grades were more impacted given that students with IEPs relied more on direct, explicit instruction from a credentialed teacher and were less equipped to learn and access materials independently for an extended period of time. There have also been inequities related to technology/internet access, healthcare disparities, and job losses and unemployment during the pandemic affecting some families more than others. Additionally, students’ and families’ well-being has been impacted by trauma, uncertainty, grief from loss, and social and political movements across the nation (e.g., Black Lives Matter movement; police shootings; the presidential election). Much remains unknown about how the 2020–2021 school year impacted the learning of general education students and students with IEPs.
Current Research Project

This dissertation starts by identifying the academic outcomes of students with IEPs during the COVID-19 pandemic by comparing their interpandemic outcomes with their prepandemic outcomes. It is hypothesized that their learning was disrupted due to the interruption of services that have almost always been provided in-person by credentialed specialists. Many students’ virtual learning environments, as well as lack of continued access and proximity to professionals, were likely to impact their progress. Knowing that this student population tends to have lower graduation rates, their chances of academic success and preparation for postsecondary options are decreased due to the lack of adequate and timely services to ensure successful paths after leaving school. To my current knowledge, no studies have specifically measured the reading and math trajectories of students with IEPs during interpandemic long-term school closures and distance learning.

This quantitative study is based on the Bronfenbrenner’s (1986, 1989) ecological systems theory. This theory describes the different environmental levels that influence a child’s development, starting with the microsystem, which consists of individuals who directly interact with the child on a regular basis (such as household members, teachers, and peers). Another important element is the mesosystem, which includes the interactions between home and school. This study is especially relevant because it acknowledges that families, teachers, and schools all play a significant and synergetic role in children’s development and education. Thus, this quantitative study explored whether the academic trajectories of students with IEPs were significantly impacted during a pandemic school year and if so,
which student populations were particularly vulnerable and which populations were more resilient in terms of academics (defined here as reading and math abilities).

In addition, this research study explored how parents and caregivers perceived distance learning for their children with IEPs and whether certain demographic factors influenced their perspectives and experiences. In doing so, the second part of this study attempts to quantitatively and qualitatively understand the impact of severity level and demographic factors that relate to academic outcomes and family opinions. Such research is important to school and district administrators, educators, and families who are attempting to understand the pandemic’s impact on public education and specific groups of children. As well, such research provides insights about how these key players may need to respond to ongoing (and potential future) school closures and potential variants of COVID-19 that may equally affect public education. Furthermore, this research may help our society respond more quickly in advocating for necessary services, programs, and supports for students and families, rather than perpetuating the achievement and opportunity gap in future educational and vocational outcomes of students.

**Delimitations**

This study has two parts, record review and survey data. This study used academic data extracted from the 2018–2019 school year and 2020–2021 school year and a survey that was administered in January 2021. The location of this study was in a K–8 suburban school district in California. Participants in this study included students with IEPs attending the school district and their parents and caregivers. Demographic data from school records as well as computerized academic data were used for the deidentified record review component
of this study. In addition, the survey included Likert items that focused on self-reported household characteristics as well as parents’ and caregivers’ perspectives on the distance learning and their child’s education. For the record review, all existing student data that the district had access to was included for this study. Regarding the survey, parents and caregivers had to meet specific inclusion criteria of the survey, and those who answered more than 30% of the survey were included in the data analysis.

**Positionality**

The researcher is currently employed as school psychologist at a school site in the school district involved in this study and has worked with some students and families who were part of this study. Due to the researcher’s position in special education, she had access to student’s IEP records and demographic information at the school site. Participation in the surveys was anonymous and not linked to students’ records. This anonymity was intentional so that the researcher was not able to link survey respondents to educational records, thus ensuring anonymity and mitigating her role and influence.

**Organization of Paper**

This paper is organized into five chapters, references, and appendixes. In Chapter 2, the literature review focuses on the academic achievement and growth of students with disabilities, including the effects of online and blending learning and family involvement on educational outcomes before and during the COVID-19 pandemic. Chapter 3 outlines the methodology of the study, including measures used for data collection and procedures. Chapter 4 includes the data analysis and a discussion of the findings. Chapter 5 provides
conclusions, recommendations and implications of this study. References and appendixes of related documents are at the end of the paper.

Research Questions

This study sought to answer the research questions specific to children with education-related disabilities during the COVID-19 pandemic:

RQ1a: How do the reading and math trajectories of students with IEPs during the nonpandemic school year (2018–2019) compare to trajectories during a pandemic school year primarily consisting of distance learning (2020–2021)?

RQ1b: What is the relationship between students’ demographic characteristics (ethnicity, educational placement, English language learning status, SES, disability type, and grade level) and reading and math trajectories comparing school years 2018–2019 and 2020–2021?

RQ2a: What are parental and caregiver opinions about distance-learning factors that influence their children’s education?

RQ2b. What is the relationship between students’ demographic characteristics (grade, ethnicity, SES, and disability type) and parental and caregiver opinions on distance-learning factors that influence their children’s education?

This dissertation includes a considerable number of professional terms. Therefore, Table 1 provides a list of key terms and their definitions that are used for this specific study.
### Table 1. Terms and Definitions

<table>
<thead>
<tr>
<th>Key terms</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online learning (also known as distance/remote learning)</td>
<td>Instruction that is primarily delivered over the internet and the student’s instructional day is primarily through their computer or other technology device (Greer et al., 2014)</td>
</tr>
<tr>
<td>Blended learning</td>
<td>Learning where online delivery is only part of the student’s instructional day in addition to the traditional face-to-face classroom format (Greer et al., 2014)</td>
</tr>
<tr>
<td>Academic trajectory</td>
<td>The rate of growth in the student’s proficiency in reading and mathematics compared to their grade level peers over a school year</td>
</tr>
<tr>
<td>Hybrid program</td>
<td>A learning option where students receive some of their instruction face-to-face in a classroom setting (either several hours per day or certain days of the week) and receive other instruction outside of school (asynchronous and/or online instruction)</td>
</tr>
<tr>
<td>Independent study</td>
<td>A learning option where students participate in a full-time, self-managed online curriculum with an assigned remote teacher</td>
</tr>
<tr>
<td>Individualized education program</td>
<td>A formal education plan for a student who meets the federal educational eligibility criteria for a disability that outlines the student’s present levels of functioning, goals, accommodations, and services</td>
</tr>
<tr>
<td>Individuals with Disabilities Education Act</td>
<td>A federal law that allows eligible students with disabilities the right to a free appropriate public education in the least restrictive environment</td>
</tr>
<tr>
<td>Free appropriate public education</td>
<td>Special education and related services that are provided to eligible students with disabilities at no cost to parents or caregivers</td>
</tr>
<tr>
<td>Least restrictive environment</td>
<td>A mandate under the Individuals with Disabilities Education Act where students receiving special education services are in general</td>
</tr>
</tbody>
</table>
education classrooms with typically developing peers to the greatest extent possible

<table>
<thead>
<tr>
<th>Title I status</th>
<th>Part of the Elementary and Secondary Education Act that provides financial assistance to local educational agencies and schools with high percentages or numbers of students from low-income families as a way to ensure all children meet their state academic standards (U.S. Department of Education, 2020a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioeconomic status</td>
<td>The family’s level of income, education, and/or occupation</td>
</tr>
<tr>
<td>Free or reduced-price meal eligibility</td>
<td>A person (or family’s) eligibility for free or reduced-price school meals in California are determined if their family income falls between 130 and 185% of their federal poverty guideline (California Department of Education, 2021); may serve as a proxy for a family’s SES</td>
</tr>
<tr>
<td>English learner (EL) status</td>
<td>A student whose primary language is not English and whose initial scores on the English Language Proficiency Assessments for California determine their need for English language development (ELD) services and supports</td>
</tr>
<tr>
<td>English only</td>
<td>A student whose primary language is English</td>
</tr>
<tr>
<td>Initially fluent English proficient</td>
<td>A student whose initial scores on the English Language Proficiency Assessments for California determined the student has fluent English proficiency and that the student does not need ELD services</td>
</tr>
<tr>
<td>Reclassified fluent English Proficient</td>
<td>A student who has been reclassified or redesignated as having fluent English proficiency based on meeting criteria to be considered proficient in English and no longer needing additional ELD services</td>
</tr>
<tr>
<td>Learning loss (learning lag)</td>
<td>The difference between student’s expected learning trajectory that is not impacted by the pandemic and their actual learning during the COVID-19 pandemic (Pier et al., 2021)</td>
</tr>
<tr>
<td>Smarter Balanced Assessment Consortium (SBAC)</td>
<td>Statewide assessments that are administered via the computer to measure student’s progress towards academic standards in California</td>
</tr>
<tr>
<td>English Language Proficiency Assessments for California</td>
<td>A mandated state test to determine a student’s English language proficiency if their primary language is not English</td>
</tr>
<tr>
<td>Policy Analysis for California Education</td>
<td>A research center led by faculty directors at California’s top universities and in collaboration with state and local decision makers with the goal of bridging “the gap between research, policy, and practice…to achieve improvement in performance and more equitable outcomes at all levels of California’s education system” (Policy Analysis for California Education [PACE], 2022).</td>
</tr>
</tbody>
</table>
CHAPTER 2

Literature Review

Little is known about the long-term effects of the COVID-19 pandemic and school closures on students with disabilities and their education. There is tremendous concern on how the effects of this pandemic may impact the educational outcomes of student populations of high needs, including children with disabilities, EL, foster youth, those experiencing homelessness, and those at risk of abuse and neglect (American Academy of Pediatrics, 2020; Levine, 2020). One especially critical issue in the field of special education is the question of what a free appropriate public education (FAPE) looks like when the country is under a state of emergency while continuing virus transmission has a serious impact on health and safety of students and educators.

In this chapter, I first discuss what FAPE has looked like during the COVID-19 pandemic. I also review the existing research on how students’ demographics (disability status, grade level, race) and educational placement have different academic trajectories and growth rates. I will then review the nascent literature on student academic outcomes during the COVID-19 pandemic. Next, the topic of academic outcomes from distance learning is discussed. Last, in the literature review I consider the influence of parents on their children’s education and the emerging literature on parental involvement when distance learning is in place. Figure 1 provides a concept map to represent the variables studied in the literature review.
**FAPE and Virtual Learning in the COVID-19 Pandemic**

At the pandemic’s onset, school districts were left without specific guidance on the implementation of services during emergency conditions. The Individuals with Disabilities Education Act (IDEA, 2004) did not specifically address what elementary and secondary schools were to do when they were “closed for an extended period of time (generally more than 10 consecutive days) because of exceptional circumstances, such as an outbreak of a particular disease” (U.S. Department of Education, 2020b). In addition, the U.S. Department of Education (2020b) stated that schools that were open for distance learning should provide
students with disabilities “equal access to the same opportunities, including the provision of FAPE” without specific details on how to implement FAPE under pandemic conditions.

These topics are compounded by the limited research about students’ academic outcomes and growth patterns during virtual and hybrid learning when enrolled in public schools. Although teletherapy has existed for decades with specific focus on speech-language therapy, behavioral therapy, and counseling, there has been no research on students with disabilities and IEPs, whether they have high-incidence disabilities or low-incidence disabilities, receiving academic instruction and demonstrating their knowledge remotely. Thus, prior to the pandemic, no information was available about FAPE in the teletherapy context for children with disabilities.

**Student Demographics and Academic Growth Trajectories of Students with Disabilities**

As a starting point, it is helpful to note that numerous longitudinal studies have examined the prepanademic academic growth trajectories of students with disabilities (Burns et al., 2020; Cain et al., 2019; Drame, 2010; Sanford et al., 2011; Wei et al., 2011; Wei et al., 2012). More studies examined the growth trajectories on reading (Burns et al., 2020; Drame, 2010; Sanford et al., 2011; Wei et al., 2011) than math achievement (Wei et al., 2012) among students with disabilities.

**Reading Achievement**

Wei et al. (2011) examined the growth of reading achievement of students with disabilities using the reading subtests from the Woodcock-Johnson III Tests of Academic Achievement. Data were extracted from the Special Education Longitudinal Study (SRI International, 2002), a nationally representative sample of 3,421 students with disabilities.
ages 7 to 17 representing 11 federal disability categories. They found that reading
achievement in all disabilities increased with age but the rate of growth decreased with age.
In addition, average reading achievement was different by disability category. Students who
performed the highest were those with a speech-language or visual impairments, whereas
those who performed the lowest were classified as having an intellectual disability or
multiple disabilities. Wei et al. (2011) also found that reading growth rates over time were
comparable among the disability categories; however, students with speech-language
impairment, hearing impairment, or autism improved at a slower rate compared to students
with learning disabilities.

Regarding demographic factors, Wei’s study (2011) found gender, racial and ethnic, and
socioeconomic differences. For example, males with disabilities had significantly higher
letter-word identification (LWI) subtest scores than females, but there was no significant
gender gap on the passage comprehension (PC) subtest. In terms of race and ethnicity,
minority students were found to lag behind in reading. Here, there were significant
differences in achievement levels but not in acceleration or the slopes between White and
Black students with disabilities on both LWI and PC. In addition, there were significant
differences in acceleration but not in level or in slope on LWI among White and Hispanic
students; yet a reading gap favoring White students emerged and increased in secondary
school. The significant gap on PC between White and Hispanic students also persisted over
time. Last, researchers found gaps between high- and low-SES families in reading
achievement levels. Extending these same ideas, Gilmour et al. (2019) estimated the size of
the reading achievement gap between students with and without disabilities. In their meta-
analysis of 180 effect sizes from 23 studies, they found that students with disabilities “performed 1.17 standard deviations, or more than 3 years, below typically developing peers” and reading gaps based on the disability label but not other student or assessment variables.

Similarly, two studies examined reading growth of second and third grade students with and without disabilities while examining the impact of reading interventions on students’ trajectories (Burns et al., 2020; Sanford et al., 2011). Sanford et al. (2011) examined students with and without special education services with 1 to 3 years of experience with the Oregon Reading First intervention program. Their measure of assessment for reading was the Oregon Assessment of Knowledge and Skills. They found that all of the intervention students, including those receiving special education services, had greater reading growth. They also found that students in special education made significantly less growth compared to those without services. Another finding from the study was that students at risk for reading failure and special education identification demonstrated poorer reading growth. Similarly, Burns et al. (2020) examined the reading growth rates of students with and without severe reading deficits receiving targeted interventions (phonics or fluency). Students with severe reading deficits scored at or below the 10th percentile on the national norm of the Measures of Academic Progress for Reading (Northwest Evaluation Association [NWEA], 2003) fall screener. To measure the students’ reading progress, they used the AIMSweb (2012) assessment system, which uses a standard curriculum-based measurement procedure. Burns et al. found that students with severe reading deficits who received targeted Tier 2
interventions performed comparably to students without reading deficits. These students also performed significantly higher than students receiving special education services for reading.

**Mathematics Achievement**

In addition to reading outcomes, researchers have considered math skills. Wei et al. (2012) examined the math growth trajectories of students with disabilities from ages 7 to 17. Similar to Wei et al.’s (2011) study on reading trajectories, data were extracted from the Special Education Longitudinal Study (SRI International, 2002). Results showed that students in all disability categories had lower math achievement levels and growth rates in elementary school, compared to a national norming sample. In secondary school, the math growth rate slowed down and was similar for all students. Among those with disabilities, students with speech-language or visual impairments had the highest math achievement and those with multiple disabilities or intellectual disability had the lowest math achievement, results relatively consistent with previously reported reading outcomes. As well, compared to students with learning disabilities on math calculation, students with autism had significantly slower growth rates and students with speech-language impairments decelerated significantly faster in terms of their growth rates (a result similar to their reading trajectories). Among students with disabilities, demographic factors (e.g., gender, White–Black, and socioeconomic status) had significant math achievement gaps that were stable over time, whereas math achievement gaps among White and Hispanic students increased over time. Notably, Wei et al. (2011) and Wei et al. (2012) found a quadratic growth curve model was a better fit to their academic data than a linear model and hypothesized that students
demonstrate the most growth in reading and math skills in the early grades with a decrease in growth rates as the student became older.

Judge and Watson (2011) employed similar longitudinal data but from the first six waves of the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K) to examine the mathematic trajectories of students with and without learning disabilities (LD). They identified students either as early-emerging LD (if they initially qualified for services in kindergarten or first grade), emerging LD (if identified in second or third grade), late-emerging LD (if identified in fourth or fifth grade), or nondisabled. They found that students with an LD demonstrated smaller gains in mathematics than those without disabilities. By the end of kindergarten, all three LD groups performed below the 25th percentile on the mathematics achievement assessment and consistently scored below the 25th percentile through fifth grade. In addition, they also examined demographic factors and found growth rates influenced by students’ SES (higher > lower), race (nonminority > minority), and gender (boys > girls) upon entry of kindergarten.

**Academic Trajectories in Specific Disability Classifications**

**Attention Deficit Hyperactivity Disorder**

Research on the trajectories of students with attention deficit hyperactivity disorder (ADHD; Bussing et al., 2012; Lawrence et al., 2021; Salla et al., 2015) found that these students tended to have lower academic performance than peers without ADHD. Specifically, Bussing et al. (2012) found that students with ADHD and special education needs had lower statewide achievement test scores than peers in the comparison groups, but had similar learning growth rates over time. Lawrence et al. (2021) compared the academic
trajectories of 327 Australian students with ADHD to 3,916 students without disabilities using achievement test data over an 8-year period. They found that students with ADHD generally had lower achievement in reading, writing, and numeracy compared to students at Year 3. In addition, the achievement gaps across all subjects grew larger as children got older, as they were behind their comparison peers “on average 2.5 years behind in reading, 3 years behind in numeracy, and 4.5 years behind in writing” by year 9. Similarly, per data from the Quebec Longitudinal Study of Child Development, Salla et al. (2015) found that high inattention in early childhood (ages 1.5 to 5) resulted in lower academic outcomes at age 12. Moderate and high inattention in middle childhood (ages 6 to 10) predicted low academic performance via both teacher ratings and standardized reading, writing, and mathematics tests at age 12.

**Autism Spectrum Disorder**

In a single longitudinal study Hyun Kim et al. (2018) examined early predictors, academic achievement, cognitive skills, parent participation, and class placement among children who were referred to agencies for possible autism spectrum disorder at age 2. These children’s academic skills varied widely at ages 9 and 18 but were generally commensurate or higher than expected given their cognitive abilities. However, 22% of the age 9 group and 32% of the age 18 group with average to above average IQs had below or low average achievement in at least one academic domain. As a compounding factor, educational placement impacted children’s academic achievement outcomes. Students with autism who were in general education or inclusion classrooms had higher achievement outcomes than those who were in special education classrooms. Contrastively, students with higher
cognitive abilities (measured at ages 3 and 9) also had higher academic achievement and “faster academic growth” from ages 9 to 18 (Hyun Kim et al., 2018, p. 258). In addition, “parent participation in intervention by age 3 predicted better achievement at age 9 and 18” (Hyun Kim et al., 2018, p. 258).

**Emotional and Behavioral Disturbance.** Researchers have also examined the impact of emotional and behavioral disturbance (EBD) on academic skills. Nelson et al. (2004) found that compared to the norm group, students with EBD had “large academic achievement deficits across all of the content areas and the deficits appeared to be stable or worsened in the case of mathematics across age.” Reid et al. (2004) found similar results in a meta-analysis examining academic skills of students with EBD. Reid et al. reported “greater deficits were not observed in older students with EBD (i.e., those more than 12 years old).” In addition, studies have produced mixed results comparing students with EBD to students with learning disabilities. Sabornie et al. (2005) found that students with EBD had lower academic achievement, whereas other studies (Lane et al., 2006; Wei et al., 2011; Wei et al. 2012) did not find any significant differences.

**Special Education Status, Educational Placement, and Academic Outcomes**

*Impact of Special Education on Academic Outcomes*

In the field of special education, there is oftentimes the controversial and complex question of whether special education is efficacious (i.e., does it work?) and whether students with IEPs benefit from and maintain skills they have gained from special education services (i.e., do children sustain learned skills?). These efficacy questions are complicated to study because students who enter special education services often do so because they have low
academic achievement and those who exit from services no longer demonstrate a need for specialized services or instruction. However, Hurwitz et al. (2020) specifically addressed these topics by looking at the effectiveness of participating in special education on the academic trajectories of 575 students with disabilities using six semesters of longitudinal data. In order to look at students’ performances before, during, and after special education placement, these researchers used a student fixed effects model of within-person change over time. Findings indicated that the reading and math scores from the Measures of Academic Progress (MAP) assessments did improve after students with disabilities were enrolled in special education (Hurwitz et al., 2020). Students who exited from special education services were found to have a sustained trajectory of academic growth, suggesting long-term positive effects of special education.

A limitation of this study is that it only took into account data from one district and their findings may not generalize to the special education programs in other public school districts across the United States. However, this quantitative study did provide evidence that students with disabilities receiving specialized services can improve their academic outcomes and sustain gains after no longer demonstrating a need for services.

*Educational Placement and Academic Outcomes*

Another school variable that may impact a child’s educational outcome is the child’s educational placement, specifically the percentage of the school day spent with typical peers in a general education setting. Under Part B of IDEA (2004), students with disabilities are to be educated in the least restrictive environment to the greatest extent possible. Thus, researchers have examined the correlation and impact of educational placement on academic
outcomes, based on children’s least restrictive environment participation. Cosier et al. (2013) examined the relationship between hours in a general education setting and academic achievement (reading and mathematics) for students with disabilities. They examined the Preelementary Education Longitudinal Study from the Institute of Education Sciences and collected data on more than 1,300 students between 6 and 9 years of age in 180 school districts. They found that the number of hours a student spent in a general education setting had a strong positive relationship with the higher student achievement in reading and mathematics.

Oh-young and Filler (2015) conducted a meta-analysis of placement effects on academic and social skill outcome measures of students with disabilities. Measures of academic achievement included Basic Academic Skills Samples, Wechsler Preschool and Primary Scale of Intelligence-Revised, and the Woodcock Johnson III Tests of Achievement. For measures that assessed social skills and social interaction, assessment data included the Social Skills Rating Scale and the Preschool Language Scale-3. Of the 24 studies reviewed from 1980 to 2013, Oh-Young and Filler found significant differences in academic and social outcome measures based on placement settings. Similar to Cosier et al. (2013), the majority of students with disabilities in more integrated settings outperformed those in less integrated settings on both measures. Both Cosier et al. (2013) and Oh-Young and Filler (2015) found that students in more integrated settings had better academic outcomes than those who were educated in separate settings outside of the general education classroom. This similarity suggests that the percentage of students’ time in the general education setting is a potential predictor of students’ future educational and academic outcomes.
Online and Blended Learning and Students with Disabilities

Another important academic achievement topic is how online and blended learning impacted students with disabilities prior to the pandemic. Such research is important for providing insights and comparative information regarding students’ academic outcomes and engagement during the pandemic. Among this group of students, the trend has been for researchers to focus on a single subject, intervention technique, or area of student need rather than online learning as a whole instructional program. For example, Kennedy and Boyle (2021) highlighted three studies (Fitzgerald et al., 2012; Morgan et al., 2016; Straub & Vasquez, 2015) that described online-based instruction for social, reading, or writing skills only. Pace and Mellard (2016) examined blended learning among sixth grade students in a single English/language arts course and Marino et al. (2014) embedded universal design for learning principles into lessons for middle school students with learning disabilities. In addition, scoping reviews from Greer et al. (2014) noted a paucity of efficacy studies about online learning and students with disabilities, whereas Rice and Dykman (2020) found only two efficacy studies (among 20 peer-reviewed articles from 2014–2017), namely the Marino et al. and Pace and Mellard studies. Thus, no comparative research studies about the academic achievement of students with IEPs who participated in fully online programs were conducted before the pandemic.

Fast forward to school closures in March, 2020, and it is important to consider additional marked contrasts between the characteristics of pre- and interpandemic online, blended, and virtual learning processes and contexts. First, students who participated in online learning prior to COVID-19 primarily received their instruction exclusively through a device or
computer outside the school setting (such as in the home) while being assigned a remote
teacher who served as a facilitator (Greer et al., 2014). Second, pre-COVID-19 academic
content and curriculums were typically designed and controlled by a business vendor, not
public school or district personnel (Greer et al., 2014) Third, pre-COVID-19 learning did not
occur during a worldwide emergency crisis period filled with uncertainty, fear, and
potentially fatal outcomes impacting children’s families. Fourth, interpandemic learning
began with a lack of preparedness and an abrupt transition from classroom to online learning
because many brick-and-mortar building students and teachers had to quickly learn to
navigate educational platforms. With this lack of expertise and time to prepare for online
learning (Tomasik et al., 2020), teachers reported being underprepared and not confident in
using online learning environments. Finally, schools in the interpandemic context initially
had limited to no instructional guidelines on distance learning from their districts (from
March to June 2020), and remote learning looked different from district to district and state
to state.

Learning Loss, Lag, and Regression

Prior to reviewing the current literature on academic outcomes of students during the
COVID-19 pandemic, it is important to discuss the definition of learning loss, as this term
has been frequently used in the educational field and in the global community. According to
Pier et al. (2021), learning loss, also known as learning lag, refers to the difference between
student’s expected learning trajectory that is not impacted by the pandemic and their actual
learning during the COVID-19 pandemic. This difference is highlighted by numerous studies
that were conducted during the COVID-19 pandemic examining the academic performance
of students in the pandemic and comparing their outcomes with academic outcomes in previous school years. In addition, it is important to make a distinction between the term *learning loss* and *regression of academic skills*, a term more familiar to educators of students with severe disabilities characterized by significantly lower cognitive and adaptive functioning. Pier’s definition, learning loss refers to the gap between expected and acquired academic skills because of the pandemic school year, whereas regression refers to loss of previously acquired skills over an extended period of time of noninstructional time (including the pandemic but also during the summer break or winter holiday break).

**Academic Outcomes Among General Education Students During COVID-19**

Some research has been conducted on the academic outcomes of general education students during the COVID-19 pandemic. Such work lends itself to future comparison to students with IEPs described next in this paper. For example, a study conducted in Switzerland by Tomasik et al. (2020) examined the reading and math performance of 28,685 students from primary and secondary schools 8 weeks before the closures and after 8 weeks of pandemic school closures. They found that the learning gains of secondary school students were mostly unaffected by the school closures. For primary school students, learning gains slowed down although “interindividual variance in learning gains” increased. In another peer-reviewed study, Engzell et al. (2021) looked at the effects of school closures using a dataset from 2017 to 2020 that covered 15% of Dutch primary schools, approximately 350,000 students. The examined data included biannual test scores in core subjects for students aged 8 to 11 years, student demographics, and school demographics. They also examined if there were differences in learning loss among students in less-educated homes.
and other variables (sex, grade level, subject areas, and previous performance). The Netherlands also had a relatively short lockdown period (8 weeks) compared to other parts of the world and are reported to have “an equitable system of school funding and the world’s highest rate of broadband access” (Engzell et al., 2021, p. 1). Results indicated a “learning loss of about 3 percentile points or 0.08 standard deviations,” “equivalent to one-fifth of a school year, the same period that schools remained closed.” Students from less-educated homes had a learning loss of up to 60% larger than the general population, suggesting inequitable effects.

In addition to these two peer-reviewed articles, outside research organizations such as PACE and private computerized academic assessment companies have issued reports based on academic data extracted from thousands of schools across the United States. Pier et al. (2021) examined student growth of approximately 100,000 students in 19 California Local Educational Agencies who were members of the CORE Data Collaborative. They compared growth from fall 2019 to winter 2021 to the “at least one of the two prior growth years (i.e., fall 2017 pretest and winter 2019 posttest, and/or fall 2018 pretest and winter 2020 posttest)” (Pier et al., 2021, p. 5). They compared three interim academic assessments: Northwest Evaluation Association (NWEA) MAP Growth, Renaissance Learning Star, and Curriculum Associates. Results indicated that there was “more learning lag for students who are economically disadvantaged (except in upper grades in math, as measured by the MAP), English learners, and Latinx. Students who were previously low achieving also had learning lag across all assessments (except in ELA, as measured by Star, where results were more mixed”).
In a separate PACE working paper, Domingue et al. (2021) studied students’ oral reading fluency (ORF) during the COVID-19 pandemic using data from nearly 100,000 K–7 students from over 100 school districts in 22 states with a total of over 250,000 measures of ORF. The majority of the data were intermittently collected in first through fourth grade throughout the school year. Domingue et al. found significant disruptions to student growth in spring 2020 when school closures occurred but higher rates of growth during the fall 2020, with stronger growth in high-achieving districts, particularly in Grades 2–3. A limitation of this study was that students tended to come from higher SES backgrounds and tended to perform higher on standardized tests, which is different from the most student populations in the nation.

Curriculum Associates, NWEA, and Renaissance Learning posted notable reports using historical academic data from their computerized assessments (i-Ready, NWEA MAP Growth assessments, and Star) to examine the learning of students in the 2020–2021 school year (Curriculum Associates, 2021; Lewis et al., 2021; Renaissance Learning, 2021). All three organizations reported inequities that occurred in learning and how certain demographic characteristics of students, households, and schools (such as a child’s race/ethnicity, grade level, EL status, family’s income level, school location and Title I status) are associated with less academic growth compared to others outside of their groups.

In an NWEA report, Lewis et al. (2021) found that students across most grades (third through eighth) made gains in reading and math during the 2020–2021 school year. However, their gains during the interpandemic school year were at a lower rate than prepandemic gains, particularly between winter and spring. In addition, students exhibited lower achievement compared to a nonpandemic school year with a bigger decrease in math
scores (8–12 percentile points) than reading (3–6 percentile points). In addition, although all student groups experienced lower achievement in the 2020–2021 school year, certain student populations (American Indian and Alaska Native, Black, Latinx, and students in high-poverty schools) were disproportionally impacted, particularly in the elementary grades that were studied.

In a research brief by Curriculum Associates (2021), company personnel looked at students’ i-Ready academic assessments at the end of 2020–2021 school year and compared them to their prior year achievement. Compared to prior school years, fewer students were on grade level in reading and in mathematics across all grades in the 2020–2021 school year. For mathematics, this decrease was observed more in the elementary and early middle school grade levels, whereas for reading, it was more observed in early elementary grades. In addition, fewer students were at grade level if they attended schools that served mostly Black and Latino students (compared to schools serving mostly White students) or if they attended a school in a lower-income zip code (than a school with a higher income zip code).

Renaissance Learning (2021) found that student growth during the first half of the 2020–2021 school year was commensurate with typical levels for the general student population who took the Star Reading and Math tests. Their median fall-to-winter Star Student Growth Percentile scores for reading and math were 46 and 48 respectively, which were close to the Student Growth Percentile benchmark (50), indicating typical growth. However, student learning and growth did not occur uniformly. On performance using percentile ranks, the general student population performed about 2 points behind pre-COVID expectations in winter 2020–2021 (midyear) and 6 points behind for math. Students in particular subgroups
(Black, Hispanic, American Indian, students with disabilities and EL students) as well as those who attended urban schools and Title I schools also “experienced greater COVID-19 impacts than the overall averages.” These results were similar to the reports from NWEA and Curriculum Associates.

**Academic Outcomes During the COVID-19 Pandemic Among Students With IEPs**

In contrast to the research on the general population of K–12 students during the COVID-19 pandemic, just one report is currently available (as of November, 2021) about the academic outcomes of students with disabilities. Pier et al. (2021) found mixed learning outcome results for students with disabilities. Compared to students without disabilities, students with disabilities had a learning lag on the MAP assessments but less of a learning lag on the Star in ELA. It is also important to note that fewer students with disabilities participated on the academic assessments during the COVID-19 pandemic, which may have impacted the results. In addition, findings did not include absent students (who did not participate in academic assessments) and thus the effects on their learning remain unknown. However, their lack of engagement and participation in remote learning (including taking interim assessments) is concerning as they may have missed a significant amount of instruction and thus their reading and mathematics skills may have been more negatively impacted than the student data would suggest.

Few empirical quantitative studies among students with disabilities because of a number of factors. First, students who qualify for special education services tend to have lower academic achievement compared to typically developing peers, and therefore their academic outcomes may not fall in the normal distribution of the bell curve. Thus, their academic
achievement levels may not be a high priority for researchers interested in the pandemic’s impact because these students might not have been expected to make substantial educational gains in nonpandemic circumstances. Second, the academic trajectories of students with disabilities may look markedly different from those of students without disabilities. Students with IEPs have a large heterogeneous set of characteristics based on confounding factors related to their social–emotional skills, behavioral needs, fine/gross motor skills, speech-language skills, etc. These related areas are likely to factor into academic skills and make it difficult to draw insights using population statistics. Third, the transition and ongoing process of accessing online instruction may have been markedly different for students with IEPs because many of their learning needs may have remained unmet in the distance learning format. For example, the nature of children’s disabilities may have prevented them from being able to navigate various educational platforms, and therefore many likely missed out on timely feedback for their assignments (Yazcayir & Gurgur, 2021). Therefore, conducting a quantitative study that examines this heterogeneous student population is more complicated and arduous and may be less well understood by researchers who do not work in special education school settings.

**Shift to Family Involvement During the COVID-19 Pandemic**

With this extensive background information about students, it is important to extend these descriptions to include family involvement in pre- and interpandemic educational activities for children with IEPs. Doing so is consistent with Bronfenbrenner’s (1986, 1989) ecological systems theory and the immediate transition to home-based distance learning.
When school closures started in March 2020, parents and caregivers were thrust into additional responsibilities as facilitators of their children’s education. This shift was in addition to carrying out their employment duties and experiencing physical and mental health stressors per the changing pandemic details provided by public health officials. The effects of this new role resulted in many parental and caregiver conflicts while trying to maintain employment and focusing on their children’s education (Perelman, 2021). In addition, some households may have experienced housing and food instability, employment instability, financial strains, limited technology access (internet and phone connectivity), and trouble accessing and navigating technology and educational platforms. Students may have also gained new responsibilities for attending to and caring for other children in the family if there was no adult in the home who could help siblings participate in online classes, school assignments, or navigate technology (Pier et al., 2021).

**Families and School Systems**

With the unexpectedly quick transition to distance learning in all schools in March 2020, the role of families in children’s education had never before been so drastically changed as immediately as children and families were expected to navigate, learn, and self-manage through technology and various online platforms in their home environments. This section of the literature review describes parental involvement prior to COVID-19 as well as the experiences and attitudes families have on distance learning. Prior to doing so, it is important to acknowledge the long-held value that parental and caregiver involvement is critical for students with and without disabilities. Evidence of this critical importance is found in the research (reports and meta-analyses) focused on how family involvement impacts students’

**Parental and Caregiver Involvement**

To start this description, it is helpful to identify definitions of parental involvement. The No Child Left Behind Act (2002) defined parental involvement as “the participation of parents in regular, two-way, and meaningful communication involving student academic learning and other school activities” (§9101). Hill et al. (2004) provide a broader definition, which is “parents’ interactions with schools and with their children to promote academic success.”

In their literature review, Hill and Tyson (2009) identified three frameworks on parental involvement. The most cited framework is Epstein’s (Connors & Epstein, 1995; Epstein, 1987; Epstein & Sanders, 2002), which identified four types of parental involvement strategies: school-based, home-based, school support for parenting, and involvement between the school and community agencies. School-based involvement includes strategies for parents such as volunteering at their child’s school, communication with teachers, and involvement in school governance. Home-based involvement includes engaging children in educational activities at home. School support for parenting occurs in the form of parent training programs that are offered by the school or district, whereas school–community partnerships involve networking with area resources. A second framework identified by Hill and Tyson was Comer’s (1995), which, not unlike Epstein’s, includes school-based involvement (e.g., parent–teacher conferences, volunteering, being present at school,
participation in school governance) and home-based involvement (e.g., parental
reinforcement of learning at home).

Another parental involvement framework was developed by Grolnick and Slowiaczek
(1994) and included three aspects: behavioral involvement involving both home- and school-
based strategies (e.g., active connections and communication between home and school,
volunteering at school, assisting with homework); cognitive–intellectual involvement, which
is a home-based involvement (e.g., exposing their children to educationally stimulating
activities and experiences); and personal involvement (e.g., attitudes and expectations about
school and education and conveying enjoyment of learning). Researchers have also
developed models of parent decision-making processes (Anderson & Minke, 2007; Hoover-
Dempsey & Sandler, 1995). For example, Hoover-Dempsey and Sandler (1995) described
how parental involvement positively influences their decisions affecting students’
educational outcomes via, for example, parents’ role construction, sense of efficacy, general
opportunities, skills and knowledge, and specific teacher and child invitations.

**Parental Involvement Among Students Without Disabilities**

Parental involvement is well regarded in public education. To extend this topic, it is
important to consider the numerous meta-analyses that have examined the role of parental
involvement on academic achievement on students without disabilities (Benner et. al., 2016;
meta-analysis is of 25 empirical studies produced three major findings. First, there was a
small to moderate relationship between parental involvement and academic achievement.
Second, parental aspirations and expectations for children’s education had the strongest
relationship to academic achievement. Third, the relationship between parental involvement and academic achievement was stronger when the measure for academic achievement was a global indicator (such as a GPA) rather than a subject-specific indicator (e.g., a math grade).

Parental involvement varies depending on a student’s grade level and the opportunities their school has to offer families of cultural, ethnic, and economic diverse backgrounds. Hill and Tyson (2009) conducted a meta-analysis of parental involvement strategies that promote academic achievement in middle school. They noted “aspects of the middle school structure do not support home- and school-based involvement strategies in the same way as in elementary school.” They observed that parental involvement in the elementary school context may expose and familiarize parents with the curriculum, expand their social capital, and add to their effectiveness of being involved in the home. In contrast, parents were less likely to help their children in middle school to increase their achievement.

Nye et al. (2006) examined 18 randomized controlled trials to determine whether parental involvement was effective in increasing academic outcomes of students in elementary school. Results indicated that parental involvement had a positive and significant effect on children’s overall academic performance, especially in reading. Similarly, Jeynes (2007) found parental involvement had a positive and significant influence on the academic achievement of urban secondary school students. Jeynes (2003, 2016, 2017) conducted meta-analyses on the role of parental involvement and minority children, Latino/a students, and African American students. Anicama et al. (2018) examined parental involvement among Chinese American students. These four sets of researchers found that there was a statistically significant positive relationship between parental involvement and their children’s academic achievement.
**Parental Involvement and Students with Disabilities**

In addition to grade level, socioeconomic status, and ethnicity, a student’s disability status may influence and shape parental involvement. According to IDEA (2004), parents and caregivers are members of the IEP team and must be provided with opportunities to meaningfully participate at IEP meetings. By being informed participants, families make critical decisions that impact their children’s education programs and future progress. Outcomes for students with disabilities are negatively impacted by low parental involvement and poor home–school partnerships, and disagreements between home and school may lead to mediation, due process, and financial and emotional burdens on both schools and families (Goldstein & Burke, 2017). Understanding special education law and parental rights as well as navigating through the IEP process may also be challenges to families of students with disabilities. Goldman and Burke (2017) conducted a systematic literature review and meta-analysis on the effectiveness of interventions to increase parental involvement in special education. They found minimal research and few peer-reviewed articles on interventions to increase parent participation. Based on a rigorous, quantitative design criterion (randomized control trial or quasi-experimental design), they found only five dissertations and three peer-reviewed studies. These intervention studies focused on parental involvement in the context of IEP meetings. They did not find evidence of the “effectiveness of parent trainings in increasing parental involvement in school for parents with disabilities.” Of the studies that they examined, most analyzed parents of students with a range of disabilities, from high-incidence disabilities such as learning disabilities to more significant disabilities such as intellectual disability. Moreover, the studies did not consider or report on parent
characteristics (e.g., parent race and income level) nor was there a diverse sample of participants.

More specifically, there has been one study on the relationship between family-teacher partnerships, academic outcomes, and family quality of life among children and youth with disabilities, i.e., autism (Eskow et al., 2018). Researchers found that satisfaction with family-teacher partnerships were correlated with improvement in academic progress and family quality of life. Similarly, other researchers examined the relationship between teacher–parent partnerships and the demographic factors of the student and family (e.g., race, disability, and SES status). Pham et al. (2018) looked at teacher–parent relationships among high school students with disabilities and found significant differences in teacher–parent relationships based on disability and SES but not race or ethnic groups (Pham et al., 2018). Families of students without disabilities had higher scores than those of students with SLDs. In addition, students of families from middle to high socioeconomic levels also had higher scores than families of low or unknown socioeconomic backgrounds.

**Parental Beliefs and Children’s Academic Outcomes**

To deepen this analysis, it is important to consider the impact of family beliefs on children’s education. For example, parental beliefs and involvement in early grades, particularly kindergarten, has correlated with higher academic achievement and growth. Using the ECLS-K dataset with a nationally representative sample of children entering kindergarten in the 1998–1999 school year, Pucconi (2015) empirically tested Taylor’s (2004) conceptual model of academic socialization. Taylor’s model describes the influence of parents’ cognition on transition practices and academic outcomes of children in
kindergarten, and all variables are influenced by the family’s socioeconomic and cultural background. Puccioni conceptualized parents’ beliefs about their children’s school readiness—specifically about readiness skills and attributes related to entering kindergarten—and transition practices as interactions between parents and children with the purpose of preparing the child for school. Parents’ beliefs on school readiness positively correlated with their children’s beginning achievement and growth. Using the same ECLS-K dataset, Jung (2016) found similar results of parents’ school readiness beliefs and family activities having a moderate and positive impact on their children’s reading skills at the start of their kindergarten year. Similarly, Slicker et al. (2021) used a later ECLS-K dataset (2010–2011) and identified distinct profiles of parents based on their expectations of kindergarten readiness (high expectations or very high expectations) and activities (fewest, moderate, and most home activities). The profile that resulted in the most advanced academic reading and mathematics skills was parents who had very high expectations and the most home activities.

**Parental Involvement in the Pandemic Context**

From the start of the COVID-19 pandemic, parents and caregivers of children experienced an increase in stress due to employment, health, and childcare concerns. Families of school-aged children also had to adjust to their children learning in the home environment with family members while maintaining their employment.

Initial research has been published about caregivers’ perceptions of school experiences, services, and supports for their children with special education needs. Greenway and Eaton-Thomas (2020) found that U.K. parents were not satisfied with the resources and supports
they had received to address the educational and psychological needs of their children with
disabilities and reported feelings of inadequacy and lack of preparedness. They did not find
that demographic factors (such as SES and disability type) specifically correlated with
parents’ experiences and perspectives of distance learning. Thorell et al. (2021) looked at
parents’ experiences in seven European countries (the United Kingdom, Sweden, Spain,
Belgium, the Netherlands, Germany, and Italy) with homeschooling during the COVID-19
pandemic. They found mixed results in that most families reported not receiving enough
support from schools and poor-quality home schooling, similar to Greenway and Eaton-
Thomas, though other families reported positive home schooling experiences.

The Impact of School Closures on Children’s and Caregivers’ Mental Health

To close this literature review, it is important to also consider how the pandemic has
impacted the mental health of children with disabilities and their families. In Greenway and
Eaton-Thomas (2020), parents reported concerns with their children’s social–emotional
functioning and well-being during the COVID-19 pandemic and believed that their children’s
lack of attendance at school resulted in harmful effects on their education and mental health.
In comparable research, Lee et al. (2021) found that the majority of parents reported changes
to their children’s social–emotional well-being, including feelings of sadness, depression,
and loneliness, as a result of the pandemic.

Similarly, recent studies also found negative effects of the pandemic and remote learning
in the home environment on parents’ and caregivers’ well-being (Chan & Fung, 2021;
Greenway & Eaton-Thomas, 2020; Ren et al., 2020). Among the parents, Chan and Fung
(2021) reported more parenting stress, depressive symptoms, and anxiety symptoms than
parents of typically developing children. For example, parents reported changes to their mood and behavior, experienced loss, and worried more as a result of sudden changes from the pandemic. Ren et al. (2020) also found significant differences among parents’ and caregivers’ states of anxiety. Parents with a college education or above, those with a high monthly family income, and those who worked from home during the pandemic had the lowest levels of anxiety. Initial studies in the pandemic should be compared to prepandemic research because parents of students with disabilities tend to experience more parenting stress than parents of children without a disability (Dabrowska & Pisula, 2010; Hayes & Watson, 2013). Cumulatively, though, it is reasonable to state that the mental health of parents, caregivers, and children was affected negatively during the pandemic school year.

Numerous studies have examined the academic trajectories and growth rates of students based on their demographics (including disability status, grade level, race, and educational placement) as well as their academic outcomes of special education services. Findings from recent studies on the effects on learning due to the COVID-19 pandemic are also discussed, with limited research turning up on how the academic outcomes of students with IEPs were impacted. Last, the review examined literature on parental involvement and its relationship with their children’s academic achievement as well as the well-being of caregivers. Cumulatively, these research reports help establish the context and rationale for the current dissertation project.
CHAPTER 3
Methodology and Research Design

This chapter presents the methodology for the study and includes a description of its participants, the recruitment process, data collection methods, data analysis methods, and my positionality.

Four research questions guided this study:

RQ1a: How do the reading and math trajectories of students with IEPs during a nonpandemic school year (2018–2019) compare to trajectories during a pandemic school year primarily consisting of distance learning (2020–2021)?

RQ1b: What is the relationship between students’ demographic characteristics (ethnicity, educational placement, English language learning status, SES, disability type, and grade level) and reading and math trajectories comparing school years 2018–2019 and 2020–2021?

RQ2a: What are parental and caregiver opinions about distance-learning factors and resources that influence their children’s education?

RQ2b. What is the relationship between students’ demographic characteristics (grade, ethnicity, SES, and disability type) and parental and caregiver opinions on distance-learning factors and resources that influence their children’s education?

Research Methodology and Study Design

The study has two arms, one aimed at answering Research Questions 1a and 1b and the other focused on Research Questions 2a and 2b. For the former, previously collected reading and math data from a California K–8 public school district were extracted via deidentified record review of students with IEPs from the 2018–2019 (prepandemic) and 2020–2021
(interpandemic) school years. In addition, demographic data were extracted to serve as independent variables (Creswell & Creswell, 2018). These quantitative data were used to examine the academic trajectories of students with IEPs across the 2 school years. In total, 736 records were reviewed, and 270 records were analyzed to look at the relationship between the independent variables (demographic characteristics) and dependent variables (math and reading scores represented by percentile ranks). Data extraction of the students’ demographics and academic performance occurred between June 2021 and August 2021.

The study’s second arm consisted of a researcher-developed parent/caregiver survey asking anonymous volunteers of their opinions about the pandemic’s impact on children’s education. This survey collected mixed data from quantitative Likert-style questions, qualitative open-ended questions, and demographic questions (open and close ended). The survey was electronically administered (via Qualtrics) in January 2021 in both Spanish and English. The survey’s consent form (also in Spanish and English) informed participants of my school district affiliation. In addition, no links were created to pair students’ IEP records with survey responses. Further details of both study arms are provided below.

Data Sources

On August 2020, the district superintendent provided a letter of support for the study to be conducted at their district. In November 2020, the district’s institutional review board provided permission to conduct the study.

Record Review Assessment Data

Reading and math assessment data from the prepandemic 2018–2019 school year provided historical data about children’s academic skills. Extracted data from the 2020–2021
school year provided interpandemic information about children’s academic skills. Data were extracted from a total of 736 records of children in Grades K–8 who had IEPs. Inclusion criteria for the record review were that the child attended a public school in the district and had an IEP developed by district personnel. Assessment data for students with IEPs in the lower elementary grades (preschool, kindergarten, first grade, and second grade) were used for descriptive analysis but excluded from inferential data analysis, as particular assessments (Star, i-Ready, and NWEA ELA and Mathematics) were not consistently administered to students at those grade levels. See Table 2 for the reading and mathematics assessments that were administered for each school level and school year.

Table 2.
Summary of Academic Assessments

<table>
<thead>
<tr>
<th>Year</th>
<th>Grade Level</th>
<th>Reading</th>
<th>Math</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Elementary and Middle Schools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018–2019</td>
<td>Fall 2018</td>
<td>Star Reading</td>
<td>i-Ready</td>
</tr>
<tr>
<td></td>
<td>Winter 2018</td>
<td>Star Reading</td>
<td>i-Ready</td>
</tr>
<tr>
<td></td>
<td>Spring 2019</td>
<td>Star Reading</td>
<td>i-Ready</td>
</tr>
<tr>
<td>2020–2021</td>
<td>Fall 2020</td>
<td>Star Reading</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Winter 2020</td>
<td>Star Reading</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Spring 2021</td>
<td>NWEA ELA</td>
<td>NWEA Math</td>
</tr>
</tbody>
</table>
Extracted data consisted of reading and math standard scores and percentile ranks. Prepandemic assessments were typically administered by general education teachers (for elementary school students) and language arts teachers (for middle school students) in whole classes of students at the same time. Such data were extracted from interim computer-based assessments that occurred approximately 3 times in each of the school years (fall, winter, and spring), although there were some variations in terms of frequency of assessments across different school sites. Variation also occurred based on children’s ages and disabilities. For example, all second to eighth grade students took academic assessments unless they were determined by their case manager to not be able to access or understand testing directions due to the severity of their disability. For students with testing accommodations, administration would have occurred in a separate location, typically with fewer students while monitored by a special educator. Extracted data also varied based on setting. In some ELD classrooms the reading assessments were conducted and monitored more frequently compared to children in non-ELD classrooms.

Setting variation also changed pre- to interpandemic. Prepandemic testing only occurred at the school level (brick-and-mortar building). In contrast, the majority of the 2020–2021 school year data was collected in nonschool buildings (e.g., community settings: family, relative, and friend’s homes; shared learning pods; childcare/learning centers). As well, some children returned to brick-and-mortar school buildings periodically in late Spring 2021 and thus assessments may have been conducted in that setting.
Star Reading Assessment Data

To measure students’ reading levels, the Renaissance Star Reading assessment was used by the district for students in Grades 2 through 8. The Star measures literacy growth for students from kindergarten through 12th grade. Students’ reading comprehension skills were assessed when they were asked to read, use context clues, interpret the meaning of the material, and select the correct word from sets of words that best fit the cloze sentences.

Completion of the Star Reading assessment results in a scaled score, grade equivalent, instructional reading level, percentile rank, normal curve equivalent, and Lexile range. As reported by Renaissance Learning (2013), the overall reliability of the Star Reading Enterprise scale was about 0.97. Reliability estimates for the scaled scores ranged from 0.93 to 0.95 for Grades 1 through 8. The overall split-half reliability was 0.97, with a range from 0.91 to 0.95. The overall test–retest reliability was 0.93, with its alternate form coefficients ranging from 0.82 to 0.88 (Renaissance, 2013). Star reading data were used by teachers as part of their decision-making on whether low-performing students needed targeted intervention supports.

i-Ready Mathematics Assessment Data

To assess their mathematics skills on an interim basis, students from Grades 1 through 5 in the district were administered i-Ready assessments. The i-Ready is an adaptive, online assessment that measures a student’s performance and growth in reading and mathematics for students in kindergarten through high school. The i-Ready Diagnostic assessment uses item response theory to determine a student’s ability level. According to third-party research from the Educational Research Institute of America, the i-Ready assessment is strongly correlated
to Common Core standards (Curriculum Associates, 2018). The response type is multiple choice (between 54 to 72 items per assessment). The math domains include number and operations, algebra and algebraic thinking, geometry, and measurement and data. The i-Ready Diagnostic assessment has three norming windows: fall, winter, and spring. Scaled scores are provided.

**NWEA MAP Growth Reading and Mathematics Assessment Data**

Another assessment that the district used was the NWEA MAP Growth assessment, a computerized adaptive instrument that assesses academic skills and growth in reading, math, language usage, and science for students in kindergarten through 12th grade (NWEA, 2019). It is an untimed assessment and can be administered up to 4 times a year (fall, winter, spring, and summer, which is optional). For this district, the NWEA MAP Growth math assessments were administered to sixth and eighth graders in the 2018–2019 school year. In the spring of 2021, all students were administered the NWEA Map Growth reading and mathematics assessments in place of the statewide SBAC assessment. Similar to the i-Ready assessment, the NWEA uses both adaptive testing and item response theory to assess the student’s ability level. The test items are aligned to the Common Core Standards as well as state-specific content standards. For Grades K–8, the following mathematical domains were assessed: operations and algebraic thinking, number and operations, measurement and data, geometry, the real and complex number systems, and statistics and probability. The reading assessment for grades K–8 assessed foundational skills (phonics, word recognition, phonological awareness, print concepts), language and writing, vocabulary use and functions, literary text (key ideas and details), literacy text (language, craft, and structure), informational text (key
ideas and details), informational text (language, craft, and structure), and vocabulary (acquisition and use). Types of item responses include selection of answer options (such as multiple choice), construction of responses using provided options (such as drag-and-drop), and generation of response without any answer options available (such as text entry).

Completion of the assessment results in a Rasch unit (RIT) score, which is an estimation of students’ instructional level and percentile rank. The district has been using NWEA Math since fall 2018. For grades kindergarten through eighth grade in the area of mathematics, the marginal reliability of the MAP ranged from 0.961 to 0.976 and the test–retest with alternate forms reliability by grade ranged from 0.753 to 0.925 (NWEA, 2019). The concurrent validity ($r$) between MAP and SBAC Mathematics scores in California was strong, ranging from 0.85 to 0.88 (NWEA, 2019) for Grades 3–8. In the area of reading, the marginal reliability of the MAP ranged from 0.955 to 0.971 and the test–retest with alternate forms reliability by grade ranged from .687 to .867 (NWEA, 2019). The concurrent validity ($r$) between MAP and SBAC ELA scores in California was strong, ranging from 0.80 to 0.83 for Grades 3 through 8.

**Correlation Between NWEA MAP Growth Assessments, Star Reading, and i-Ready.** Renaissance Learning (2014) examined the correlation between MAP Reading and Star Reading assessments. Researchers applied equipercentile linking analysis (Kolen & Brennan, 2004) to suggest a link between the MAP Reading and Star Reading scales. As a result, users can search for the Star Reading score that corresponds to a MAP Reading Score. The Pearson correlations between Star Reading scaled scores and MAP Reading scaled scores for Grades 1–8 were between 0.76–0.83 (overall: 0.87, sample size: 20,848). Correlations between MAP
scores and the Star score equivalents (obtained from the linking) for Grades 1–8 were 0.95–
0.98 (overall score of 0.96), and observed Star Reading Scaled Score correlation with the
Star Reading Scale Score Equivalents for MAP Reading RIT scores were 0.80 to 0.84
(overall: 0.90). Limitations of this report’s findings were that data were limited to Grades 1–8
(instead of K–12) and its data came from two school districts; therefore, these cut scores are
approximations that could be improved upon with more available data in the future
(Renaissance, 2014).

In contrast, and to my knowledge, there have been no reports examining the correlation
between the NWEA MAP mathematics assessments and i-Ready assessments. However, both
assessments share high correlations with a third measure not used in the current study, the
SBAC. Correlations between i-Ready and the spring 2018 SBAC Assessments were 0.89 for
Mathematics (Curriculum Associates, 2019). Correlation between RIT scores from NWEA
MAP Growth tests and SBAC Mathematics for Grades 3–8 in Spring 2015 were between
0.85 and 0.89 (NWEA, 2019).

**Record Review Demographic Data**

Demographic information was obtained from three school databases: (a) SIRAS, an
online database that manages IEPs and other data on students with IEPs; (b) Panorama, an
online platform that includes demographic information (such as eligibility for free and
reduced-price meal) and other student data (academics, behavior, and social–emotional
learning); and (c) PowerSchool, a program that includes demographic information, class
schedule, and grades. Student data from PowerSchool and SIRAS consisted of each student’s
grade, gender, birthdate, age, current school of attendance, home language, English language
proficiency status, disability, special education and related services, statewide alternate assessment status, prior and current educational placement, and 2020–2021 percentage of placement in the general education and special education settings. Information extracted from the Panorama database included eligibility for free and reduced-price meal. Academic scores (Star Reading, i-Ready, and NWEA) were retrieved through the corresponding databases.

Demographic data (such as child’s grade, age, race/ethnicity, and home language, eligibility for free and reduced meal) were based on parent and guardian report and documentation they provided upon enrolling children in school. English language proficiency status was based on parent report on the home language survey, students’ performance on English language development tests, and determination by the language review team. Information on the IEP (such as disability, educational placement, statewide assessment, percentages of general education and special education setting) was derived from team decisions, which included parent and guardians, case manager, specialist(s), and administrator.

**Survey Development**

The online parent/caregiver survey included 19 demographic questions about the child and caregiver, 24 Likert-style questions regarding caregivers’ perceptions of distance learning in relation to their children with a disability, and five open-ended/multiple-choice questions regarding the pandemic’s impact, the number of hours families spent facilitating children’s learning, and any outside services children received. The survey was voluntary and anonymous.
Demographic items on the survey were similar to most questions found in school enrollment forms including questions about a respondent’s gender, highest level of education, income status, and number of children living in household. Child-related demographic information was gathered on gender, race/ethnicity, grade, disability, language(s) spoken to the child, and eligibility for free or reduced-price meal. The survey was available in Spanish and English. Translation services were provided via a paid professional language translation vendor.

Questions regarding family and learning experiences were developed based on then-available resources about the pandemic’s impact on students, schools, districts, and families from news articles, statements from professional and governmental organizations, and public comments at district board meetings. These nascent sources were utilized in an effort to develop the survey’s validity. The initial survey was reviewed by parents and professionals outside the district (including a special educator and speech-language pathologist) and several administrators in the district (superintendent, assistant superintendents, and director of special education) to support its readability, validity, and reliability. In addition, the survey was piloted with several parents of school-aged children and educators, who accessed the survey on either their laptops or mobile phones. Completing the survey was timed with two individuals and estimated to take approximately 15 minutes.

Survey Procedures

A district representative provided me with a then-current list of family email addresses of K–8 students with IEPs. In total, 663 surveys were sent. Families received a bilingual recruitment email (in English and Spanish) with a link to the consent form, screener, and
survey. Disclosure of my current employment as a district school psychologist was included in the consent form. A second recruitment email was sent approximately 2 weeks after the initial one. In total, 60 parents and caregivers opened and started the survey and 46 completed the majority of survey items yielding a 76.6% completion rate. Respondents were able to complete the survey only once on their chosen device.

Family inclusion criteria were (a) being a parent, caregiver, or legal guardian who made educational decisions for their child with an IEP, (b) having a child who attended a public school in the school district, and (c) having a child with an IEP enrolled in Grades K–8 but not preschool.

**Accountability and Data Storage**

The researcher has 8 years of professional experience in reviewing school and educational records and previously served as a research assistant for 3 years at several psychology laboratories. In her position as a school psychologist for the school district, she was trained in data confidentiality. The researcher extracted demographic and academic data from the aforementioned databases and inputted information onto a spreadsheet. All participants’ identifying information was eliminated at the initial process of the data input. Digital files were stored in the researcher and her advisor’s laptops, both requiring password or fingerprint access. A copy of the deidentified files was saved as back-up onto the researcher’s Google drive that only she had access to.
Data Analysis

Record Review Quantitative Data Analysis

Reading. To compare the reading trajectories of students with IEPs during a nonpandemic school year 2018–2019 with their reading trajectories during the pandemic school year, a fixed effect generalized estimating equation with repeated measures of standardized percentile rank reading scores was used. The independent variable was time (comparing the slope of lines for each pair of time points), and the dependent variable was the student’s reading performance, as measured by the standardized percentile rank reading scores (specifically Fall 2018, Winter 2018, Spring 2019, Fall 2020, Winter 2020, and Spring 2021). If students had multiple measures of the Star Reading assessment in a particular trimester, their highest score and percentile rank for that period (Fall, Winter, or Spring) was used for the study as it would indicate their best academic performance. The researcher considered using the median of their Star assessment scores as a representative summary score for the student’s trimester; however, due to my experiences as a school psychologist reviewing student records including Star scores, some assessment scores (particularly from Star reading) are particularly influenced by a student’s attention and distractibility at the time of the assessment, motivation to do well, and other environmental factors that cannot be easily controlled for. Therefore, some students with attention difficulties may have some outlier scores that do not reflect their actual academic performance but rather how well they were attending to the assessment.

Math. To compare the math trajectories of the 2 school years, the researcher also used a fixed effect generalized estimating equation with repeated measures of standardized
percentile rank math scores. The independent variable was time (comparing differences between the Spring 2019 and Spring 2021 scores), and the dependent variable was the student’s math performance, as measured by standardized percentile rank math scores (specifically Spring 2019 and Spring 2021).

**Demographic Characteristics.** To look at the relationship between the students’ demographic characteristics (ethnicity, English language learning status, SES, disability type, etc.) and their reading and math trajectories over the 2 school years, the researcher used a generalized estimating equation with repeated measures of standardized percentile rank reading scores (Fall 2018, Winter 2018, Spring 2019, Fall 2020, Winter 2020, and Spring 2021) and with repeated measures of standardized percentile rank math scores (Spring 2019 and Spring 2021). The independent variable was demographic variables, and the dependent measure was students’ reading and math performance, as measured by the standardized percentile ranks.

**Parent/Caregiver Survey Data Quantitative Data Analysis**

To explore parental and caregiver opinions on distance learning and their children’s education, the researcher used descriptive statistics through a frequency distribution of survey opinions on a Likert scale response (including the mean, standard deviation, and median of responses). To examine relationship between students’ demographic characteristics and parental and caregiver opinions, a chi-square test of independence was used. The students’ demographic characteristics were compared to each opinion category (which some categories being collapsed due to items that are related in content). Items in the survey were collapsed: (a) whether distance learning was a good match for their child’s
attention, academic performance, language and communication skills, memory; and (b) whether distance learning was a good match for their ability to use technology for learning and technology interests. All of the other Likert survey items were looked at as single variables.

**Parent/Caregiver Survey Data Qualitative Data Analysis**

Several steps were undertaken to analyze the qualitative data from the open-ended questions in the parent/caregiver survey. In the first step, I sorted individual passages from responses to two questions about the positive and negative impact of the pandemic on children’s education. After sorting these comments, the researcher (and advisor) independently read through the comments, categorized them into newly created major themes and subgroups, and discussed and compared opinions about the different categories and statements. This process yielded an initial summary document of parent/caregiver positive and negative themes. In a second step, the researcher and her advisor again independently reviewed the summary document to verify that the initial review and generated themes were appropriate. We conducted this verification during 2 subsequent weeks and met again to compare opinions and fine tune the document. As a result, three initial major themes and multiple subgroups emerged from the comments reflective of positive and negative impact statements about (a) the home environment and household members, (b) the children, and (c) the school setting and its personnel. Upon agreement, the researchers developed definitions for each theme and subgroup.

In a third step, the emerging thematic analysis was shared with three outside reviewers—a faculty member in the Lurie College of Education with expertise in qualitative analysis and
two district administrators with backgrounds in special education. These reviewers were asked to offer opinions about whether the positive and negative statements were a good fit with the thematic categories and to offer comments for other potential theme categories and subgroups. Per this coding process, the total interrater reliability among the three outside reviewers was 84.7% (84.8% agreement in the themes, 85.7% agreement in the subgroups). For the positive impact statements, the interrater reliability was 84.3% (86.7% agreement in the themes, 76.9% agreement in the subgroups). For the negative impact statements, the interrater reliability was 85.2% (83.3% agreement in the themes, 93.3% agreement in the subgroups). In addition, interrater reliability rates were calculated between the research team and outside reviewers. Here, the total interrater reliability for the initial coding items for positive and negative impact statements was 84.8% (93.9% agreement in the themes, 80.1% agreement in subgroups). For the positive impact statements, the interrater reliability was 93.3% (100% agreement in the themes, 86.7% agreement in the subgroups). For the negative impact statements, the interrater reliability was 77.8% (88.9% agreement in the themes, 75.0% agreement in the subgroups). In a final step, the researcher and advisor reviewed any discrepancies, completed a final content analysis, and clarified definitions.

Table 3 provides a summary of the initial variables in this study and the proposed data analyses that were to be conducted to answer each of the research questions. As noted in Chapter 4, some data analyses were modified and others added as part of post hoc analyses.
<table>
<thead>
<tr>
<th>Research question</th>
<th>Measures</th>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Tests/method</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1a</td>
<td>Reading: Star and NWEA ELA&lt;br&gt;Math: i-Ready and NWEA Math</td>
<td>Time</td>
<td>Standardized percentile rank reading/math scores</td>
<td>Generalized estimating equation with repeated measures</td>
</tr>
<tr>
<td>RQ1b</td>
<td>Reading: Star and NWEA ELA&lt;br&gt;Math: i-Ready and NWEA Math</td>
<td>Ethnicity, educational placement, English language learning status, SES, disability type, Title I school status, and grade level</td>
<td>Standardized percentile rank reading/math scores</td>
<td>Generalized estimating equation with repeated measures</td>
</tr>
<tr>
<td>RQ2a</td>
<td>Likert items&lt;br&gt;Open-ended questions</td>
<td>Child/parent demographics</td>
<td>Likert scale items</td>
<td>Descriptive statistics, thematic analysis</td>
</tr>
<tr>
<td>RQ2b</td>
<td>Child/parent demographic characteristics, Likert items</td>
<td>SES and parent education, child’s ethnicity, disability, grade levels</td>
<td>Likert scale items</td>
<td>Chi-square test of independence</td>
</tr>
<tr>
<td></td>
<td>Parent education, income</td>
<td>Technological and academic variables</td>
<td>Kruskal-Wallis; Mann-Whitney U</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 4
Findings and Results

This study examined two topics related to the COVID-19 pandemic, (a) the reading and mathematics scores of students with IEPs in the 2018–2019 and 2020–2021 school years, and (b) caregivers’ opinions of the distance learning environment’s impact on their children’s education during the COVID-19 pandemic. This chapter presents the findings. First, the record review data are presented with the students’ demographic characteristics followed by a description of their academic trajectories. Second, the parent/caregiver survey demographics are presented followed by a summary of their perceptions on the distance learning environment’s impact.

Student Demographics and Academic Data from Record Reviews

Data Review Process

As a first step, it is important to identify which students with IEPs were included in the data analysis. The original dataset of preschool to eighth grade students with IEPs contained 736 students. In this group, 433 students were removed before analysis because they were missing more than 20% of their assessment data. A further 33 students were removed because their grade or disability type did not have a large enough sample size to use in analysis. Thus, the final sample size for data analysis was 270 students in Grades 4–8 who had four primary disabilities: autism (AUT), specific learning disability (SLD), speech-language impairment (SLI), and other health impairment (OHI). These 270 students had reading and math assessment data from an initial Fall 2018 observation period (which served as baseline), along with at least one assessment observation from the Spring 2019, Fall 2020,
and Spring 2021. Some of the 270 students had additional assessments in these four observation periods, whereas some students had additional assessments in the Winter 2019 and Winter 2021. Thus, because not all of the 270 students had the same number of observations, a Little’s Missing Completely at Random test was used to determine whether the differing numbers of observations randomly occurred. Results indicated the pattern of inconsistent data was indeed random; therefore, an expectation-maximization method was applied to balance the inconsistent number of observations resulting in a revised dataset. This method was especially useful for adapting inconsistent (or missing) values by assuming the existence of unobserved data.

**Demographic Characteristics**

Table 4 provides information about the demographic characteristics of the students in the record review portion of this study. Among this group, not all columns total 270 students because some data were not available in the children’s educational records. There were more male than female students in the sample, and each grade level was fairly equally represented.

**Table 4. Student Sample Demographic Variables**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>168</td>
<td>62.2%</td>
</tr>
<tr>
<td>Female</td>
<td>102</td>
<td>37.8%</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>47</td>
<td>17.4%</td>
</tr>
<tr>
<td>5</td>
<td>57</td>
<td>21.0%</td>
</tr>
<tr>
<td>6</td>
<td>52</td>
<td>19.3%</td>
</tr>
<tr>
<td>7</td>
<td>52</td>
<td>19.3%</td>
</tr>
<tr>
<td>8</td>
<td>62</td>
<td>23.0%</td>
</tr>
<tr>
<td><strong>Hispanic or Not</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>150</td>
<td>53.8%</td>
</tr>
<tr>
<td>Not Hispanic</td>
<td>120</td>
<td>46.2%</td>
</tr>
<tr>
<td><strong>Primary Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>180</td>
<td>67.0%</td>
</tr>
<tr>
<td>Asian</td>
<td>39</td>
<td>14.4%</td>
</tr>
</tbody>
</table>
Research Question 1a asked, “How do the reading and math trajectories of students with IEPs during a prepandemic school year (2018–2019) compare to trajectories during an interpandemic school year primarily consisting of distance learning (2020–2021)?”

**Reading.** Students’ reading and mathematics scores, as represented in percentile ranks, from the 2 school years were used to determine how they had performed academically compared to their norm groups on the standardized assessments. For reading, students with IEPs as a whole had similar performances in the prepandemic year ($M = 18.9, SD = 24.1$), as they did in the interpandemic school year ($M = 18.2, SD = 23.2$). The majority of students with IEPs (approximately 78%) scored in the first and fourth quartile in reading in both pre-
and interpandemic school years. The remaining 22% of the reading scores were in the three higher quartiles (25th to 99th quartile). The 26th to 50th and 51st to 75th quartile grew from 10.1 to 12.8% and 3.2% to 5.3% respectively. The highest quartile (76th to 99th) decreased from 8.0% to 3.7% of the student population.

Descriptive data were available about the percentages of students who experienced higher and lower reading and math scores pre- to interpandemic. Reading scores during the prepandemic year were similar in terms of who higher (41.9%) and lower (45.2%) performance in the interpandemic school year, and 12.8% stayed the same in terms of reading outcomes. In contrast, students whose reading scores were in the 25th to 99th quartile were more likely to perform lower in reading in the interpandemic school year—66.6% to 86.7% had lower scores and 13.3% to 33.3% had higher scores. For the total sample, 71 students (37.8%) scored higher in the interpandemic school year, 97 students (51.6%) scored lower, and 20 students (10.6%) scored the same.

Mathematics. For mathematics, students with IEPs had a lower average group performance in the interpandemic year ($M = 15.7, SD = 22.1$) compared to their performance as a group in the prepandemic school year ($M = 19.7, SD = 20.3$). In contrast to the student distribution for reading performances, more students’ mathematic scores fell in the first to fourth quartile in the interpandemic school year. There were 144 students (76.5%) in that lowest quartile in the prepandemic school year, and there were 153 students (81.4%) in that quartile in the interpandemic school year. The percentage of students in the 25th to 50th quartile also decreased from 15.4% in the prepandemic school year to 8.0% in the
interpandemic school year. The 51st to 75th quartile grew from 3.2% to 8.0%, and the 76th to 99th quartile decreased from 4.8% to 2.6%.

In three of the four quartile groups, the majority of students generally performed lower in the interpandemic school year. In the lowest quartile (first fourth), 65.0% students performed lower, whereas 24.5% performed higher in math during the interpandemic school year. In the 25th–49th quartile, 75.8% performed lower and 24.1% performed higher in math. Last, for those in the 75th–99th quartile, 55.5% of students performed lower, whereas 44.4% performed higher. For the whole sample, 25.5% scored higher in the interpandemic school year, 66.5% scored lower, and 8% scored the same.

In summary, there were two trends for students’ reading and math skills. First, a majority of students fell into the lowest quartile for both reading and math during the pre- and interpandemic school years. Second, more of these students performed lower in mathematics in the interpandemic school year compared to the number of students who performed lower in reading.

With the assistance of a professional statistician, a generalized estimating equation (GEE) method was used to assess the change in reading and math scores. GEE is an extension of the generalized linear model (GLM) to longitudinal data and is used in repeated measures design (Fitzmaurice et al., 2012). GEE differs from the traditional mixed method regression because the GEE models the average response instead of the within-subjects covariance structure (Hubbard et al., 2010).

To assess changes in reading scores between time points and years, GEE was used to predict reading scores across time. Before calculating the model, each reading score
measurement was first converted from a scaled score into the appropriate percentile rank. Then each measurement was standardized using z-transformation due to variations in testing instruments. The result of z-transformation was new variables, each with $M = 0$ and $SD$ of 1. Time was entered as a fixed factor with Fall 2018 as the comparison group (baseline). A statistically significant result indicated the time point had a different mean reading or math score than the comparison group.

**Reading (Whole Group).** For the entire student sample, there was a statistical difference between students’ reading performance in the prepandemic school year (2018–2019) and the interpandemic school year (2020–2021) (see Table 5). The GEE revealed a difference in the average standardized percentile rank between several different time points. The average reading score showed statistically significant differences between Fall 2018 and Fall 2020 ($p = .02$), between Fall 2018 and Winter 2020 ($p = .03$), and between Fall 2018 and Spring 2021 ($p = .03$). Spring 2021 reading scores were 0.03 lower than Fall 2018 scores. In contrast, the reading trajectory of the 2018–2019 school year were stable with nonsignificant differences between Fall 2018 and Winter 2018 and between Fall 2018 and Spring 2019 scores. In addition, per Figure 2, prepandemic reading scores were relatively consistent across multiple observations. In contrast, the interpandemic school year started off slightly lower. Reading performance scores increased, and Spring 2021 rates were consistent with Fall 2018.
Table 5.
*Time Predicting Reading Parameter Estimates*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>95% Wald CI</th>
<th>Hypothesis test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2021</td>
<td>-.031</td>
<td>.0144</td>
<td>-.060</td>
<td>-.003</td>
<td>- .060, -.003</td>
<td>Wald chi-square: 4.786, df: 1, Sig: .029*</td>
</tr>
<tr>
<td>Winter 2021</td>
<td>-.021</td>
<td>.0096</td>
<td>-.039</td>
<td>-.002</td>
<td>- .039, -.002</td>
<td>Wald chi-square: 4.566, df: 1, Sig: .033*</td>
</tr>
<tr>
<td>Fall 2020</td>
<td>-.024</td>
<td>.0106</td>
<td>-.045</td>
<td>-.003</td>
<td>- .045, -.003</td>
<td>Wald chi-square: 5.072, df: 1, Sig: .024*</td>
</tr>
<tr>
<td>Spring 2019</td>
<td>-.008</td>
<td>.0078</td>
<td>-.023</td>
<td>.007</td>
<td>- .023, .007</td>
<td>Wald chi-square: 1.058, df: 1, Sig: .304</td>
</tr>
<tr>
<td>Winter 2019</td>
<td>-.005</td>
<td>.0074</td>
<td>-.020</td>
<td>.009</td>
<td>- .020, .009</td>
<td>Wald chi-square: .542, df: 1, Sig: .462</td>
</tr>
<tr>
<td>Fall 2018</td>
<td>0*</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>Wald chi-square: .542, df: 1, Sig: .462</td>
</tr>
</tbody>
</table>

*Note.* *p < .05

Figure 2.
*Standardized Mean Percentile Rank Reading Scores by Year*
**Mathematics (Whole Group)**

For the entire student sample, the GEE revealed no statistically significant differences in the average standardized math percentile ranks between the pre-pandemic school year (2018–2019) and the inter-pandemic school year (2020–2021; \( p = 1.00 \); Table 6). Table 6 shows no differences in math scores between the Spring 2019 and Spring 2021.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>95% Wald CI</th>
<th>Wald chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring 2019</td>
<td>.000</td>
<td>.03</td>
<td>-.057</td>
<td>.057</td>
<td>.000</td>
<td>.000</td>
<td>1</td>
<td>1.00</td>
</tr>
<tr>
<td>Spring 2021</td>
<td>0</td>
<td>a</td>
<td></td>
<td></td>
<td>.</td>
<td>.</td>
<td></td>
<td>.</td>
</tr>
</tbody>
</table>

**Table 6.**

*Difference in Math Scores Between 2019 and 2021 Parameter Estimates*

**Figure 3.**

*Mean Standardized Math Scores by Year*

**Research Question 1b (Demographics)**

Research Question 1b asked, “What is the relationship between students’ demographic characteristics (ethnicity, educational placement, English language learning status, SES,
disability type, and grade level) and reading and math trajectories comparing school years 2018–2019 and 2020–2021?"

**Ethnicity.** The first demographic variable that was analyzed was the Hispanic versus non-Hispanic. Results indicated no major differences between the two groups for reading and math outcomes (specifically the percentages of those who performed higher and those who performed lower). Specifically, for reading, 35.6% of Hispanic students and 41.0% of non-Hispanic students had higher reading scores in the interpandemic school year, and 51.9% of Hispanic students and 50.6% of non-Hispanic students had lower reading scores. For math, 23.1% of Hispanic students and 30.1% of non-Hispanic students had higher math scores in the interpandemic school year, and 70.2% of Hispanic students and 62.7% of non-Hispanic had lower math scores. Although the percentages of the two groups were similar, the non-Hispanic group gained more percentile ranks in reading and more variability ($M = 13.0, SD = 15$) compared to the Hispanic group in reading ($M = 13.0, SD = 15$). This result was also observed in mathematics. For the interpandemic school year, Hispanic students had an average mean of 8.3 percentile rank gains ($SD = 6.3$), whereas non-Hispanic students had a higher mean ($M = 14.8, SD = 14.5$).

**Specific Learning Disability.** The academic outcomes of students with an SLD were examined in particular due to SLD being the most prevalent disability in the school district. Based on the results, 39% of students with SLD performed higher in reading during the interpandemic school year, 49.2% had lower scores, and 11.8% had the same scores. For mathematics, 23.7% had higher scores, 68.6% had lower scores, and 7.5% had the same
scores. In summary, more students with SLD performed lower in math (68.6%) than in reading (49.2%).

**English Language Learner Status.** For students with and without English language learner (ELL) status, the percentages of those who performed higher and lower in the interpandemic school year were similar for reading and math outcomes. For reading, 32.3% of ELL students and 44.4% of non-ELL students had higher reading scores in the interpandemic school year, and 54.2% of ELL students and 47.8% of non-ELL students had lower reading scores. For math, 22.9% of ELL students and 30.0% of non-ELL students had higher math scores in the interpandemic school year, and 69.8% of ELL students and 63.3% of non-ELL students had lower math scores. Similar to the results of previously mentioned demographic variables, there were more students in both ELL and non-ELL groups who performed lower (than higher) on the mathematics assessment during the interpandemic school year.

**Free and Reduced-Price Lunch.** Student eligibility for a free/reduced-price lunch, which served as a proxy of SES, was examined for differences between those who qualified and those who did not. There were no differences between the two groups for reading. For reading, 31.6% of eligible students and 39.6% of no eligible students had higher reading scores in the interpandemic school year, and 50.0% of eligible students and 44.6% of noneligible students had lower reading scores. Results were very different for mathematic outcomes between the two groups. Nearly every eligible student who qualified for free/reduced-priced meals had lower math scores (89.5%), and only one eligible student in the studied population obtained a higher math score during the interpandemic school year.
This result contrasts with the student population that were not eligible for free/reduced-price lunch where 71.4% performed lower in math, whereas 23.0% performed higher in the interpandemic school year.

**Title I School Status.** There were no differences between the two groups for students’ reading and mathematics outcomes when students’ Title I school status was taken into consideration. For reading, 41.9% of students attending Title I schools and 34.7% of the comparison group had higher reading scores in the interpandemic school year, and 48.3% of the attenders and 54.7% of the comparison group had lower reading scores. For math, 27.9% of students attending Title I schools and 24.2% of comparison group had higher math scores in the interpandemic school year, and 64.5% of attenders and 68.4% of comparison group had lower math scores.

**Percentage in General Education.** Last, the students’ percentage in the general education setting, specifically how often they were included with typical peers in the instructional setting, was also examined. Students fell into three inclusion groups: 75%–100%, 50%–74%, and <50%. In terms of reading, there were some mixed results. For students included in general education for 75%–100% of the time and less than 50% of the time, more students obtained lower scores in reading during the pandemic year (56.8% and 35.3% respectively) compared to students who had higher scores in those two groups (37.8% and 23.5% respectively). It should be noted that 5.4% of students in the 75%–100% group and 41.1% of students in the <50% group had the same scores. For students included for 50%–74% of the time, more students had higher reading scores (50%) compared to those who had lower scores (29.1%), and 20.8% had the same scores in this group. For math, the
majority of students in all three groups (ranging from 58.8% to 66.9%) performed lower in mathematics during the interpandemic school year, and a lesser percentage made gains (range of 11.8%–29.1%).

In summary, two main trends were observed based on specific demographic characteristics. First, of the students who made gains in reading and math, non-Hispanic students showed larger gains though also more variability in scores than Hispanic students. Second, almost every student who qualified for free/reduced-price lunch obtained a lower math score in the interpandemic school year. This result contrasts to their comparison group, who had better outcomes in terms of the percentage of students who had higher scores in math.

To ensure enough observations for the inferential analysis, the professional statistician recommended that student demographic characteristics be combined. Thus, two models were created to predict reading and math performances. In Model 1, ethnicity, free/reduced-price lunch status, and EL status were combined. In Model 2, primary disability, Title I status, grade level, and percentage in general education (in 2020–2021) were combined.

**Model 1 (Reading): Ethnicity, Free/Reduced Lunch, and EL Status.**

The first model examined how students’ ethnicity (Hispanic or not Hispanic), free/reduced-price lunch status (yes or no), and EL status (yes or no) predicted reading scores. Time was entered as a fixed factor with Fall 2018 as the comparison (baseline) group. A statistically significant result indicated the time point had a different mean reading score than the comparison group. In Model 1, all three variables predicted reading scores (Table 7).
Table 7.
Reading Model 1 Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>Wald chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>-.361</td>
<td>.1069</td>
<td>-.571</td>
<td>-.152</td>
<td>11.433</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>[Non-Hispanic]</td>
<td>0^a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td></td>
<td></td>
<td>.</td>
</tr>
<tr>
<td>Free/reduced-price lunch</td>
<td>-.266</td>
<td>.0870</td>
<td>-.437</td>
<td>-.095</td>
<td>9.334</td>
<td>1</td>
<td>.002*</td>
</tr>
<tr>
<td>[Not FRPL]</td>
<td>0^a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td></td>
<td></td>
<td>.</td>
</tr>
<tr>
<td>English learner</td>
<td>-.473</td>
<td>.1100</td>
<td>-.688</td>
<td>-.257</td>
<td>18.496</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>[Not EL]</td>
<td>0^a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td></td>
<td></td>
<td>.</td>
</tr>
</tbody>
</table>

Note. *p < .01

Ethnicity (Hispanic and non-Hispanic Groups) and Reading.

Two noteworthy trends were found in these data. First, results showed that non-Hispanic children had significantly higher mean reading scores compared to Hispanic children at each time point (p < .001). Second, in comparison to the pre-pandemic year, non-Hispanic students had very little variability in their reading scores in the inter-pandemic school year. In contrast, Hispanic students’ trajectories indicated that they performed lower at the start of the inter-pandemic school year but had consistent growth and appeared to catch up (Figure 4).
Two noteworthy trends were found in these data. First, children receiving free/reduced-price lunch had lower average reading scores at all time points compared to children who were not eligible for free/reduced-price lunch ($p = .002$). Second, Figure 5 shows that children receiving free/reduced-price lunch experienced a decrease in reading scores beginning after Spring 2019 and persisting to Spring 2021. Among the free/reduced-price lunch group, there was a slight decline in performance in the interpandemic school year. The comparison group (ineligible students) did not show very much variation across the 2 school years (per Figure 5).
**Figure 5.**
*Standardized Mean Percentile Rank Reading Scores by Year and Free/Reduced-Price Lunch Qualification*

EL Status and Reading.

Two noteworthy trends were also found in these data. First, the EL group had significantly lower reading scores at each time point ($p < .001$). Second, both the EL and non-EL groups had approximately the same relatively flat trend in reading scores in the prepandemic school year. Both groups also had slightly higher scores in the Spring 2021 than the Winter 2021 and interpandemic school years (per Figure 6).
Figure 6.
Standardized Mean Percentile Rank Reading Scores by Year and EL Status

Model 1 (Math): Ethnicity, Free/Reduced Price Lunch Status, and EL Status.

Student ethnic identification, free/reduced-price lunch status, and EL status were examined in relation to math scores. Results indicated that ethnicity and free/reduced-price lunch status, but not EL status, predicted math scores (Table 8).

Table 8.
Math Model 1 Parameter Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>95% Wald CI</th>
<th>Hypothesis test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Std.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wald chi-square</td>
<td>df</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.548 &amp; .1375</td>
<td>.278</td>
</tr>
<tr>
<td>[Non-Hispanic]</td>
<td>0a</td>
<td>.</td>
</tr>
<tr>
<td>Free/Reduced Price Lunch</td>
<td>.375 &amp; .1071</td>
<td>.165</td>
</tr>
<tr>
<td>[Not FRPL]</td>
<td>0a</td>
<td>.</td>
</tr>
<tr>
<td>English learner (EL)</td>
<td>.207 &amp; .1378</td>
<td>-.063</td>
</tr>
<tr>
<td>[Not EL]</td>
<td>0a</td>
<td>.</td>
</tr>
</tbody>
</table>

Note. *p < .01
*Ethnicity (Hispanic and non-Hispanic) and Math.*

Similar to the aforementioned reading scores, two noteworthy trends were found regarding students’ math trajectories. First, non-Hispanic children had significantly higher mean math score compared to Hispanic children at each time point \((p < .001)\). Second, per Figure 7, non-Hispanic students showed a slight increase in the interpandemic school year and Hispanic students showed a slight decrease in the interpandemic school year.
Similar to the reading scores, two noteworthy trends were found. First, students with free/reduced-price lunch status had significantly lower math scores comparing the Spring 2019 and Spring 2021 ($p < .001$). Second, Figure 8 shows the trajectories of the two groups and their math performance. Compared to the prepandemic school year, those with free/reduced-price lunch showed a slightly lower score in the interpandemic school year. In contrast, their comparison group showed a very slight increase in the interpandemic school year.
EL Status and Math.

Unlike the reading performance, EL status did not predict math scores. There was no statistically significant difference between the two groups ($p = .133$). Per Figure 9, the EL status group had a very slight decrease, whereas the non-EL group had a very slight increase.

Figure 9.
EL Status and Math
Model 2 (Reading): Disability Type, Title 1 School Status, Grade Level, and Percentage in General Education.

In the second model, the child’s primary disability, Title 1 school status, grade level, and percentage in general education in the 2020–2021 school year were grouped together in predicting reading performance. Here, SLD, Title 1 nonschool status, fourth grade, and general education percentage were entered as fixed factor predictors for reading scores. Table 9 shows disability type ($p < .001$), Title I school status ($p = .003$), and percentage in general education ($p = .000$) had statistically significant relationships with reading scores. In contrast, grade level did not (range of $p = .080$ to .922).

### Table 9.
**Reading Model 2 Primary Disability Diagnosis, Title I Status, Grade, and General Ed % Predicting Reading**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>Wald chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade=8</td>
<td>-.155</td>
<td>.1292</td>
<td>-.408</td>
<td>.098</td>
<td>1.445</td>
<td>1</td>
<td>.229</td>
</tr>
<tr>
<td>Grade=7</td>
<td>.093</td>
<td>.1524</td>
<td>-.205</td>
<td>.392</td>
<td>.374</td>
<td>1</td>
<td>.541</td>
</tr>
<tr>
<td>Grade=6</td>
<td>-.233</td>
<td>.1330</td>
<td>-.493</td>
<td>.028</td>
<td>3.063</td>
<td>1</td>
<td>.080</td>
</tr>
<tr>
<td>Grade=5</td>
<td>-.014</td>
<td>.1427</td>
<td>-.294</td>
<td>.266</td>
<td>.010</td>
<td>1</td>
<td>.922</td>
</tr>
<tr>
<td>[Grade=4]</td>
<td>0a</td>
<td>.</td>
<td>-.</td>
<td>.</td>
<td>8.806</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Title I School</td>
<td>-.261</td>
<td>.0881</td>
<td>-.434</td>
<td>-.089</td>
<td>8.806</td>
<td>1</td>
<td>.003*</td>
</tr>
<tr>
<td>[Not]</td>
<td>0a</td>
<td>.</td>
<td>-.</td>
<td>.</td>
<td>8.806</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Autism</td>
<td>.490</td>
<td>.1261</td>
<td>.243</td>
<td>.737</td>
<td>15.106</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>OHI</td>
<td>.571</td>
<td>.1436</td>
<td>.290</td>
<td>.853</td>
<td>15.836</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>SLI</td>
<td>.772</td>
<td>.1786</td>
<td>.422</td>
<td>1.123</td>
<td>18.705</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>[SLD]</td>
<td>0a</td>
<td>.</td>
<td>-.</td>
<td>.</td>
<td>8.806</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>Spring 2021</td>
<td>.007</td>
<td>.0433</td>
<td>-.078</td>
<td>.092</td>
<td>.027</td>
<td>1</td>
<td>.869</td>
</tr>
<tr>
<td>Winter 2021</td>
<td>-.045</td>
<td>.0317</td>
<td>-.108</td>
<td>.017</td>
<td>2.062</td>
<td>1</td>
<td>.151</td>
</tr>
<tr>
<td>Fall 2020</td>
<td>-.046</td>
<td>.0366</td>
<td>-.117</td>
<td>.026</td>
<td>1.556</td>
<td>1</td>
<td>.212</td>
</tr>
<tr>
<td>Spring 2019</td>
<td>-.009</td>
<td>.0255</td>
<td>-.059</td>
<td>.041</td>
<td>.126</td>
<td>1</td>
<td>.722</td>
</tr>
<tr>
<td>Winter 2019</td>
<td>-.011</td>
<td>.0260</td>
<td>-.062</td>
<td>.040</td>
<td>.185</td>
<td>1</td>
<td>.667</td>
</tr>
<tr>
<td>[Fall 2018]</td>
<td>0a</td>
<td>.</td>
<td>-.</td>
<td>.</td>
<td>8.806</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>% in gen. ed.</td>
<td>.017</td>
<td>.0021</td>
<td>.013</td>
<td>.021</td>
<td>72.130</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
</tbody>
</table>

*Note.* $^*p < .05.$
**Primary Disability Type and Reading.**

Noteworthy trends were found in these results. First, Figure 10 shows that students with SLD had significantly lower reading scores at all time points compared to the other disability types. Students with a SLD designation had a lower median reading score (Med. = -.53) compared to students with autism (Med. = -.22; \(p < .001\)), SLI (Med. = -.13; \(p < .001\)), and OHI (Med. = -.18; \(p = .64\)). Second, there was variation in the trajectories among these student groups (Figure 10). For example, students with SLD showed increased reading scores during both the pre and interpandemic years, whereas students with SLI showed decreased scores over time, especially during the prepandemic year. In contrast, students with OHI and autism showed relatively consistent scores across the 2 years.

**Figure 10.**
*Standardized Mean Reading Percentile Rank Scores by Disability Type and Year*

---

**Title I Status and Reading.**

Noteworthy trends were found in these results. First, students at a Title I school had lower average reading scores compared to students not in a Title I school (\(p = .03\)). Second,
there was variation in the students’ trajectories across the 2 years (Figure 11). Students not in Title 1 schools had relatively flat slopes with a slight increase in Spring 2021. Students in Title 1 schools also had relatively flat slopes but a more pronounced increase in the Spring 2021. Both groups showed slight gains from Spring 2019 to Spring 2021.

**Figure 11.**
*Standardized Mean Reading Percentile Rank Score for Title I School Status by Year*

<table>
<thead>
<tr>
<th></th>
<th>Fall 2018</th>
<th>Winter 2019</th>
<th>Spring 2019</th>
<th>Fall 2020</th>
<th>Winter 2021</th>
<th>Spring 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Title I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grade Level and Reading.**

There was no statistically significant difference in mean reading scores comparing fourth graders with students in Grades 5, 6, 7, or 8. Figure 12 shows marked variations in children’s trajectories based on grade level. For example, fifth graders had decreased and flat scores during both years, whereas fourth graders showed a downward sloping pattern in the prepandemic year but a marked increasing pattern in the interpandemic year. Overall, fourth, sixth, and eighth grade students showed slight increases from Spring 2019 to Spring 2021, whereas fifth and seventh graders showed a slight decrease.
Figure 12.
Variations in Trajectory Based on Grade Level

General Education Percentage and Reading

Figure 13 shows the median standardized reading score across time points by general education percentage in quartiles. Similar to the other predictors in the model the within quartile variation does not appear to change significantly across time points but those in the fourth quartile do have a higher median reading score compared to lower quartiles. At the end of the interpandemic school year, both the first quartile (0–24%) and fourth quartile (75–100%) showed a slight decrease in the Spring 2021 performance. Figure 13 also highlights the linear nature of the students’ scores. Here, students with the lowest amount of time in general education had the lowest reading scores. Students with the second, third, and fourth lowest amount of time in general education had the second, third, and fourth lowest reading scores, respectively.
Model 2 (Math): Disability Type, Title 1 School Status, Grade Level, and Percentage in General Education.

In the second model, the child’s primary disability, Title 1 school status, child’s grade level, and percentage in general education were grouped together in predicting math performance. As with the first model, time was entered as a fixed factor with Fall 2018 as the comparison group. SLD, non-Title I school status, general education percentage, and Grade 4 level were also entered as fixed factor predictors for math scores. Table 10 shows that Title I school status, disability type, and general education percentages all had a statistically significant relationship with math scores, but not grade level.
### Table 10.
*Math Model 2 Primary Disability Diagnosis, Title I Status, Gen. Ed., and Grade Predicting Math Scores*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>95% Wald CI</th>
<th>Wald chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade=8</td>
<td>-.144</td>
<td>.1526</td>
<td>-.443</td>
<td>.155</td>
<td>.893</td>
<td>1</td>
<td>.345</td>
<td></td>
</tr>
<tr>
<td>Grade=7</td>
<td>.012</td>
<td>.1762</td>
<td>-.333</td>
<td>.357</td>
<td>.005</td>
<td>1</td>
<td>.946</td>
<td></td>
</tr>
<tr>
<td>Grade=6</td>
<td>-.146</td>
<td>.1613</td>
<td>-.462</td>
<td>.170</td>
<td>.822</td>
<td>1</td>
<td>.364</td>
<td></td>
</tr>
<tr>
<td>Grade=5</td>
<td>-.013</td>
<td>.1673</td>
<td>-.341</td>
<td>.314</td>
<td>.006</td>
<td>1</td>
<td>.936</td>
<td></td>
</tr>
<tr>
<td>[Grade=4]</td>
<td>0a</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>1</td>
<td>. .</td>
<td></td>
</tr>
<tr>
<td>Title I School</td>
<td>-.367</td>
<td>.1039</td>
<td>-.571</td>
<td>-.164</td>
<td>12.491</td>
<td>1</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>[Not]</td>
<td>0a</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>1</td>
<td>. .</td>
<td></td>
</tr>
<tr>
<td>Autism</td>
<td>.640</td>
<td>.1879</td>
<td>.271</td>
<td>1.008</td>
<td>11.590</td>
<td>1</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>OHI</td>
<td>.266</td>
<td>.1476</td>
<td>-.023</td>
<td>.555</td>
<td>3.244</td>
<td>1</td>
<td>.072</td>
<td></td>
</tr>
<tr>
<td>SLI</td>
<td>.748</td>
<td>.1800</td>
<td>.396</td>
<td>1.101</td>
<td>17.287</td>
<td>1</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>[SLD]</td>
<td>0a</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>1</td>
<td>. .</td>
<td></td>
</tr>
<tr>
<td>Spring 2021</td>
<td>-.003</td>
<td>.0273</td>
<td>-.057</td>
<td>.050</td>
<td>.012</td>
<td>1</td>
<td>.911</td>
<td></td>
</tr>
<tr>
<td>[Spring 2019]</td>
<td>0a</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>. .</td>
<td>1</td>
<td>. .</td>
<td></td>
</tr>
<tr>
<td>% Gen. Ed.</td>
<td>.018</td>
<td>.0024</td>
<td>.013</td>
<td>.022</td>
<td>56.246</td>
<td>1</td>
<td>&lt;.001*</td>
<td></td>
</tr>
</tbody>
</table>

*Note. *p < .05.*

**Disability Type and Math**

Students with SLD had a lower median math score (Med. = -.49) compared to students with autism (Med. = -.44; *p < .001*) and students with SLI (Med. = .05; *p < .001*) but not students with OHI (Med. = -.29; *p = .07*). Figure 14 shows the mean math score at each time point for each disability type. These data indicate that students with SLI and autism had increases in their math scores from Spring 2019 to Spring 2021. In contrast, students with OHI had relatively consistent scores and students with SLD had decreased scores.
Title I Status and Math

The Title I school status was also a significant predictor of math performance. Comparison of pre- and interpandemic scores showed a similar trend of math performance across time points within the 2 points. Students at the Title I school had lower average math scores compared to students not in a Title I school \( (p < .001) \). Figure 15 shows the mean math score at each time point for both groups with relatively consistent slopes except for a slight increase in the Title 1 group and a slight decrease in the non-Title 1 group.
Grade Level and Math

There was no statistically significant difference in mean math scores across grade levels. As shown in Figure 16, fourth, fifth, and sixth graders had a slight increase, whereas eighth graders had a slight decrease and seventh graders had a decrease.

General Education Percentage and Math

Percentage of time in general education was a predictor of math scores. As shown in Figure 17, students in the highest quartile (75–100%) showed a marked decrease in their
math scores from prepanemic to interpandemic. This result was in contrast to students in the other three quartiles whose scores dropped slightly. In addition and similar to the earlier reported results about reading, there was a linear relationship between percentage time in general education and math scores.

**Figure 17.**
*Math Scores From Prepanemic to Interpandemic*

Table 11 shows the parameter estimates per a percentile split predicting reading across time points. After accounting for time, these data indicate the low performing group had a mean reading score 1.29 standard deviations below the high performers \( (p < .001) \). Per Figure 18, students with higher reading scores had relatively flat slopes for both the pre- and interpandemic years. In contrast, students with lower reading scores also had a relatively flat slopes until Spring 2021, which suggests a marked decrease.
**Table 11.**
Post Hoc Low vs. High Performers Predicting Reading Scores

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>95% Wald CI</th>
<th>Hypothesis test</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-1.288</td>
<td>.0790</td>
<td>-1.443</td>
<td>-1.133</td>
<td>265.684</td>
</tr>
<tr>
<td>[High]</td>
<td>0a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Fall 2018</td>
<td>.055</td>
<td>.0369</td>
<td>-0.18</td>
<td>.127</td>
<td>2.207</td>
</tr>
<tr>
<td>Winter 2018</td>
<td>.053</td>
<td>.0380</td>
<td>-0.021</td>
<td>.128</td>
<td>1.961</td>
</tr>
<tr>
<td>Spring 2019</td>
<td>.055</td>
<td>.0389</td>
<td>-0.021</td>
<td>.132</td>
<td>2.028</td>
</tr>
<tr>
<td>Fall 2020</td>
<td>.019</td>
<td>.0362</td>
<td>-0.052</td>
<td>.090</td>
<td>.269</td>
</tr>
<tr>
<td>Winter 2020</td>
<td>.024</td>
<td>.0360</td>
<td>-0.047</td>
<td>.094</td>
<td>.435</td>
</tr>
<tr>
<td>[Spring 2021]</td>
<td>0a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

*Note.* *p < .01

**Figure 18.**
Reading Score Across Time for Initially Lower vs. Higher Performing Students

Table 12 shows the parameter estimates for percentile split predicting math across time points. Prior to calculating the model, and similar to the aforementioned reading scores, all
students below the 10th percentile rank (low) were coded into a new variable in contrast to those at or above the 10th percentile (high). After accounting for time, the low performing group had a mean math score 1.15 standard deviations below the high performers ($p < .001$). Figure 19 shows an increase in math scores among the high initial performers pre- to interpandemic. Similarly, the low initial performers also had an increase in math scores pre- to interpandemic.

**Table 12.**

*Post Hoc Low vs. High Performers Predicting Math Scores*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>B</th>
<th>Std. error</th>
<th>Lower</th>
<th>Upper</th>
<th>Wald chi-square</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>-1.152</td>
<td>.0783</td>
<td>-1.305</td>
<td>-.999</td>
<td>216.652</td>
<td>1</td>
<td>&lt;.001*</td>
</tr>
<tr>
<td>High</td>
<td>0a</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

*Note.* $^*p < .01$

**Figure 19.**

*Math Scores Across Time for Initially Lower and Higher Performing Students*
Results from the Parent and Caregiver Survey

Survey Respondents’ Demographics

A total of 60 parents and caregivers opened and initiated the survey, 46 of who completed the majority of the survey (77% of responses) and were included in the data analysis. In this group, 40 (87%) respondents completed the survey in English and 6 (13%) completed the survey in Spanish.

Among the survey respondents, a majority \( (n = 41; 89\%) \) were women, three \( (7\%) \) were men, and two \( (4\%) \) declined to state. In identifying their highest educational degrees, a majority \( (76\%) \) of the respondents had an associate’s degree or higher, 16 \( (34.8\%) \) had a master’s degree, 14 \( (30.4\%) \) had a bachelor’s degree, eight \( (17.4\%) \) had a high school diploma or equivalency, three \( (6.5\%) \) had an associate’s degree, three \( (6.5\%) \) had less than a high school diploma, and two \( (4.3\%) \) had a doctoral or professional degree. For income levels (relative to the United States), a majority self-reported middle \( (n = 19; 42.2\%) \) or high \( (n = 16; 35.5\%) \) incomes, whereas 10 \( (22.2\%) \) reported low income. A majority of the respondents also reported not having any prior teaching experience \( (82.6\%) \) nor prior special education experience \( (87.0\%) \).

The respondents provided demographic information about their children and households (Tables 13, 14, and 15). Various demographics of the student population appear to be adequately represented in terms of gender, grade level, and race/ethnicity. For primary disability, the largest category represented was autism, followed by SLD, and SLI. For household demographics, the majority of respondents had either one or two children and had
one to two adults at home who were able to facilitate their children’s learning. Table 13 shoes the household demographics.

**Table 13.**
*Survey Demographic Data About the Children*

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Survey %</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>56.52%</td>
<td>26</td>
</tr>
<tr>
<td>Female</td>
<td>41.30%</td>
<td>19</td>
</tr>
<tr>
<td>Decline to state</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>Child’s grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindergarten</td>
<td>10.87%</td>
<td>5</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; grade</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; grade</td>
<td>4.35%</td>
<td>2</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; grade</td>
<td>15.22%</td>
<td>7</td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt; grade</td>
<td>10.87%</td>
<td>5</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt; grade</td>
<td>10.87%</td>
<td>5</td>
</tr>
<tr>
<td>6&lt;sup&gt;th&lt;/sup&gt; grade</td>
<td>13.04%</td>
<td>6</td>
</tr>
<tr>
<td>7&lt;sup&gt;th&lt;/sup&gt; grade</td>
<td>10.87%</td>
<td>5</td>
</tr>
<tr>
<td>8&lt;sup&gt;th&lt;/sup&gt; grade</td>
<td>21.74%</td>
<td>10</td>
</tr>
<tr>
<td>Child’s race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latinx</td>
<td>26.09%</td>
<td>12</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>26.09%</td>
<td>12</td>
</tr>
<tr>
<td>Asian</td>
<td>17.39%</td>
<td>8</td>
</tr>
<tr>
<td>Multiple ethnicities</td>
<td>15.22%</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>4.35%</td>
<td>2</td>
</tr>
<tr>
<td>I prefer not to disclose/leave blank</td>
<td>10.87%</td>
<td>5</td>
</tr>
<tr>
<td>Eligibility for free or reduced-price meal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26.09%</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>60.87%</td>
<td>28</td>
</tr>
<tr>
<td>Not sure or don’t know</td>
<td>13.04%</td>
<td>6</td>
</tr>
</tbody>
</table>
Table 14.
Survey Demographic Data About the Children’s Main Disability and Learning Option

<table>
<thead>
<tr>
<th>Child’s main disability</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUT</td>
<td>32.61%</td>
<td>15</td>
</tr>
<tr>
<td>SLD</td>
<td>21.74%</td>
<td>10</td>
</tr>
<tr>
<td>SLI</td>
<td>17.39%</td>
<td>8</td>
</tr>
<tr>
<td>OHI</td>
<td>10.97%</td>
<td>5</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>8.70%</td>
<td>4</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>4.35%</td>
<td>2</td>
</tr>
<tr>
<td>Multiple disabilities</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Orthopedic impairment</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Visual impairment</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>Not sure or don’t know</td>
<td>2.17%</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning option</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual school</td>
<td>91.30%</td>
<td>42</td>
</tr>
<tr>
<td>Independent study</td>
<td>6.52%</td>
<td>3</td>
</tr>
<tr>
<td>Not sure or don’t know</td>
<td>2.17%</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 15.
Survey Respondents’ Household Demographics

<table>
<thead>
<tr>
<th>Household Demographics</th>
<th>Survey Percentage</th>
<th>Survey Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>30.43%</td>
<td>14</td>
</tr>
<tr>
<td>2</td>
<td>43.48%</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>6.52%</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>4.35%</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>Number of family who assist or are directly involved in child’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>23.91%</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>56.52%</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>6.52%</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>5+</td>
<td>8.70%</td>
<td>4</td>
</tr>
<tr>
<td>Number in household who are working part-time from home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>78.25%</td>
<td>36</td>
</tr>
<tr>
<td>1</td>
<td>17.39%</td>
<td>8</td>
</tr>
<tr>
<td>Missing</td>
<td>4.35%</td>
<td>2</td>
</tr>
<tr>
<td>Number in household who are working full-time from home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>28.26%</td>
<td>13</td>
</tr>
<tr>
<td>1</td>
<td>56.52%</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>13.04%</td>
<td>6</td>
</tr>
<tr>
<td>Missing</td>
<td>2.17%</td>
<td>1</td>
</tr>
<tr>
<td>Number in household who are working part- or full-time outside from home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>47.82%</td>
<td>22</td>
</tr>
<tr>
<td>1</td>
<td>41.30%</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>8.70%</td>
<td>4</td>
</tr>
<tr>
<td>Missing</td>
<td>2.17%</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. N= 46.*

**Research Question 2A**

Research question 2A asked, “What are parental and caregiver opinions about distance-learning factors and resources that influence their children’s education?”
Descriptive Statistics. Respondents’ opinions varied regarding distance learning environment being a good match for their age/grade, disability, attention span, academic performance, language, memory, and ability to make educational progress on IEP goals. However, a majority of respondents (77.2%) found that the distance learning environment was a good match for their children’s ability to use technology (54.5% agree, 22.7% strongly agree). In addition, the majority of respondents (88.6%) reported that the distance learning environment was not a good match for their children’s social–emotional skills (47.7% strongly disagree, 40.9% disagree). Table 16 presents caregiver responses to survey items about their child’s distance learning.

Figure 20.
Distance Learning Being a Good Match
Table 16.  
*Distance Learning Being a Good Match*

<table>
<thead>
<tr>
<th>Abbreviated Items</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>Row %</td>
<td>$n$</td>
<td>Row %</td>
</tr>
<tr>
<td>Age and grade</td>
<td>10</td>
<td>21.7%</td>
<td>16</td>
<td>34.8%</td>
</tr>
<tr>
<td>Disability</td>
<td>11</td>
<td>24.4%</td>
<td>18</td>
<td>40.0%</td>
</tr>
<tr>
<td>Attention span</td>
<td>17</td>
<td>38.6%</td>
<td>11</td>
<td>25.0%</td>
</tr>
<tr>
<td>Academic performance</td>
<td>12</td>
<td>26.7%</td>
<td>13</td>
<td>28.9%</td>
</tr>
<tr>
<td>Language and communication</td>
<td>9</td>
<td>20.5%</td>
<td>15</td>
<td>34.1%</td>
</tr>
<tr>
<td>Memory</td>
<td>8</td>
<td>17.8%</td>
<td>12</td>
<td>26.7%</td>
</tr>
<tr>
<td>Ability to use technology</td>
<td>4</td>
<td>9.1%</td>
<td>5</td>
<td>11.4%</td>
</tr>
<tr>
<td>Technology interests</td>
<td>4</td>
<td>9.3%</td>
<td>6</td>
<td>14.0%</td>
</tr>
<tr>
<td>Ability to make progress on IEP goals</td>
<td>7</td>
<td>15.6%</td>
<td>19</td>
<td>42.2%</td>
</tr>
<tr>
<td>Social–emotional skills</td>
<td>21</td>
<td>47.7%</td>
<td>18</td>
<td>40.9%</td>
</tr>
<tr>
<td>Feelings about the virus and their safety</td>
<td>3</td>
<td>6.7%</td>
<td>9</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

The majority of respondents reported their comfort level (77.3%), feelings of competence (78.6%), and availability/flexibility (72.7%) as factors promoting their children’s learning. In addition, a majority indicated that their stress level hindered their children’s education in the
distance learning format. Many respondents disagreed with any barriers related to technology on their children’s education during the distance learning format, e.g., technology skills, number of technology devices, cost of technology devices, and consistency of Internet connectivity. Tables 17, 18, and 19 and Figures 21, 22, and 23 show the caregivers’ responses to survey items about factors that promote or hinder their children’s education in the distance learning format.

Table 17.
Factors Promoting Child’s Distance Learning

<table>
<thead>
<tr>
<th>Abbreviated items</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort level</td>
<td>5</td>
<td>11.4%</td>
<td>5</td>
<td>11.4%</td>
</tr>
<tr>
<td>Competence</td>
<td>4</td>
<td>9.5%</td>
<td>5</td>
<td>11.9%</td>
</tr>
<tr>
<td>Availability and flexibility</td>
<td>5</td>
<td>11.4%</td>
<td>7</td>
<td>15.9%</td>
</tr>
</tbody>
</table>

Figure 21.
Distance Learning Factors That Promote Learning

The following factors promote my child’s education in the distance learning format.
Table 18.
Nontechnological Factors Hindering Child’s Distance Learning

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent/Caregiver Stress Level</td>
<td>4 (9.1%)</td>
<td>8 (18.2%)</td>
<td>21 (47.7%)</td>
<td>11 (25.0%)</td>
</tr>
<tr>
<td>Number of elders (65+)</td>
<td>1 (12.5%)</td>
<td>2 (25.0%)</td>
<td>5 (62.5%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Frequency of workers</td>
<td>2 (20.0%)</td>
<td>1 (10.0%)</td>
<td>7 (70.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Presence of one or more essential workers</td>
<td>2 (10.5%)</td>
<td>8 (42.1%)</td>
<td>6 (31.6%)</td>
<td>3 (15.8%)</td>
</tr>
<tr>
<td>Total number of people</td>
<td>6 (16.7%)</td>
<td>14 (38.9%)</td>
<td>15 (41.7%)</td>
<td>1 (2.8%)</td>
</tr>
<tr>
<td>Age of people</td>
<td>8 (22.9%)</td>
<td>16 (45.7%)</td>
<td>10 (28.6%)</td>
<td>1 (2.9%)</td>
</tr>
</tbody>
</table>

Figure 22.
Technological Factors Hindering Child’s Distance Learning

The following factors hinder my child’s education in the distance learning format:

- Age of People
- Total Number of People
- Presence of One or More Essential Workers
- Frequency of Workers
- Number of elders (65+)
- Parent/Caregiver Stress Level
Table 19.
Technological Factors Hindering Child’s Distance Learning

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology skills and competency</td>
<td>14</td>
<td>15</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Number of technology devices needed</td>
<td>12</td>
<td>12</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>Cost of technology devices</td>
<td>14</td>
<td>14</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Consistency of Internet connectivity</td>
<td>11</td>
<td>15</td>
<td>12</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 23.
Technological Factors Hindering Child’s Distance Learning

The following factors **hinder** my child's education in the distance learning format:

Consistency of Internet Connectivity

Costs of Technology Devices

Number of Technology Devices Needed

Technology Skills and Competency

Qualitative Responses on Parent Surveys

Table 20 shows the distribution of the responses to the open-ended questions in the survey around the three major themes: home characteristics, child characteristics, and school
For any other factors that positively impacted their child’s education in distance learning, there were an equal number of comments about the home and school domains and a lower number about the children. The most frequently coded subgroup theme was related to parents, caregivers, and household members from the home/family factors, followed by teaching staff characteristics in the school factors. Regarding the open-ended question asking if anything negatively impacted their children’s education in distance learning, child and school characteristics were frequently mentioned more than home/family characteristics. Child and school themes were consistent. The two highest categories in the negative impact question were children’s dis/abilities, and socialization opportunities.

Table 20.
Summary Table of Coded Quotes From Open-Ended Questions

<table>
<thead>
<tr>
<th>Theme</th>
<th>Positive $n$ (%)</th>
<th>Negative $n$ (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme 1: Family’s home environment &amp; household</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents/caregivers/household members (comments about their characteristics, stress, engagement, supports, and/or knowledge about their children)</td>
<td>$17/46 = 37.0%$</td>
<td>$8/62 = 12.9%$</td>
</tr>
<tr>
<td>Home environment (comments about the physical, auditory, spatial and environmental characteristics of the home)</td>
<td>$13 (28.3%)$</td>
<td>$4 (6.4%)$</td>
</tr>
<tr>
<td><strong>Theme 2: The child</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socialization opportunities (comments about the child’s interactions with peers and/or teachers)</td>
<td>$0.5 (1.9%)$</td>
<td>$12.5 (20.2%)$</td>
</tr>
<tr>
<td>Children’s well-being (comments about the child’s mental health, emotional status, and feelings of safety)</td>
<td>$6 (13.0%)$</td>
<td>$0 (0.0%)$</td>
</tr>
<tr>
<td>Children’s dis/abilities (comments about the child’s educational needs, skills, and/or interests)</td>
<td>$4.5 (9.8%)$</td>
<td>$15 (24.2%)$</td>
</tr>
<tr>
<td><strong>Theme 3: The school</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curriculum (comments about the academic curriculum and/or written work)</td>
<td>$17/46 = 37.0%$</td>
<td>$24.5/62 = 39.5%$</td>
</tr>
<tr>
<td>The IEP (comments about IEP implementation or)</td>
<td>$0 (0.0%)$</td>
<td>$6.5 (10.5%)$</td>
</tr>
<tr>
<td></td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>-----------------------------------------------------------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>Teaching staff characteristics</td>
<td>7</td>
<td>15.2%</td>
</tr>
<tr>
<td>(comments about school personnel, such as their abilities/skills,</td>
<td>8</td>
<td>12.9%</td>
</tr>
<tr>
<td>attitudes, temperament, and/or understanding of children’s needs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct interaction</td>
<td>4</td>
<td>8.7%</td>
</tr>
<tr>
<td>(comments about opportunities for students to engage in one-to-one</td>
<td>1.5</td>
<td>2.4%</td>
</tr>
<tr>
<td>or direct instruction)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virtual school</td>
<td>5</td>
<td>10.9%</td>
</tr>
<tr>
<td>(comments about internet connectivity/access, and/or the virtual</td>
<td>5</td>
<td>8.1%</td>
</tr>
<tr>
<td>and technology tools offered and used by the school for learning)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Family and Home Characteristics.** The most frequently coded theme among the positive factors that impacted their children’s distance learning was parents, caregivers, and household members. Many survey respondents commented on the benefits of having more opportunities to be involved with their children’s learning and to observe their children’s academics, behaviors, and disability challenges. They also reported how their children were able to get individualized support and help from caregivers when they needed it.

Furthermore, parents and caregivers reported that distance learning gave them a better idea of the content their children were learning and new knowledge of how to then facilitate their children’s education. One respondent reported,

> Seeing what he needs has been eye opening. It has been a lucky gift—we did not really understand dyslexia or what my son needed until we saw him struggling at home. Now that we see what he needs, we have been able to help him. We did not realize how much of this negative impact had on his development as a student.

Another respondent reported how her child’s grades were improved through her active involvement at home with understanding what is expected of her daughter in her classes:

> En mi caso mi hija a subido sus calificaciones pues yo e estado al pendiente de sus clases y me e involucrado en todo su aprendizaje a distancia. Eso es algo positivo que a traído la pandemia.
Translation:

In my case, my daughter has raised her grades because I have been aware of her classes and have been involved in all of her distance learning. That is something positive that the pandemic has brought.

In contrast to the positive statements, several families noted that they had experienced additional stress that accompanied their new responsibilities of facilitating their children’s distance learning at home. One parent reported that the stress related to this role “has also increased tension and fatigue” in their household. Another Spanish-speaking parent noted that she did not have the education of the teacher and did not know the exact words to teach her daughter, even though she tried to teach her as much as she could.

For home environment, parents commented that they found the home setting enabled their child to focus better “without being distracted by classmates” and having “less noise, [and] less distraction than in a classroom.” Another parent shared, “There are not as many time restraints so she can take her time doing her work…Her sensory needs are better met at home, and it’s been easier to change assignments to her needs.” Similarly, another parent noted that the comfort at home and flexibility during distance learning had been beneficial to their child’s learning experience.

In contrast, other survey respondents noted certain challenges with children participating online learning at home. A number of families reported that there were many distractions in their home environments (including toys, books, noise level, and level of attention for childcare and toddlers). In addition, some families had homes where multiple children needed to share a common space (such as the living or dining room) with other family members during class instruction, while adults also needed to use that same space to work
from home. As an example, one survey respondent noted that “all 4 members of our household work from home (3 in the same room).”

**School Characteristics.** The second most mentioned theme among the positive factors that impacted their children’s learning was teaching staff characteristics. Families reported the herculean efforts from their children’s teachers and support staff during the pandemic school year. They also commented on how the teachers’ personal qualities (flexible, empathetic, and supportive to their student and family’s unique needs and circumstances) positively influenced their children’s education. One respondent reported that a positive factor was the “ability and willingness of teachers to listen to parents concerns and adapt lessons.” Another caregiver reported, “Her classroom teacher is awesome. Very empathetic to all students in class, given everything currently going on.” Another caregiver wrote, “Great staff at the school—they go out of their way to check in and make sure we are supported.” In addition to their flexibility and empathy, families indicated the impact of teachers’ skills and abilities in addressing their children’s academics and educational success through distance learning. One parent reported “His teacher is amazingly engaged, organized and consistent…my son really likes her….and a teachers abilities makes a difference too.”

In contrast, teaching staff characteristics was also the third most mentioned topic among respondents’ negative comments. Although there were many positive comments about teaching staff, not all families shared those experiences and feelings. Several families reported that the teachers and staff lacked training and knowledge of how to help or teach their children during distance learning. Respondents expressed concerns with the teachers’ abilities to fully understand their students, whether it was knowing the appropriate rigor and
challenge to meet their academic needs, being flexible in terms of the workload, or their
general skills in addressing academics and instruction.

Another theme that emerged among the positive statements was characteristics of virtual
school, particularly the virtual and technology tools offered and used by the school for
learning. Of the parents who mentioned positive experiences in this theme, the majority
reported the benefits of technological applications that enabled their children to access their
work and demonstrate their knowledge, specifically use of dictation, read back functions,
going back to replay a lesson, and the use of voice-to-text. However, some negative
comments that impacted their children’s learning were home-internet connection glitches,
problems with the Chromebook provided by the school, technical and internet issues from the
teacher’s end, and concerns with children accessing technology all day. In addition to these
technology concerns, respondents questioned whether the use of virtual instructional delivery
enabled the teaching staff to observe and identify which students were struggling and what
they needed in order to benefit from instruction. One parent noted, “Virtual format doesn’t
support kids falling behind. It’s hard to see online.”

**Child Characteristics.** Respondents also reported that distance education had a positive
impact on some children’s well-being. Specifically, children who had a history with bullying,
anxious behaviors, feelings of stress, and somatization (e.g., headaches and stomachaches) no
longer had those experiences, whereas learning at home. One parent wrote, “Not having daily
harassment and bullying from peers at school has made learning enjoyable.” Another
caregiver shared, “My daughter is not as anxious at home. Her anxiety and behaviors at
school were a hindrance to her learning.” A parent also reported, “My son seemed to be
stressed in a regular classroom (complaints, headaches, stomachaches)—now that stress is
gone.”

Some families noted positive factors related to their children’s abilities, skills, and
interests that assisted their children’s learning in virtual school. One respondent found that
their son “speaks up in the virtual classroom,” whereas another parent observed their
daughter’s “interest in seeing and talking to classmates/teacher.” Another caregiver noted
how their daughter has “really learned how to use her iPad.” These personal qualities and
interests enabled students to actively engage and participate in work and social interactions in
the online format.

In contrast, this domain also appeared as one of the most frequently coded negative
factors. One of the most voiced areas was that their children had difficulties with maintaining
attention and engagement in distance learning, particularly as the teacher could not be
physically present and in close proximity with the student to observe and facilitate the
student’s attention and learning. One respondent reported, “It is difficult for the teacher and
the staff to keep her attention during class.” Another parent reported that their child did not
“want to be on video” and “gets distracted by other things on the computer.” Additionally,
two respondents also observed their children’s lack of awareness and difficulties in self-
advocating for their needs in the virtual classroom (e.g., asking the teacher for help or
clarification on assignments).

Another most frequently coded theme in the negative comments was socialization
opportunities. Many respondents mentioned that the lack of social interaction with peers and
teachers had a negative impact on their children’s learning. Respondents shared similar
concerns of their children’s social and emotional development due to the lack of opportunities to play with and see their peers in person.

**Research Question 2B**

Research Question 2b asked, “What is the relationship between students’ demographic characteristics (e.g., grade, ethnicity, SES, and disability type) and parental and caregiver opinions on distance-learning factors that influence their children’s education?”

**Inferential Statistics.** It was challenging to answer Research Question 2b via inferential analysis because of the low number of survey respondents who fit into different demographic categories. For various reasons, the following demographic variables were not able to be analyzed: ethnicity, disability, and grade. For the ethnicity variable, only non-Hispanic ($n = 12$) had a large enough cell size to use in analysis. Collapsing ethnicity into non-Hispanic and all others was considered; however, participants could select “multiple ethnicities,” which meant it was not possible to discern a child’s ethnicities. In addition, the child’s disability variable was also not able to be analyzed, as only children with autism had a large enough cell size ($n = 15$) for analysis. Collapsing across all remaining disability types would have created a highly heterogeneous group with disparate diagnosis types. Last, among the different grade levels, eighth graders had the largest cell size ($n = 10$), but this was not large enough for analysis.

One solution to address sample sizes was to sort the caregivers’ education levels into two groups, respondents with a college degree ($n = 35$) and those without a college degree ($n = 11$). Although the latter group did not meet minimum threshold for analysis, both parametric (chi square) and nonparametric (Mann-Whitney $U$; Kruskal Wallis) analyses were done
investigating whether respondents with and without college degrees answered survey questions differently. For these analyses, multiple survey items were investigated, including nine questions (five general items and four child-specific characteristics) related to respondent’s opinions about whether the distance learning environment was a good match for their children, three questions related to whether certain caregiver factors promoted learning in the distance environment, and two questions related to the use of technology. Appendix E provides multiple tables with the results from these analyses, which found no statistically significant differences between respondents with and without college degrees. In addition, a similar analysis was conducted comparing respondents who reported higher versus lower incomes. Results of these analyses also found no statistically significant differences in how respondents answered survey questions (see Appendix F).
CHAPTER 5
Conclusions, Recommendations, and Implications

Introduction

This chapter includes a summary of the study’s findings, conclusions, limitations, and implications. Recommendations for future research are also discussed.

Summary of Study

As recent research on the impact on student learning continues to emerge from the COVID-19 pandemic, there remains a dearth of research on students with IEPs and how their caregivers experienced remote learning in a pandemic school year. The purpose of this study was to examine academic trajectories of students with IEPs and their caregivers’ perspectives towards distance learning during the COVID-19 pandemic. In addition, given the heterogeneity of these groups, demographic data would be disaggregated to determine whether there were significant differences among subgroups in terms of academic outcomes and experiences with distance learning. Results from this study could impact district and school administrators’ decision-making in terms of how to best allocate needed resources for student populations whose learning has been most impacted during the pandemic. Consequently, findings will also highlight for families, educators and specialists (e.g., school psychologists and speech-language therapists) working directly with children with disabilities and what some students may specifically need and benefit from.
Summary of Findings and Conclusions

RQ1a asked “How do the reading and math trajectories of students with IEPs during a nonpandemic school year (2018–2019) compare to trajectories during a pandemic school year primarily consisting of distance learning (2020–2021)?”

A statistically significant difference in reading performance was found between the pre- and interpandemic school years among students with IEPs, but no difference was found in their math scores. Students with IEPs had lower interpandemic reading scores across all time points; however, as a whole group, their math performance was not significantly impacted during the pandemic.

RQ1b asked, “What is the relationship between students’ demographic characteristics (ethnicity, educational placement, English language learning status, SES, disability type, and grade level) and reading and math trajectories comparing school years 2018–2019 and 2020–2021?”

The students’ demographic characteristics, ethnicity (Hispanic or not Hispanic), free/reduced-price lunch status, EL status, disability type, Title I school status, and general education percentage all had a statistically significant relationship with reading scores. In contrast, grade level did not have a statistically significant relationship with reading scores. For math scores, ethnicity, free/reduced-price lunch status, disability type, Title I school status, and general education percentage also had a statistically significant relationship. In contrast, EL status and grade level did not predict math scores. Thus, specific student characteristics predicted lowered reading and math performances (specifically, ethnicity, free/reduced-price lunch status, disability type, Title I school status, and general education...
percentage). Grade level was not a predictor of academic skills and EL status predicted reading, but not math performance.

These findings are commensurate with nascent research conducted by Pier et al. (2021) in which researchers found “more learning lag for students who are economically disadvantaged (except in upper grades in math, as measured by the MAP), English learners, and Latinx.” In contrast to Pier et al., grade level was not a statistically significant predictor of math performance. Similar to several studies on the relationship of placement and academic outcomes (Cosier et al., 2013, Hyun Kim et al., 2018, Oh-Young & Filler, 2015), results found a linear relationship between percentage time in general education and academic scores.

In this study, only four disability groups (SLD, SLI, OHI, and AUT) were examined as they had enough students to conduct inferential statistics. Results showed that students with SLD tended to have statistically significant lower reading and mathematics scores, compared to the other three disability groups. These results were different from prepandemic studies conducted by Wei et al. (2011; Wei et al., 2012), in which they were able to look at 11 federal disability categories and reading and mathematical performances. Wei et al. (2011) found that students with speech-language impairment and visual impairment had higher scores in reading and mathematics, whereas those with intellectual disability or multiple disabilities had the lowest scores.

A post hoc data analysis found that there were significant differences between initially low performing students (who scored below the 10th percentile time in the Fall 2018) and higher performing students (who scored above 10th percentile rank) for both reading and
math scores. These were commensurate with Piers’ study, which found, “Students who were previously low achieving also had learning lag across all assessments.”

In addition, a collateral result from this study was the consistent discrepancy noted in reading and math scores among students across both the pre- and interpandemic school years. For example, non-Hispanic students had consistently higher academic scores than Hispanic students and students who did not get free/reduced-price lunches had higher scores than students eligible for free/reduced-price lunch. Similar results were found based on English learner status (yes or no), Title 1 school status (yes or no) and percentage of time in general education (less or more). As well, students with SLD had consistently lower scores than students with autism, OHI, or SLI.

Using the parent/caregiver survey, RQ2a asked, “What are parental and caregiver opinions about distance-learning factors and resources that influence their children’s education?”

Findings indicated that opinions varied considerably regarding distance learning environment being a good match for their children’s ages/grades, disabilities, attention spans, academic performance, language, memory, and ability to make educational progress on IEP goals. This variation suggests nuances with certain topics and variables in relation to children with IEPs, which are discussed next.

Some families noted that the lack of in-person instruction had greatly hindered their children’s progress. These caregiver-reported experiences were similar to findings from the literature where families of children with disabilities were not satisfied with the supports they were given to address their children’s educational needs or did not feel they received enough
supports from their schools during distance learning (Greenway & Eaton-Thomas, 2020; Thorell et al., 2021). Findings also revealed that the majority of parents and caregivers reported that the distance learning environment was not a good match for their children’s social–emotional skills. Similar results were found in the recent literature on the caregiver-reported negative impact on children’s education and mental health due to lack of in-person school attendance (Greenway & Eaton-Thomas, 2020). Similarly, a high percentage of respondents indicated that stress levels hindered their children’s education in the distance learning format. These findings were consistent with recent studies that found negative effects of the pandemic and remote learning in the home environment on parents’ and caregivers’ well-being (Chan & Fung, 2021; Greenway & Eaton-Thomas, 2020; Ren et al., 2020). The family interactions at home not only included how parents and caregivers were feeling with their additional responsibilities but also how their children felt the loss of in-person social interactions with peers and teachers and the daily connections that they would typically get from attending school (Greenway & Eaton-Thomas, 2020; Lee et al., 2021). Furthermore, researchers indicated that caregivers of students with disabilities tended to experience more parenting stress than parents without a child with a disability (Dabrowska & Pisula, 2010; Hayes & Watson, 2013). However, the current study does not discern how much additional stress the pandemic caused among parents who likely experienced prepandemic stress because of their children’s disabilities.

Regarding use of technology, the majority of respondents found that the distance learning environment was a good match for their children’s ability to use technology. Many respondents disagreed with any barriers related to technology on their children’s education
during the distance learning format. For example, multiple topics (technology skills and competency of household members; number of technology devices needed; cost of technology devices used for learning; and consistency of their household’s Internet connectivity) were denied as specific barriers. From these findings, it is reasonable to hypothesize that everyday prepandemic technology usage may have helped families feel more comfortable using educational technology in the pandemic’s distance learning format. However, these results should be interpreted with some caution because many technology industries exist in the district’s larger geographic area.

The majority of respondents also reported their own comfort levels, feelings of competence, and availability/flexibility promoted their children’s learning. These findings were different Greenway and Eaton-Thomas’s (2020), who found that parents reported feelings of inadequacy and lack of preparedness when their children were learning remotely. However, these differences may be due to the timing of the surveys administration, the availability of school resources to families, and the frequency and quality of communication between home and school. This study’s survey was administered in the middle of the pandemic school year where families and school had more than half a school year to adjust to remote learning in the home setting and its additional responsibilities.

Finally, based on the survey’s open-ended questions, respondents were more likely to write positive comments on the pandemic’s impact on their family’s home environment (as related to children’s education), negative comments on the pandemic’s impact on children’s socialization and educational programs, and equally positive and negative comments about the children’s schools and their personnel.
Finally, RQ2b asked, “What is the relationship between students’ demographic characteristics (grade, ethnicity, SES, and disability type) and parental and caregiver opinions on distance-learning factors and resources that influence their children’s education?”

Based on the number of respondents for this study, parametric and nonparametric statistics found that neither parental level of education (college degree v. noncollege degree) nor self-reported household income (high v. low) influenced survey responses. These results were consistent with Greenway and Eaton-Thomas (2020) who also did not find that SES specifically correlated with parents’ experiences and perspectives of distance learning. In addition, it was difficult to inferentially analyze other distinct demographic and survey responses based on the number of respondents. Instead, descriptive examples were used to highlight minimal differences in technology use based on gender and parental teaching characteristics based on children’s grade levels.

Discussion

Significant attention and concern from the news media, community, and research field has been given towards students’ learning loss during the pandemic. Students who attended school in March 2020 and beyond experienced instructional disruptions and have less learning time in the classroom than older peers who graduated high school before 2020. This experience is likely to have more profound, long-lasting impact on later school graduates who will be attending colleges or joining the workforce. Colleges and employers may notice larger differences in terms of preparedness, readiness, and knowledge base that the incoming classes might come with. However, notable differences among different demographic groups
emerged that are consistent with previous literature. For example, students with higher SES backgrounds will have more resources to fill in such gaps, compared to those of lower SES.

Regarding the pandemic’s unique impact on school-aged students with disabilities, they generally were not as provided with the necessary services as written on their IEPs. Although certain students with IEPs may have had positive experiences learning remotely, findings of this study indicated that some student populations still experienced a lack of growth in academic performance in the pandemic school year and those students were previously identified as needing explicit instruction, immediate feedback, and physical proximity from a credentialed teacher. Students with disabilities will continue to be at risk of remaining at disadvantaged positions throughout their school years if the method and consistency of those services differ over an extended period of time. From the pandemic, they are less likely to catch up with their peers based solely on school resources, given that the instruction and supports that they need have been disrupted multiple times during the pandemic. Therefore, some families have begun to take over this responsibility of providing additional supports to fill in any gaps and to monitor their children’s progress. However, as educational leaders deeply concerned about equity, school and district administrators should be aware of such inequities that exists in their schools and should seek to provide adequate services and programs to ensure that students with disabilities do not get left behind, regardless of their demographic factors.

Many, if not all, families experienced frustration, stress, anxiety, and sadness from the uncertainty, loss, and grief that came as a result of the COVID-19 pandemic in some way or another (e.g., education and school social events, employment, basic needs such as food and
shelter, access to health care, social/family gatherings, and travel). However, one theme that emerged from the study’s findings was the resiliency of some students with IEPs and their families during the COVID-19 pandemic. Based on the academic data and caregiver surveys, a number of students and families adjusted and adapted their lives to the different environment as well as task demands. These families were able to learn different ways of navigating such routines at home in order for them to have some day-to-day continuity while mitigating other barriers.

Even though the resilience of students with disabilities was not particularly examined in this study, resiliency was a theme that emerged from this study’s results in the academic record review as well as in the caregiver survey. Resilience is defined as the overcoming of adversity and hardships and having a lessened impact to environmental risks (Rutter, 2012). It is important to note that students, families, and educators have expanded and developed their thinking, problem-solving abilities, and coping skills as a result of this pandemic and are more prepared than ever to manage another emergency event should it occur. Many have adjusted to use of technology and applications to learn and teach. In addition, this population has now found ways to communicate via technology (e.g., email, phone, or videoconferencing) and meet in ways similar to in-person meetings. Yet, it is equally important to recognize that some families still have not been able to adapt as quickly or as easily due to language and cultural barriers, stressors, trauma, and significant life events.

Aside from the students’ academic outcomes during the pandemic, they and their families have encountered greater and more pressing challenges in the pandemic and thus, have grown more resilient as they manage their lives outside of the school experience that were
not accounted for in this study. Although it is unlikely public school districts will have
another full lockdown similar to the March 2020 school closures, students, families, and
educators are likely more equipped to navigate their daily lives and routines and respond to
unique barriers if this circumstance were to ever occur again.

Limitations

The record review portion of this study had four limitations. First, there was
standardization of students’ percentile ranks in the studied sample, which limits the
generalizability of this study to other school districts. One reason for the standardization was
that the types of assessments used to measure students’ reading and math scores changed
during the pandemic school year, which made comparing students’ standardized scores
across different assessments difficult. As a result, their percentile ranks were used, and z-
scores were created and standardized in the sample.

A second limitation was the number of students who were not included in the study due
to inconsistent data or not having a large enough sample size (based on a demographic
characteristic) to use in the analysis. The final sample size was 270 students; however, the
study had the potential of using 736 total student records.

A third limitation was that this study only reviewed the academic performance of
students over 2 school years. Had more school years been taken into account, additional data
would further articulate the general trends that are seen across a longer educational period. A
fourth limitation was that most of the interpandemic school-year assessments were conducted
in the home environment. Doing so could have influenced (increased or decreased) the
results, depending, for example, on the testing environment (e.g., distractions) and the
student’s motivation to do well. Given that this study used archival data, the researcher did not know the testing conditions and was not able to account for the quality control of the testing itself.

With the parent and caregiver survey, there were also several limitations. The total sample size of the surveys was low \( n = 46 \) which made conducting inferential analyses difficult. There may have been lower participation due to the fact that families were fatigued from the pandemic itself, district emails and surveys, and managing various responsibilities (e.g., employment, parenting, and facilitating their children’s education). This survey was conducted in the middle of the interpandemic school year, and results and reported experiences might have been different had respondents been surveyed at the start or end of the year. Finally, although the survey items were piloted with several parents of school-aged children and educators, it was not piloted to families of school-aged children with IEPs.

**Recommendations for Future Research**

More research is needed with a larger sample of students and families. The current study was not able to accommodate student absences, lack of remote learning engagement, and other factors that influenced families and students under pandemic circumstances. Although 270 students with IEPs is a relatively high number, as is 46 survey respondents, it would be helpful to create additional opportunities for those individuals not included in the current study. More specifically, future studies could create strategies to include younger elementary aged students’ academic assessments because doing so will provide insights about emerging reading and mathematics skills. Furthermore, more research is needed to examine the academic progress of students with moderate and severe disabilities who are not able to take
traditional computer-based online assessments but are assessed through alternative assessments to measure educational progress. As a number of students with significant disabilities are eligible for extended school year over the summer (due to evidence of regression of skills for extended breaks), particular attention is needed to ensure they are provided with the quality of instruction and level of support that enables them to make educational progress despite the world still being in a pandemic.

Given that the survey was anonymous and not connected to children’s academic data, it might be beneficial to connect students’ academic data with family report as well as teacher report. It would also be beneficial to look at the relationships between students’ cognitive factors (such as intellectual functioning and executive functioning skills), their social–emotional well-being, and their educational outcomes during the pandemic, especially because survey respondents noted a socialization impact. An intervention study addressing the slopes in learning of students with disabilities, particularly students who showed marked reduction upon returning to classroom-based learning, in order to catch them up quicker would be useful. As noted by several earlier figures, students showed marked reductions in their academic skills at the onset of the pandemic’s school year.

In addition, it might be helpful to engage in an additional qualitative approach by interviewing families and students on their experiences with remote learning and school-home communications. Doing so might allow researchers to identify more nuanced interpretations of the pandemic’s impact as well as member checks about research findings. Last, in order to triangulate the current results, it would be helpful to gather the perspectives
of educators in special education and general education on the successes and barriers to remote learning when working with students with IEPs.

**Recommendations for Practice**

Many unknown answers remain to the question of how the COVID-19 pandemic has impacted the academic learning abilities of students with IEPs. The record review data from this study revealed that not all student groups showed a decrease in academic trajectories during the pandemic, which is encouraging and tremendously to the credit of the educators, families, and students who quickly adjusted their lives as a result of school closures and adapted to the remote learning environment. However, the pandemic’s had a greater impact on reading skills, and marked differences in overall reading and math performance based on particular demographic characteristics. Administrators and educators should take note of these results as certain student populations continue to be disadvantaged by circumstances that they have no or limited control of. For example, this study revealed large discrepancies based on disability type, ethnicity, EL status, SES, and Title I school status. Such discrepancies were present prior to pandemic’s onset and, per the current study, appeared perpetuated and exacerbated by the pandemic itself.

Although district and school administrators, school educators (particularly teachers and school psychologists), and families were likely aware of these discrepancies prior to the pandemic, it is critical that pandemic-related actions prioritize efforts to address these inequities. In this study, which looked at academic data of one school district, results indicated that the majority of students with IEPs obtained lower mathematic scores in the interpandemic school year. Furthermore, there were some noticeable outcome differences
among students based on their ethnicity and SES status, which are likely to impact their educational trajectories in the long-term if left unaddressed. Specifically, nearly every student who was eligible for free and reduced-price lunch had a lower score in math during the interpandemic school year. A second finding was that among students who had higher scores in reading in the interpandemic year, the non-Hispanic students showed higher average growth in reading scores compared to Hispanic students. District administrators need to identify ways to address this problem of practice specific to the unique demographic populations that exist in their own school districts. Using data already at their disposal, districts should identify the root of the problem through review of records (e.g., district and special education department policies and procedures; student academic data and IEPs), and focus groups and individual interviews with various stakeholders (e.g., administrators, educators, families, and students). Doing so would allow district and school personnel to learn more about their district’s unique characteristics and fine-tune family and student-based supports consistent with the unique factors that influence children’s growth.

In addition, although the current study was only able to analyze complete academic data sets, district and special education administrators should pay extra close attention to those student populations who might have incomplete academic progress data in their educational records. For example, some children and families experienced greater pandemic impact, intermittent absences, and/or reduced internet connectivity were less represented in the current data analysis but likely need extra attention from their school districts. Efforts need to be made to identify such students and families to create fine-tuned interventions giving these children and families the same educational opportunities as their less impacted peers.
As the majority of students have returned to in-person learning at the start of the 2021–2022 school year, special education teachers and school psychologists have the available data to analyze the individual progression of students’ academic performance. Analyzing such information will allow school personnel to adjust student supports based on concrete data and unique child-specific circumstances. For example, the data may indicate that educators need to provide more targeted, intensive interventions and/or adjust the service minutes that match the students’ level of need, which may be higher than previous school years. Given that some students with severe learning disabilities have significant attention and memory issues, they may require more in-depth services to make substantive progress (through observable gains and generalization) in their classrooms. In addition, IEP teams may need to expand the present levels of functioning section in the IEP to consider how the specific child and family’s pandemic-related situation impacts the child’s progress. District and special administrators should take into account that some students with disabilities may need more intensive services and/or additional family resources as they were more impacted by the pandemic. In order to be intentional with this response, administrators need to make students’ educational progress and resilience from their first school year in the pandemic an intentional goal in their department. They need to formalize a process that involves special education teachers and school psychologists to ensure school teams review the existing academic data of their students and identify needs of students and families (including when certain students need higher intensity of services), rather than waiting on the parent or caregiver to take the lead on such advocacy. In addition, district personnel should advocate for and allocate more funds to address the additional services that some students need as well as additional
curricula, supports, and coaching to address the retention of reading and math skills. Furthermore, families and teachers may need additional training on how to develop and address IEP goals that can also be supported by families in the home setting if they wish to be more involved. For administrators and educators, it is their duty to ensure schools provide equitable learning opportunities for all students, particularly those whose families might not be able to advocate for their needs or be familiar with special education law and IEP processes.

Based on the survey results and literature on families of children with disabilities, it is imperative that district and school personnel consider child and family well-being and stress levels that impact children’s learning during pandemic conditions. District personnel might consider asking families for their input on how their children are doing at school and suggestions about how the schools can improve children’s academic and social–emotional outcomes. For example, districts can respond to some of the negative comments made regarding distance learning by enacting family-recommended actions on a regular basis. Districts might also pay closer and more sensitive attention when families and students have low participation rates. Such information could indicate the fatigue that many families face during a pandemic school year. In addition, district administrators and school staff should find ways for families who may have language barriers to have a voice in their children’s educational process as well, as they may be less likely to advocate for their children’s needs with teachers or in the IEP process. Culturally reflective focus groups or individual interviews would be beneficial in order to increase parent voice, particularly those who have rarely participated in the process. In addition, families of children with disabilities would
likely benefit from newsletters and outreach events to develop ways to manage their stress levels, connect with other families with similar circumstances, and find support through their local communities.

**Implications**

Among many final thoughts about this dissertation’s impact, it is important to consider this study’s external validity. Although the sample sizes and diversity of the participants were study strengths, this study’s impact is based on a single district, limited grade levels, and particular disabilities. Yet the data from this study indicate that children from particular groups (particularly Hispanic, English learners, low income, from Title 1 schools, those with SLD, and those with low skills at onset) were more vulnerable to fall behind than their comparison groups. And children’s reading scores were more impacted by the pandemic than their math scores. Such conclusions compel district administrators, researchers, families, and school personnel to look into their problems of practice to identify the root causes of such results and whether they might apply to other school districts. Attention should be given to the retention of academic skills, ensuring that pandemic circumstances do not perpetuate inequities that allow certain populations to continue to get left behind.

From the survey and this dissertation’s theoretical framework (Bronfenbrenner’s [1989] ecological systems theory), it is also important for us to prioritize children’s socialization during pandemic circumstances to ensure daily meaningful personal connections between students and teachers. Schools and families need to work together to discover novel strategies that can be employed to support interpersonal connections among children. In addition, schools may want to explore how online social skills and social–emotional learning (SEL)
programs and opportunities can be used in order to promote children’s well-being, even when their in-person interactions are limited by pandemic or future emergency conditions.

Similarly, one positive component of the pandemic is that parents and caregivers likely have a deeper understanding of their children’s learning characteristics, which suggests deeper knowledge than just their children’s disability. In this study, several caregivers voiced that they have discovered more about how their children’s disabilities were impacting them educationally and also learned more about the supports their children needed in order to be successful in their classes. Such a finding compels us to further consider how some families of children with disabilities have shifted their thinking about their roles in public education as a result of the COVID-19 pandemic. In turn, districts need to find avenues for families’ perspectives to be reflected in IEP processes and programming.

In terms of implications of least restrictive environment in a pandemic, students who were more included in general education classrooms tended to have higher academic scores than students who were less included before and during the pandemic. However, it is important to note that a potentially confounding factor here because this study did not collect data about whether students received the same quality and intensity of supports (including accommodations and services) in the remote learning setting as they may have in the nonremote environment. Thus, because student’s supports were not measured, it is important to cautiously interpret students’ reading and math outcomes in relation to percentage of time in general education.

As schools in the United States continue to be held accountable to provide FAPE to students with IEPs under pandemic and other emergency conditions, it is important to
recognize that administrators and educators continue to discern how schools are ensuring that students with IEPs receive FAPE in light of such circumstances. As noted in this dissertation’s introduction, there continues to be ambiguity and not much guidance from the federal and state government on the implementation of such services remotely and more importantly what criteria schools can use to determine whether they are implementing FAPE as best as they could in such situations. In this study, patterns and trends in academic performances were collectively but perhaps it is better to consider what FAPE looks like in a pandemic more individually and as a case-by-case manner. Based on the academic and survey data, some students whose needs, particularly their academic needs, were adequately met and provided during the interpandemic school year, as their academic scores and classroom engagement were not negatively impacted by remote learning at home. Given that FAPE takes into account other areas of need besides academics (such as language/communication, social skills, behavior, fine/gross motor skills, etc.), the current results for some students were promising but it would be difficult to hypothesize or generalize how and to what extent students with IEPs were impacted in those areas, given that those areas were not examined in this study.

As schools continue to navigate the COVID-19 pandemic and may encounter other unpredictable conditions that require long-term school closures such as another pandemic or a natural disaster, it is imperative that schools receive FAPE guidance from the state and federal government on the provisions of students’ IEPs under such circumstances and additional funding for resources, staffing, and training to minimize the impact of disruptions to their learning and education. Although some students’ academic needs were likely to be
adequately met in remote settings, others likely experienced inequitable outcomes in other areas within and outside the IEP (such as basic needs) that continue to impact their education. Two questions remain unanswered: (a) how do schools determine whether they are implementing IEPs to the fullest in emergency conditions? and (b) how do schools support families so as to mitigate factors that impact the implementation of the IEP and FAPE?

**Conclusion**

This study examined academic trajectories of students with IEPs and their caregivers’ perspectives towards distance learning during the COVID-19 pandemic. This study was important because, to my current knowledge, no studies have specifically measured the reading and math trajectories of students with IEPs during interpandemic long-term school closures and distance learning. It is believed that students’ virtual learning environments as well as lack of continued access and proximity to professionals are likely to impact their progress. As this student population tends to have lower graduation rates, lack of adequate and timely services may negatively impact their academic performance as well as their chances of academic success and preparation for postsecondary options. In conclusion, the results of this study supported the findings of studies regarding significant differences in academic performance based on certain student demographic characteristics prior to the pandemic and offered new insights into how students’ academic performances in reading and mathematics were impacted during the pandemic school year. In addition, findings from caregiver surveys indicated a range of experiences (both positive and negative) about their children’s experiences with distance learning that are consistent with the recent literature during the COVID-19 pandemic.
Despite the impact of the pandemic on families and schools today, new insights about public education arise that impact the quality and lives of students with IEPs. Although some parts of society would like to return back to the “normal” circumstances prior to the pandemic, it is important to see that the world has certainly changed since the onset of the COVID-19 pandemic and is continually changing rapidly. Therefore, rather than trying to bring back past practices, all educators and administrators need to take the lessons that they learned from the recent past, accept a different and more developed way of thinking and problem solving, and adapt to the new and changing contexts in which they live and work in order to ensure schools provide equitable opportunities to all students. Educators and administrators need to ask themselves whether they have changed and started doing things differently or whether they are trying to impose what was previously done and more familiar to them, even though those practices are less impactful in the current circumstances.
REFERENCES


128


Lane, K. L., Carters, E. W., Pierson, M. R., & Glaeser, B. C. (2006). Academic, social, and behavioral characteristics of high school students with emotional disturbances or


Rice, M. F., & Dykman, B. (2020). The emerging research base on online learning and students with disabilities. In K. Kennedy & R. E. Ferdig (Eds.), *Handbook of*
research of k–12 online and blended learning (2nd ed.). Carnegie Mellon University ETC Press.


SRI International (2002). *Special education elementary longitudinal study (SEELS).* http://www.seels.net/grindex.html


U.S. Department of Education. (2020b). *Secretary DeVos reiterates learning must continue for all students, declines to seek congressional waivers to FAPE, LRE requirements of IDEA.* https://sites.ed.gov/idea/secretary-devos-declines-to-seek-congressional-fape-lre-waivers-to-idea-requirements


Recruitment Email - Date: January 5th and 6th, 2021

Subject: Special Education Research in COVID-19 Pandemic at SJSU

Dear parents and caregivers,

Este mensaje está en español abajo.

We are inviting you to a research study that examines how the COVID-19 pandemic impacts students with special needs and their families. This research is being conducted through a partnership between San José State University and XXX School District. We were given permission to inform you of this research opportunity, and we welcome your participation.

The link below provides you with more information about this study, and after reading this description you can decide whether you want to participate.

Participants will be asked to answer questions about themselves and their child’s educational experience. The survey is completely anonymous and will take about 15 minutes to complete.

If you are interested in learning more about the study, please click on the following link below.

https://sjsu.qualtrics.com/jfe/form/SV_243Dnth8xmCqMSh

Thanks,

Charlene Lee, NCSP, BCBA and Paul W. Cascella, Ph.D., CCC
charlene.lee@sjsu.edu
paul.cascella@sjsu.edu
Estimados padres, madres y cuidadores:

Los invitamos a un estudio de investigación que examina de qué modo la pandemia de COVID-19 afecta a los estudiantes con necesidades especiales y a sus familias. Esta investigación se realiza a través de una asociación entre San Jose State University y el Distrito Escolar de XXX. Tenemos permiso para informarles sobre la oportunidad de esta investigación y agradecemos su participación. El vínculo a continuación proporciona más información sobre este estudio y después de leer esa descripción, pueden decidir si desean participar.

Los participantes tendrán que contestar preguntas sobre ellos y sobre la experiencia educativa de sus niños. La encuesta es completamente anónima y completarla tomará unos 15 minutos. Para obtener más información sobre el estudio, hay que hacer clic en el enlace que sigue a continuación. Para cambiar esta encuesta a español, vaya al cuadro de idioma que está marcado como inglés. El cuadro de idioma está a mano derecha hacia arriba de la página. Cambie el idioma a español manteniendo presionado y arrastrando hacia abajo hasta elegir el Idioma español.

https://sjsu.qualtrics.com/jfe/form/SV_243Dnth8xmCqMSh

Gracias,

Charlene Lee, NCSP, BCBA y Paul W. Cascella, Ph.D., CCC
charlene.lee@sjsu.edu
paul.cascella@sjsu.edu
Follow Up Email - Date January 12th and 13th, 2021

Dear parents and caregivers,

We are still gathering data for this research study if you are interested and haven’t already completed this survey. Thank you to those who have responded so far. We sincerely appreciate your time and input.

All the best,

Charlene and Paul

Estimados padres, madres y cuidadores:

Todavía estamos reuniendo datos si está interesado y aún no ha completado esta encuesta. Gracias a quienes han respondido hasta ahora. Agradecemos sinceramente su tiempo y sus aportes.

Muchas gracias,

Charlene y Paul
APPENDIX B

SURVEY INSTRUMENT (ENGLISH)

Parent/Caregiver Survey

Demographic, Educational, and Home Factors Associated with Academic Achievement of Students with Individualized Education Programs (IEPs) during the COVID-19 pandemic

You are invited to participate in a research study that examines how the COVID-19 pandemic impacts students with special needs and their families. Specifically, the survey seeks your opinions about how the pandemic has impacted your child’s education. Eligible participants of the survey must meet the three criteria: 1) They are a parent/caregiver or legal guardian who makes educational decisions for their child with an IEP (Individual Education Program), 2) Their child attends a public school within the XXX School District, and 3) Their child has an IEP with the XXX School District and is not in preschool.

The co-investigators are Charlene Lee, a current doctoral student at San Jose State University and a school psychologist in the XXX School District, and Paul Cascella, a professor at SJSU. This research is conducted through San Jose State University and not your child’s school or school district. Whether you choose to participate will not be known to the researcher, the university, and district, and if you participate in the survey, your responses will not have any effect on your child’s services or education.
If you agree to participate in this study, you will answer questions about yourself and your child with an IEP. The survey takes about 15 minutes. You can answer all, some, a few, or none of the questions and skip any question you do not want to answer. Your participation is completely voluntary. This means you can choose to participate or not participate. This survey is completely anonymous. You will not be asked for your name and the survey’s software will not track your email address or physical location.

As a precaution, some of the survey questions may make you feel uncomfortable or distressed, especially if you and your child are having a difficult time with the pandemic. Again, you are welcome to skip any of the questions. You will not receive any direct benefits or compensation for answering the survey except perhaps feeling that you have contributed to research about how the pandemic is affecting children with special needs and their families.

If you would like more information about this survey, please contact Paul Cascella at paul.cascella@sjsu.edu. If you have complaints about this research, please contact Bradley Porfilio, bradley.porfilio@sjsu.edu. If you have questions about participant’s rights or if you feel you have been harmed in any way by answering this survey, please contact Pamela Stacks at 408-924-2479.

If you wish to participate in this research study, please proceed to the following items below. Thank you.
By participating in this study, you acknowledge that this research study is being conducted by researchers at San Jose State University, not your child’s school or school district.

- Yes, I acknowledge that this research study is being conducted by researchers from San Jose State University, not from my child’s school or school district

Do you agree to participate in this study?

- I agree to be part of this study and have read the consent form
- I do not want to participate in the study

Please confirm if the following is true: I am a parent/caregiver or legal guardian who makes educational decisions for my child with an IEP (Individual Education Program)

- True
- False

Please confirm if the following is true: My child attends a public school within the XXX School District

- True
- False
Please confirm if the following is true: My child has an IEP with the XXX School District and is not in preschool

○ True

○ False

Please answer the following questions about your child who has an IEP. If you have multiple children who have IEPs, please answer this survey only once with all of your answers focused on only one child with an IEP. Please feel free to skip any question you do not wish to answer.

Q8 Which learning option is your child with an IEP currently enrolled in for the 2020-2021 school year? (Check one)

○ Virtual Learning/Virtual School (teacher-led format where online classes include live and pre-recorded instruction as well as independent work)

○ Independent Study (format where the student can work alone, is responsible for independent assignments, and there is a written agreement regarding submission of assignments, resources, and academic goals)

○ Not Sure or Don’t Know

○ Other ____________________________________________________________
Q9 What is your child’s gender?

- Male
- Female
- Other
- Decline to State

Q10 What is your child’s grade?

- Kindergarten
- 1st
- 2nd
- 3rd
- fourth
- 5th
- 6th
- 7th
Q11 What is your child’s race/ethnicity? (Check one)

- [ ] African American
- [ ] Native American
- [ ] Asian
- [ ] Hispanic/Latinx
- [ ] Pacific Islander
- [ ] White, Non-Hispanic
- [ ] Multiple Ethnicities
- [ ] Other ________________________________________________
- [ ] Unknown
- [ ] I prefer not to disclose
Q12 Hispanic/Latinx: Check all that apply

☐ Guatemalan/Guatemalan American

☐ Mexican/Mexican American

☐ Puerto Rican/Puerto Rican American

☐ Salvadorian/Salvadorian American

☐ Other ________________________________

☐ Unknown

☐ I prefer not to disclose
Q13 Asian: Check all that apply

☐ Asian Indian/Indian American

☐ Chinese/Chinese American

☐ Filipino/Filipino American

☐ Japanese/Japanese American

☐ Korean/Korean American

☐ Thai/Thai American

☐ Vietnamese/Vietnamese American

☐ Other ____________________________________________

☐ Unknown

☐ I prefer not to disclose
Q14 Multiple Ethnicities: Check all that apply

☐ African/African American

☐ Asian Indian/Indian American

☐ Chinese/Chinese American

☐ Filipino/Filipino American

☐ Guatemalan/Guatemalan American

☐ Japanese/Japanese American

☐ Korean/Korean American

☐ Irani/Irani American

☐ Iraqi/Iraqi American

☐ Mexican/Mexican American

☐ Native American

☐ Pacific Islander
☐ Pakistani/Pakistani American

☐ Puerto Rican/Puerto Rican American

☐ Salvadoran/Salvadorian American

☐ Thai/Thai American

☐ Vietnamese/Vietnamese American

☐ White, Non-Hispanic

☐ Other ________________________________

☐ Unknown

☐ I prefer not to disclose
Q15 What language(s) do you and other caregivers in the household speak to your child in the home? (Check all that apply)

☐ English

☐ Spanish

☐ Other ________________________________________________
Q16 What is your child’s main educational disability? (Check one)

○ Specific Learning Disability

○ Other Health Impairment

○ Autism

○ Emotional Disturbance

○ Speech or Language Impairment

○ Intellectual Disability

○ Orthopedic Impairment

○ Traumatic Brain Injury

○ Visual Impairment

○ Deafness

○ Hearing Impairment

○ Deaf-Blindness

○ Multiple Disabilities
Q17 What other educational disabilities does your child have? (Check all that apply)

☐ Specific Learning Disability

☐ Other Health Impairment

☐ Autism

☐ Emotional Disturbance

☐ Speech or Language Impairment

☐ Intellectual Disability

☐ Orthopedic Impairment

☐ Traumatic Brain Injury

☐ Visual Impairment

☐ Deafness
☐ Hearing Impairment

☐ Deaf-Blindness

☐ Multiple Disabilities

☐ Not Sure or Don’t Know

☐ None (No secondary disability)
Q18 Is your child eligible for free or reduced-price lunch?

- Yes
- No
- Not Sure or Don’t Know

Q19 During the school day, Monday to Friday, does your child spend time in one or multiple settings? (Check one)

- One setting
- Two settings
- More than two settings

Q20 Please answer the following questions about yourself.
Q21 What is your gender?

○ Male

○ Female

○ Other

○ Decline to State

Q22 What is your highest degree of education? (Check one)

○ Less than high school diploma

○ High school diploma or equivalency

○ Associate’s degree

○ Bachelor’s degree

○ Master’s degree

○ Doctoral or Professional degree (e.g., Ph.D., Ed.D., M.D., J.D.)
Q23 Do you consider your household to be lower income, middle income, or high income, relative to the United States? (Check one)

- Lower income
- Middle income
- High income

Q24 How many children (up to age 18) live in your household?

________________________________________________________________

Q25 How many family members/caregivers assist in or are directly involved in your child’s education?

________________________________________________________________

Q26 How many parents/caregivers in your household are working part-time from home?

________________________________________________________________

Q27 How many parents/caregivers in your household are working full-time from home?

________________________________________________________________
Q28 How many parents/caregivers in your household are working part- or full-time outside of your home?

________________________________________________________________

Q29 Do any members of your household have teaching experience at a school for students in kindergarten to 12th grade?

   ○ Yes
   ○ No

Q30 Do any members of your household have special education or related teaching experience?

   ○ Yes
   ○ No
Q31 The distance learning environment is a good match for my child’s...

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age and grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education-related</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>disabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and/or diagnoses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention span, focus,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and self-regulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>skills (self-control)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q32 The distance learning environment is a good match for my child’s...

<table>
<thead>
<tr>
<th>Academic performance, abilities, and skills</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language and communication skills</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Memory</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Ability to use technology for learning (e.g., navigate educational platforms)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q33 The distance learning environment is a good match for my child’s...

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology interests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ability to make</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>educational progress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on their IEP goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social–emotional skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feelings about the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>virus and their safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q34 The following factors promote my child’s education in the distance learning format:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>My (or anyone else’s) comfort level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My (or anyone else’s) competence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My (or anyone else’s) learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My (or anyone else’s)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

162
else’s)
availability
and flexibility
in supporting
my child’s
learning
Q35 The following factors hinder my child’s education in the distance learning format:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent/Caregiver</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Stress Level</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The number of elders (65+) living in the household</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The frequency of workers (nannies, housekeepers) in the household</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The presence of one or more essential workers living in the household</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

164
Q36 The following factors hinder my child’s education in the distance learning format:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>The total number of people living in the household</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The age of people living in the household</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>The technology skills and competency of household members</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q37 The following factors hinder my child’s education in the distance learning format:

<table>
<thead>
<tr>
<th>The number</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>of technology devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>needed in the household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cost of technology devices used for learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The consistency of my household’s Internet connectivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q38 If applicable, please state any other factors that positively impact your child’s education in distance learning.

________________________________________________________________

Q39 If applicable, please state any other factors that negatively impact your child’s education in distance learning.

________________________________________________________________

Q40 Estimate the average number of hours you spend per day supporting your child’s distance learning outside of school hours (Monday to Friday plus weekends)

________________________________________________________________

Q41 Estimate the average number of hours you spend per day supporting your child’s distance learning during school hours (Monday to Friday)

________________________________________________________________
Q42 How do you feel about the total number of hours you are supporting your child’s distance learning?

- It is less than what my child needs.
- It is enough for my child’s needs.
- It is more than what my child needs.
Q43 Additional Services: Other than services within your child’s school district, indicate any services that you or your child currently receives. Check all that apply. Include the number of hours per week for each additional service.

☐ No additional services outside of school

☐ In-home academic tutoring

☐ Remote academic tutoring

☐ In-home student counseling

☐ Student counseling teletherapy

☐ In-home family counseling

☐ Family counseling teletherapy
☐ In-home speech therapy ______________________________

☐ Speech teletherapy ______________________________

☐ In-home occupational or physical therapy

☐ Occupational or physical teletherapy

☐ In-home Applied Behavior Analysis (ABA) or other behavioral services

☐ Remote Applied Behavior Analysis (ABA) or other behavioral services

☐ Other Services/Supports and Number of Hours per Week
APPENDIX C
SURVEY INSTRUMENT (SPANISH)

Parent/Caregiver Survey

Factores demográficos, educativos y del hogar asociados con el rendimiento académico de los estudiantes con programas de educación individualizado (IEP) durante la pandemia de COVID-19

Lo invitamos a participar en un estudio de investigación que examina de qué modo la pandemia de COVID-19 afecta a los estudiantes con necesidades especiales y a sus familias. Específicamente, la encuesta busca sus opiniones sobre el modo en que la pandemia ha afectado la educación del niño(a). Los coinvestigadores son Charlene Lee, actualmente estudiante de doctorado en San Jose State University y psicóloga escolar del Distrito Escolar de XXX, y Paul Cascella, profesor de SJSU. Esta investigación se realiza a través de San Jose State University y no de la escuela ni del distrito escolar del niño(a). Ni el investigador, ni la universidad o el distrito tendrán conocimiento sobre la decisión que tome con respecto a participar; además, si participa en la encuesta, sus respuestas no tendrán ningún efecto sobre los servicios o la educación del niño(a).

Si acepta participar en este estudio, contestará preguntas sobre usted y sobre el niño(a) con un Programa de educación individualizado (PEI o IEP). Completar la encuesta toma unos 15
 minutos. Puede contestar la totalidad, algunas, unas pocas o ninguna de las preguntas y puede omitir cualquier pregunta que no quiera contestar. Su participación es completamente voluntaria. Esto significa que puede optar por participar o por no participar. Esta encuesta es completamente anónima. No se le preguntará su nombre y el software de la encuesta no rastreará su dirección de correo electrónico ni su ubicación física.

Como precaución le advertimos que es posible que algunas preguntas de la encuesta le hagan sentir incomodidad o angustia, en especial si usted y el niño(a) están pasando un tiempo difícil con la pandemia. Repetimos: puede omitir cualquiera de las preguntas. No recibirá ningún beneficio ni compensación directa por contestar la encuesta, excepto quizá sentir que ha contribuido a investigar sobre cómo la pandemia está afectando a niños con necesidades especiales y a sus familias.

Si desea más información sobre esta encuesta, póngase en contacto con Paul Cascella en paul.cascella@sjsu.edu. Si tiene algún reclamo sobre esta encuesta, póngase en contacto con Bradley Porfilio, bradley.porfilio@sjsu.edu. Si tiene preguntas sobre los derechos de los participantes o si siente que contestar esta encuesta le ha causado algún perjuicio, póngase en contacto con Pamela Stacks al 408-924-2479.

Si desea participar en este estudio de investigación, pase a los puntos que siguen a continuación. Gracias.
Al participar en este estudio, usted reconoce que este estudio de investigación está siendo realizado por investigadores de San Jose State University, no de la escuela ni del distrito escolar del niño(a).

☐ Sí, reconozco que este estudio de investigación está siendo realizado por investigadores de San Jose State University, no de la escuela ni del distrito escolar del niño.

¿Acepta participar en este estudio?

☐ Acepto formar parte de este estudio y he leído el formulario de consentimiento.

☐ No quiero participar en el estudio.

Confirme si lo que sigue es cierto: Soy el padre/madre/cuidador o tutor legal que toma decisiones educativas para el niño(a) con un Programa de educación individualizado (PEI o IEP).

☐ Cierro

☐ Falso
Confirme si lo que sigue es cierto: El niño asiste a una escuela pública dentro del Distrito Escolar de XXX.

- Cierto
- Falso

Confirme si lo que sigue es cierto: El niño(a) tiene un PEI (o IEP) en el Distrito Escolar de XXX y no está en preescolar.

- Cierto
- Falso

Conteste las siguientes preguntas sobre el niño(a) con un PEI (o IEP). Si tiene varios niños con PEI, conteste la encuesta una sola vez con todas las respuestas enfocadas en uno solo de los niños con PEI. No dude de omitir cualquier pregunta que no desee contestar.
Q8 ¿En qué opción de aprendizaje está inscrito el niño(a) con un PEI para el año escolar 2020-2021? (Marque una opción.)

○ Aprendizaje/Escuela virtual (formato dirigido por el maestro en el que las clases en línea incluyen instrucción en vivo y pregrabada, así como trabajo independiente)

○ Estudio independiente (formato dirigido por un progenitor en el que hay un convenio escrito para cada estudiante con respeto a la presentación de asignaciones, los recursos y los objetivos académicos)

○ No estoy seguro/No sé

○ Otro ________________________________

Q9 ¿Cuál es el género del niño(a)?

○ Masculino

○ Femenino

○ Otro

○ Me niego a contestar
Q10 ¿Cuál es el grado del niño(a)?

- Jardín de infancia
- 1°
- 2°
- 3°
- 4°
- 5°
- 6°
- 7°
- 8°
Q11. ¿Cuál es el origen racial/étnico del niño(a)? (Marque una opción.)

- Afroestadounidense
- Nativo americano/indio americano
- Asiático
- Hispano/latino
- Originario de las islas del Pacífico
- Blanco, no hispano
- Múltiples etnias
- Otro _____________________________________________________________________________
- Desconocido
- Prefiero no contestar
Q12 Hispano/latino: Marque todas las opciones que corresponda

☐ Guatemalteco/guatemalteco estadounidense

☐ Mexicano/mexicano estadounidense

☐ Puertorriqueño/puertorriqueño estadounidense

☐ Salvadoreño/salvadoreño estadounidense

☐ Otro _____________________________________________________

☐ Desconocido

☐ Prefiero no contestar

Q13 Marque todas las opciones que corresponda

☐ Indoasiático

☐ Chino/chino estadounidense

☐ Filipino/filipino estadounidense

☐ Japonés/japonés estadounidense
Coreano/coreano estadounidense

Tailandés/tailandés estadounidense

Vietnamita/vietnamita estadounidense

Otro _______________________________

Desconocido

Prefiero no contestar
Q14 Múltiples etnias: Marque todas las opciones que corresponda

☐ Africano/afroestadounidense

☐ Indoasiático

☐ Chino/chino estadounidense

☐ Filipino/filipino estadounidense

☐ Guatemalteco/guatemalteco estadounidense

☐ Japonés/japonés estadounidense

☐ Coreano/coreano estadounidense

☐ Irani/irani estadounidense

☐ Iraquí/iraquí estadounidense

☐ Mexicano/mexicano estadounidense

☐ Nativo americano/indio americano

☐ Originario de las islas del Pacífico
Paquistaní/paquistaní estadounidense

Puertorriqueño/puertorriqueño estadounidense

Salvadoreño/salvadoreño estadounidense

Tailandés/tailandés estadounidense

Vietnamita/vietnamita estadounidense

Blanco, no hispano

Otro ________________________________________________

Desconocido

Prefiero no contestar

Q15 Qué idiomas usted y otros cuidadores de la familia le hablan al niño(a) en la casa?
(Marque todas las opciones que corresponda.)
☐ Inglés

☐ Español

☐ Otro ______________________________
Q16 ¿Cuál es la discapacidad educativa del niño(a)? (Marque una opción.)

- Discapacidad Específica de Aprendizaje
- Otras deficiencias de la salud
- Autismo
- Transtorno Emocional
- Deficiencia del Habla o del Lenguaje
- Discapacidad Intelectual
- Deficiencia Ortopédica
- Lesión Cerebral Traumática
- Deficiencia Visual
- Sordera
- Deficiencia Auditiva
- Sordo-Ciego
- Discapacidades Múltiples
Q17 ¿Qué otras discapacidades educativas tiene el niño(a)? (Marque todas las opciones que corresponda.)

☐ Discapacidad Específica de Aprendizaje

☐ Otras deficiencias de la salud

☐ Autismo

☐ Transtorno Emocional

☐ Deficiencia del Habla o del Lenguaje

☐ Discapacidad Intelectual

☐ Deficiencia Ortopédica

☐ Lesión Cerebral Traumática

☐ Deficiencia Visual

☐ Sordera

☐ No estoy seguro/No sé
Deficiencia Auditiva
Sordo-Ciego
Discapacidades Múltiples
No estoy seguro/No sé
Ninguna (ninguna discapacidad secundaria)

Q18 ¿El niño(a) es reúne los requisitos para almuerzo gratuito o de precio reducido?

Sí
No
No estoy seguro/No sé
Q19 Durante la semana escolar, de lunes a viernes, ¿el niño(a) pasa el tiempo en uno o en múltiples lugares? (Marque una opción.)

○ Un lugar

○ Dos lugares

○ Más de dos lugares

Q20 Conteste las siguientes preguntas sobre Usted.

Q21 ¿Cuál es su género?

○ Masculino

○ Femenino

○ Otro

○ Me niego a contestar
Q22. ¿Cuál es el nivel educativo más alto que alcanzó? (Marque una opción.)

- Estudios secundarios incompletos
- Estudios secundarios completos o equivalencia
- Título de asociado
- Título de licenciado
- Título de maestría
- Título de doctorado o profesional (p. ej. Ph.D., Ed.D., M.D., J.D.)

Q23. Por medidas de los Estados Unidos, ¿considera usted que su familia es de bajos ingresos, ingresos medios o ingresos altos? (Marque una opción.)

- Bajos ingresos
- Ingresos medios
- Ingresos altos

Q24. ¿Cuántos niños (menores de 18 años de edad) viven en su casa?
Q25 ¿Cuántos familiares/cuidadores asisten o están directamente involucrados en la educación del niño(a)?
________________________________________________________________

Q26 ¿Cuántos padres/cuidadores de la familia están trabajando medio tiempo desde la casa?
________________________________________________________________

Q27 ¿Cuántos padres/cuidadores de la familia trabajan a tiempo completo desde la casa?
________________________________________________________________

Q28 ¿Cuántos padres/cuidadores de la familia trabajan medio tiempo o a tiempo completo de la casa?
________________________________________________________________

Q29 ¿Algun miembro de la familia tiene experiencia de enseñanza en una escuela para estudiantes entre jardín de infancia y 12º grado?

☐ Sí

☐ No
Q30 ¿Algún miembro de la familia tiene experiencia de enseñanza de educación especial o alguna experiencia relacionada?

- Sí
- No

Q31 El ambiente de aprendizaje a distancia va bien con el niño(a) con respecto a...

<table>
<thead>
<tr>
<th></th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edad y grado</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discapacidades relacionadas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>con la educación y/o diagnósticos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacidad de atención, enfoque y habilidades de autorregulación (autocontrol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q32 El ambiente de aprendizaje a distancia va bien con el niño(a) con respecto a...

<table>
<thead>
<tr>
<th></th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rendimiento académico, capacidades y habilidades</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habilidades de lenguaje y comunicación</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memoria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacidad para usar tecnología para el aprendizaje (p. ej. desplazarse por plataformas educativas)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q33 El ambiente de aprendizaje a distancia va bien con el niño(a) con respecto a...

<table>
<thead>
<tr>
<th></th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intereses en tecnología</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Capacidad para hacer progresos</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>educativos con respecto a los objetivos del PEI (o IEP)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Habilidades socioemocionales</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sentimientos sobre el virus y su seguridad</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q34 Los siguientes factores promueven (hacen más fácil) la educación del niño(a) en el formato de aprendizaje a distancia:

<table>
<thead>
<tr>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mi nivel de comodidad (o el de cualquier otra persona) al apoyar el aprendizaje del niño</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mi nivel de competencia (o el de cualquier otra persona) para apoyar el aprendizaje del niño</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mi disponibilidad y flexibilidad (o el de cualquier otra persona) para apoyar el aprendizaje del niño</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q35 Los siguientes factores obstaculizan (presentan dificultades) la educación del niño(a) en el formato de aprendizaje a distancia:

<table>
<thead>
<tr>
<th>Factores</th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nivel de estrés de padres/cuidadores</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Número de personas mayores (más de 65 años de edad) que viven en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Frecuencia de trabajadores (niñeras, personal de limpieza) en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Presencia de uno o más trabajadores esenciales que viven en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Q36 Los siguientes factores obstaculizan (presentan dificultades) la educación del niño(a) en el formato de aprendizaje a distancia:

<table>
<thead>
<tr>
<th></th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Número total de personas que viven en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Edad de las personas que viven en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Habilidad y competencia en tecnología de los miembros de la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Q37 Los siguientes factores obstaculizan la educación del niño(a) en el formato de aprendizaje a distancia:

<table>
<thead>
<tr>
<th></th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>De acuerdo</th>
<th>Muy de acuerdo</th>
<th>No aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>Número de dispositivos de tecnología que se necesitan en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Costo de los dispositivos de tecnología usados para el aprendizaje</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Continuidad de la conectividad de Internet en la casa</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Q38 Si aplica, indique cualquier otro factor que afecte positivamente la educación del niño(a) en el aprendizaje a distancia.

________________________________________________________________

Q39 Si aplica, indique cualquier otro factor que afecte negativamente la educación del niño(a) en el aprendizaje a distancia.

________________________________________________________________

Q40 Indique una estimación del número promedio de horas que usted dedica al día para apoyar el aprendizaje a distancia del niño(a) fuera del horario escolar (de lunes a viernes más los fines de semana)

________________________________________________________________

Q41 Indique una estimación del número promedio de horas que usted dedica al día para apoyar el aprendizaje a distancia del niño(a) el horario escolar (de lunes a viernes)

________________________________________________________________
Q42 ¿Qué siente con respecto al número total de horas en que apoya el aprendizaje a distancia del niño(a)?

- Es menor que lo que el niño(a) necesita
- Es suficiente para lo que el niño(a) necesita
- Es mayor que lo que el niño(a) necesita
Q43 Servicios adicionales: Aparte de los servicios dentro del distrito escolar del niño(a) indique cualquier servicio que usted o el niño(a) reciban actualmente. Marque todas las opciones que corresponda. Incluya el número de horas por semana para cada servicio adicional.

☐ Ningún servicio adicional aparte de la escuela

☐ Tutoría académica en la casa

☐ Tutoría académica remota

☐ Orientación para estudiantes en la casa

☐ Teleterapia de orientación para estudiantes

☐ Orientación para la familia en la casa

☐ Teleterapia de orientación para la familia
☐ Terapia del habla en la casa

☐ Teleterapia del habla

☐ Terapia ocupacional o fisioterapia en la casa

☐ Teleterapia ocupacional o fisioteleerapia

☐ Análisis aplicado de la conducta (ABA) u otros servicios conductuales en la casa

☐ Análisis aplicado de la conducta (ABA) u otros servicios conductuales remotos

☐ Otros servicios/apoyos y número de horas por semana
APPENDIX D

THEMES

Theme 1: The Family’s Home Environment & its Household Members

1. Parents/caregivers/household members (comments about their characteristics, stress, engagement, supports, and/or knowledge about their children)

2. Home environment (comments about the physical, auditory, spatial and environmental characteristics of the home)

Theme 2: The Child

1. Socialization opportunities (comments about the child’s interactions with peers and/or teachers)

2. Children’s well-being (comments about the child’s mental health, emotional status, and feelings of safety)

3. Children’s dis/abilities (comments about the child’s educational needs, skills, and/or interests)

Theme 3: The School

1. Curriculum (comments about the academic curriculum and/or written work)

2. The IEP (comments about IEP implementation or tracking)

3. Teaching staff characteristics (comments about school personnel, such as their abilities/skills, attitudes, temperament, and/or understanding of children’s needs)

4. Direct interaction (comments about opportunities for students to engage in one-to-one or direct instruction)
5. Virtual school (comments about internet connectivity/access, and/or the virtual and technology tools offered and used by the school for learning)

<table>
<thead>
<tr>
<th>Primary race</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>180</td>
<td>66.7%</td>
</tr>
<tr>
<td>Native American</td>
<td>24</td>
<td>8.9%</td>
</tr>
<tr>
<td>African-American</td>
<td>14</td>
<td>5.2%</td>
</tr>
<tr>
<td>Asian Indian</td>
<td>12</td>
<td>4.4%</td>
</tr>
<tr>
<td>Left Blank</td>
<td>9</td>
<td>3.3%</td>
</tr>
<tr>
<td>Chinese</td>
<td>8</td>
<td>3.0%</td>
</tr>
<tr>
<td>Filipino</td>
<td>8</td>
<td>3.0%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Japanese</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Korean</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Samoan</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Hmong</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Guamanian</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Hawaiian</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Laotian</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Native language</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Spanish</td>
<td>135</td>
<td>50.0%</td>
</tr>
<tr>
<td>English</td>
<td>101</td>
<td>37.4%</td>
</tr>
<tr>
<td>Hebrew</td>
<td>6</td>
<td>2.2%</td>
</tr>
<tr>
<td>Mandarin (Putonghua)</td>
<td>5</td>
<td>1.9%</td>
</tr>
<tr>
<td>Other non-English language</td>
<td>5</td>
<td>1.9%</td>
</tr>
<tr>
<td>Punjabi</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>Japanese</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Korean</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Telegu</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>Arabic</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Cantonese</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Farsi (Persian)</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Hindi</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Hmong</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Samoan</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>Primary disability</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----</td>
<td>------</td>
</tr>
<tr>
<td>Specific learning disability</td>
<td>164</td>
<td>53.8%</td>
</tr>
<tr>
<td>Other health impairment</td>
<td>53</td>
<td>17.4%</td>
</tr>
<tr>
<td>Autism</td>
<td>38</td>
<td>12.5%</td>
</tr>
<tr>
<td>Speech or language impairment</td>
<td>36</td>
<td>11.8%</td>
</tr>
<tr>
<td>Emotional disturbance</td>
<td>7</td>
<td>2.3%</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>4</td>
<td>1.3%</td>
</tr>
<tr>
<td>Hard of hearing</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Orthopedic impairment</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Visual impairment</td>
<td>1</td>
<td>0.3%</td>
</tr>
</tbody>
</table>
### Table 24.
**Chi-Square Tests of Independence Parent Education**

<table>
<thead>
<tr>
<th></th>
<th>No college</th>
<th></th>
<th>Associate’s or higher</th>
<th></th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age and grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>7</td>
<td>63.6%</td>
<td>19</td>
<td>54.3%</td>
<td>3.87</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>36.4%</td>
<td>16</td>
<td>45.7%</td>
<td></td>
</tr>
<tr>
<td>Education-related disabilities and/or diagnoses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>44.4%</td>
<td>25</td>
<td>73.5%</td>
<td>0.44</td>
</tr>
<tr>
<td>Agree</td>
<td>5</td>
<td>55.6%</td>
<td>9</td>
<td>26.5%</td>
<td></td>
</tr>
<tr>
<td>Agree</td>
<td>7</td>
<td>87.5%</td>
<td>23</td>
<td>71.9%</td>
<td></td>
</tr>
<tr>
<td>Ability to make educational progress on their IEP goals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>40.0%</td>
<td>22</td>
<td>62.9%</td>
<td>1.67</td>
</tr>
<tr>
<td>Agree</td>
<td>6</td>
<td>60.0%</td>
<td>13</td>
<td>37.1%</td>
<td></td>
</tr>
<tr>
<td>Social–emotional skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>7</td>
<td>77.8%</td>
<td>32</td>
<td>94.1%</td>
<td>3.53</td>
</tr>
<tr>
<td>Agree</td>
<td>2</td>
<td>22.2%</td>
<td>2</td>
<td>5.9%</td>
<td></td>
</tr>
<tr>
<td>Feelings about the virus and their safety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>25.0%</td>
<td>10</td>
<td>32.3%</td>
<td>1.15</td>
</tr>
<tr>
<td>Agree</td>
<td>6</td>
<td>75.0%</td>
<td>21</td>
<td>67.7%</td>
<td></td>
</tr>
<tr>
<td>Caregivers’ Comfort level in supporting child’s learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>33.3%</td>
<td>7</td>
<td>20.0%</td>
<td>5.76</td>
</tr>
<tr>
<td>Agree</td>
<td>6</td>
<td>66.7%</td>
<td>28</td>
<td>80.0%</td>
<td></td>
</tr>
<tr>
<td>Caregivers’ competence in supporting child’s learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>25.0%</td>
<td>7</td>
<td>20.6%</td>
<td>1.82</td>
</tr>
<tr>
<td>Agree</td>
<td>6</td>
<td>75.0%</td>
<td>27</td>
<td>79.4%</td>
<td></td>
</tr>
<tr>
<td>Caregivers’ availability and flexibility in supporting child’s learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
<td>22.2%</td>
<td>10</td>
<td>28.6%</td>
<td>0.08</td>
</tr>
<tr>
<td>Agree</td>
<td>7</td>
<td>77.8%</td>
<td>25</td>
<td>71.4%</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* All chi-square value had an associated \( p \) value >.05.
### Table 25.
**Technology and Academic Subscale Measures of Central Tendency**

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>2.91</td>
<td>.85</td>
<td>3.00</td>
<td>1.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Academic</td>
<td>2.32</td>
<td>.86</td>
<td>2.25</td>
<td>1.00</td>
<td>4.00</td>
</tr>
</tbody>
</table>

### Table 26.
**Technology and Academic Scale Measures of Central Tendency by Parent Education**

<table>
<thead>
<tr>
<th>Parent Education</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>No college</td>
<td>3.06</td>
<td>.63</td>
<td>2.87</td>
<td>.90</td>
</tr>
<tr>
<td>Associate’s or higher</td>
<td>2.48</td>
<td>.79</td>
<td>2.27</td>
<td>.89</td>
</tr>
</tbody>
</table>
## APPENDIX F

### INFERENTIAL STATISTICS—INCOME LEVEL AND LIKERT SCALE ITEMS

Table 27. 
*Income by Survey Item Crosstabs*

<table>
<thead>
<tr>
<th></th>
<th>High income</th>
<th>Lower income</th>
<th>Middle income</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n )</td>
<td>( % )</td>
<td>( n )</td>
<td>( % )</td>
</tr>
<tr>
<td><strong>Age and grade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2</td>
<td>12.5%</td>
<td>5</td>
<td>45.5%</td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>25.0%</td>
<td>3</td>
<td>27.3%</td>
</tr>
<tr>
<td>Agree</td>
<td>8</td>
<td>50.0%</td>
<td>2</td>
<td>18.2%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>2</td>
<td>12.5%</td>
<td>1</td>
<td>9.1%</td>
</tr>
<tr>
<td><strong>Education-related disabilities and/or diagnoses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2</td>
<td>13.3%</td>
<td>5</td>
<td>50.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>53.3%</td>
<td>1</td>
<td>10.0%</td>
</tr>
<tr>
<td>Agree</td>
<td>1</td>
<td>6.7%</td>
<td>3</td>
<td>30.0%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>4</td>
<td>26.7%</td>
<td>1</td>
<td>10.0%</td>
</tr>
<tr>
<td><strong>Ability to make educational progress on their IEP goals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>2</td>
<td>12.5%</td>
<td>2</td>
<td>20.0%</td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>50.0%</td>
<td>2</td>
<td>20.0%</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
<td>25.0%</td>
<td>5</td>
<td>50.0%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>2</td>
<td>12.5%</td>
<td>1</td>
<td>10.0%</td>
</tr>
<tr>
<td><strong>Social–emotional skills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>8</td>
<td>53.3%</td>
<td>4</td>
<td>44.4%</td>
</tr>
<tr>
<td>Disagree</td>
<td>7</td>
<td>46.7%</td>
<td>3</td>
<td>33.3%</td>
</tr>
<tr>
<td>Agree</td>
<td>0</td>
<td>0.0%</td>
<td>2</td>
<td>22.2%</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*Note.* All chi-square value had an associated \( p \) value >.05.
Table 28. Technology and Academic Scale Measures of Central Tendency by Income

<table>
<thead>
<tr>
<th></th>
<th>High income</th>
<th>Lower income</th>
<th>Middle income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Technology</td>
<td>3.03</td>
<td>.81</td>
<td>2.55</td>
</tr>
<tr>
<td>Academic</td>
<td>2.36</td>
<td>.81</td>
<td>2.19</td>
</tr>
</tbody>
</table>