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Virtual Education Implementation for Children with Autism Spectrum Disorders Amidst the COVID-19 Pandemic

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Virtual Education Implementation for Children with Autism Spectrum Disorders Amidst the COVID-19 Pandemic

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Dedication

This dissertation is dedicated to the remarkable children navigating the complex world of Autism Spectrum Disorders (ASD) and to the tireless pursuit of advancing research that champions their unique learning differences. It honors and embodies the very spirit of diversity, with each child presenting a canvas of distinctive strengths and challenges..

Heartfelt gratitude extends to the families and educators who stand as steadfast allies in the pursuit of tailored educational approaches. Together, we embark on a collective mission to unlock the vast reservoirs of potential residing within each child on the autism spectrum. Through rigorous research, innovative interventions, and a deepened understanding of neurodiversity, we aspire to create an educational landscape that nurtures the flourishing of every unique mind.

May this dedication serve as a beacon of unwavering commitment to the advancement of knowledge, one that seeks not only to unravel the complexities of ASD but also to translate those discoveries into transformative educational practices.

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Abstract

Virtual Education Implementation for Children with Autism Spectrum Disorders Amidst the COVID-19 Pandemic

Background: The COVID-19 pandemic led to widespread school closures in the Washington DC metropolitan region, necessitating a shift from traditional in-person education to virtual platforms. The context was significantly influenced by the evolving pandemic and its impact on the region's COVID-19 positive rates, with the Washington DC region facing some of the highest positive rates in 2020. These escalating positive rates posed substantial challenges to planning and implementing in-person learning, primarily driven by concerns for public health and safety. The region's persistently low percentages of in-person learning made it one of the worst in the country regarding the provision of in-person instruction (Burbio, 2023). The challenges and uncertainties related to school closures, phased reopening, and hybrid learning formats significantly impacted children with Autism Spectrum Disorders (ASD), who rely on specialized educational interventions outlined in Individualized Education Plans (IEPs). Caregivers and education providers had to adapt their strategies for implementing educational interventions using technology, yet evidence-informed guidance in implementation practices in virtual education for children with ASD is lacking.

Objective: This study aims to describe contextual complexities surrounding the experiences of caregivers and education providers implementing virtual education for children with ASD in the Washington DC metropolitan region during the COVID-19 pandemic. It explores factors influencing implementation experiences related to the development and implementation of educational interventions, collaboration among IEP team members, impact of educational interventions on IEP goal achievement, and changes in roles and resources during the pandemic.

Abstract

Virtual Education Implementation for Children with Autism Spectrum Disorders Amidst the COVID-19 Pandemic

Methods: A multi-case study design was conducted using qualitative methods. A purposive selection process identified twenty-five participants, comprised of sixteen caregivers and nine education providers. Each participant engaged in an one-hour virtual interview guided by the Consolidated Framework for Implementation Research (CFIR) featuring open-ended questions. Memos captured significant participant comments, and interviews were transcribed, reviewed for accuracy, and analyzed thematically using NVivo.

Results: Thematic data analysis identified thirty-four initial codes grouped into eight subthemes, revealing three overarching themes. Participants encountered significant challenges in transitioning to virtual education, fostering team collaboration, and implementing virtual education effectively. Study findings highlight the critical need for development of: needs assessments, guidelines, and training. This research culminated in the creation of the Model of Translation and Implementation of Virtual Education for children with ASD (MOTIVE-ASD), standing as a robust call to action and a guide for the development of Standards for Virtual Implementation tailored specifically for virtual education programs.

Conclusion: This study provides valuable insights into the development and implementation of virtual education, team collaboration dynamics, IEP goal achievement, and changes in roles and resources during the pandemic. The findings are instrumental for guiding the development of tailored virtual education programs for enhancing the virtual education experience. As virtual education continues to evolve, interested-parties will be equipped with knowledge and resources to navigate educational implementation remotely for children with ASD, in the face of future natural or public health disasters.

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List of Abbreviations

ABA: Applied Behavior Analysis

ASD: Autism Spectrum Disorder

CFIR: Consolidated Framework for Implementation Research

DCPS: District of Columbia Public Schools

DSM-5: Diagnostic Statistical Manual 5th Edition

FAPE: Free and Appropriate Public Education

FCPS: Fairfax County Public Schools

IDEA: Individuals with Disabilities Education Act

IEP: Individualized Education Program

LEA: Local Educational Agency

LRE: Least Restrictive Environment

MOTIVE-ASD: Model of Translation & Implementation in Virtual Education for children with ASD

OT: Occupational Therapist

PGSPS: Prince George's County Public Schools

PT: Physical Therapist

SLP: Speech Language Pathologist

SPED: Special Educator

Chapter 1: Introduction

Background

The COVID-19 pandemic has brought forth an unprecedented time with numerous impacts to our global society. Education is one area that has been grossly affected. In March 2020, the Washington DC metropolitan region along with many neighboring states were issued a federal mandate to close schools and businesses to help mitigate the spread of the novel Coronavirus (CDC, 2020). This mandatory closure forced interested parties, particularly education providers and caregivers of children with Autism Spectrum Disorder or ASD, to engage in an alternative form of teaching and learning presented by virtual education. This research study seeks to describe those experiences faced by interested parties and provide practical insight into their process of implementing virtual education for children with ASD during the COVID-19 pandemic.

ASD is a development disability characterized by significant social, communication, and behavioral challenges (CDC, 2014). The etiology of autism is believed to involve a complex interplay of genetic and environmental factors (CDC, 2019). Recent statistics from the CDC reveal a notable increase in the prevalence of ASD, with 1 in 36 children diagnosed with ASD in 2020, compared to 1 in 44 children in 2018, and 1 in 54 children in 2016 (CDC, 2023). This escalating prevalence underscores the growing number of children with ASD entering the educational system, seeking specialized services and support (Zablotsky et al., 2019).

As the population of children with ASD continues to expand, so too does the imperative for tailored educational interventions and accommodations (Zablotsky et al., 2019). The COVID-19 pandemic, with its disruption of traditional classroom settings, further accentuated the need for innovative and adaptive approaches to education for children with ASD. It is within

this context that our study seeks to shed light on the multifaceted challenges and opportunities faced by interested-parties in the realm of virtual education for this vulnerable and diverse group of learners.

Diagnosis of Autism Spectrum Disorder

The process of diagnosing ASD primarily relies on the observation of a child's developmental milestones and behaviors, in contrast to other medical conditions that often necessitate specific diagnostic tests. Remarkably, ASD can be identified as early as 18 months, and by the age of two, an experienced specialist can provide a reliable diagnosis, setting the stage for the child to access crucial early intervention services (Lord et al., 2006; Hyman et al., 2020; CDC, 2022).

Early Recognition and Evaluation

Given the immense importance of early diagnosis, it is essential for parents and caregivers to be informed about potential early indicators of autism and associated behaviors. When ASD is suspected, the child should undergo a comprehensive assessment conducted by experienced professionals or diagnostic teams with expertise in the evaluation and treatment of ASD. Early diagnosis and intervention play a pivotal role in enhancing the long-term outcomes and quality of life for individuals with ASD. Therefore, recognizing these early signs, shown below in Table 1.1, and seeking professional assessment is of paramount importance.

Table 1.1

Early Signs for Autism Spectrum Disorders

Early Indications of ASD	Related Behaviors of Concern
Limited or absent eye contact	Unresponsiveness to name or attempts at interaction
Delayed speech or absence of speech	Difficulty in engaging in back-and-forth interactions
Unusual responses to sensory stimuli	Repetitive motions or fixations on specific objects
Lack of interest in peers or social play	Resistance to changes in routines or surroundings
Limited use of gestures to communicate	Intense focus on specific topics or activities

(National Center on Birth Defects and Developmental Disabilities, 2020; Centers for Disease Control, 2020)

Evolution of Autism Spectrum Disorder Diagnosis

Historically, the Diagnostic and Statistical Manual, 4th Edition (DSM-4), recognized four distinct diagnoses related to ASD: 1) autistic disorder, 2) Asperger syndrome, 3) pervasive developmental disorder-not otherwise specified (PDD-NOS), and 4) childhood disintegrative disorder (Gilmore, 2019). Each of these diagnoses exhibited similar behavioral characteristics but at varying levels of severity (Gilmore, 2019; Wright, 2013). However, the DSM-5, reflecting evolving understanding and clinical practice, consolidated these four independent diagnoses into a single diagnostic category known as autism spectrum disorder with three levels of severity (Wright, 2013).

This significant change was driven by the need to conceptualize autism as a spectrum of neurological disorders rather than distinct and separate conditions (Wright, 2013). The diagnosis of ASD under the DSM-5 is now characterized by an individual's challenges in the realms of social communication, social interaction, and the presence of restricted or repetitive behaviors (Gilmore, 2019). This transition to a spectrum-based approach has contributed to a more

nuanced and comprehensive understanding of autism, acknowledging the diverse range of experiences and symptoms within this population.

Diagnostic and Statistical Manual, 5th Edition (DSM-5)

A diagnosis for ASD relies on a comprehensive assessment as there is no single test for diagnosis. Instead, individuals must meet the specific diagnostic criteria outlined in the Diagnostic and Statistical Manual, fifth edition (DSM-5) to receive this diagnosis. Historically, ASD diagnosis involved the recognition of a triad of impairments, including 1) impairment of social interaction, 2) impairment of communication, and 3) restricted, repetitive, and stereotyped patterns of behavior (Autism Diagnosis Criteria: DSM-5, 2020). However, the DSM-5 has consolidated these impairments into a dyad, combining 1) impairment of social interaction and communication as one domain and 2) restricted, repetitive, and stereotyped patterns of behavior as another (Autism Diagnosis Criteria: DSM-5, 2020; American Psychiatric Association (APA), 2013).

Despite the reduction in the number of underlying impairments, the DSM-5 introduced five specific criteria that must all be met for a diagnosis of ASD to be established (American Psychiatric Association (APA), 2013; CDC, 2014; Autism Diagnosis, 2020) and shown in Table 1.2. The DSM-5 criteria aim to provide a comprehensive framework for the diagnosis of ASD, allowing for a more precise and consistent identification of individuals with this disorder.

Table 1.2

DSM-5 Diagnostic Criteria for Autism Spectrum Disorder (ASD)

CRITERION	DESCRIPTION
Criterion A: Persistent deficits in social communication and social interaction	Impairments in using and understanding nonverbal communication, developing and maintaining relationships, and reciprocating social interactions
Criterion B: Restricted, repetitive patterns of behavior, interests, or activities	Engagement in repetitive motor movements, insistence on sameness, fixated interests with abnormal intensity, and hyper-or-hypo reactivity to sensory input
Criterion C: Symptoms must be present in early childhood	Symptoms should manifest in early developmental periods even if they might not become fully apparent until social demands exceed capabilities
Criterion D: Symptoms lead to significant impairment in social, occupational, or other important areas of current functioning	Symptoms should result in challenges across multiple contexts, such as home, school, or work
Criterion D: These disturbances are not better explained by intellectual disability or global developmental delay	Symptoms should not be primarily attributable to intellectual or developmental conditions

(American Psychiatric Association, 2013; Center for Disease Control, 2014; Autism Diagnosis, 2020)

Autism Spectrum Disorder Severity Levels

The adoption of the DSM-5 ushered in a more precise classification of ASD, introducing three distinct levels of severity. These severity levels offer greater clarity in understanding where an individual falls on the autism spectrum and enable tailored interventions and support strategies (Kandola & Gill, 2019; Wright, 2013). The three levels of ASD severity encompass a range from mild to severe symptoms, specifically addressing two key domains: social skills and restrictive or repetitive behaviors (Gilmore, 2019). These three levels, shown in Table 1.3, are designed to provide insights into an individual's ability to communicate effectively, adapt to new

situations, broaden their interests beyond repetitive patterns, and navigate daily life challenges (Gilmore, 2019).

Table 1.3

Severity Levels of Autism Spectrum Disorders

ASD Severity Levels	Social Skills	Restrictive or Repetitive Behaviors	Examples
Level 1 Requiring Support	• Without supports in place, deficits in social communication cause noticeable impairments • Difficulty initiating social interactions • Decreased interest in social interactions	• Inflexibility of behavior • Difficulty switching between activities • Difficulty with organization and planning	• Speaks in full sentences & engages in communication but whose to & from conversations with others fail • Attempts at making friends are odd & typically unsuccessful
Level 2 Requiring Substantial Support	• Marked deficits in verbal & nonverbal social communication skills • Social impairments apparent even with supports in place, • Limited initiation of social interaction	• Inflexibility of behavior • difficulty coping with change, • May show distress when changing focus or action	• Speaks in simple sentences, whose interaction is limited to narrow special interests and who has markedly odd nonverbal communication
Level 3 Requiring Very Substantial Support	• Severe deficits in verbal and nonverbal social communication • Very limited initiation of social interactions	• Inflexibility of behavior • Extreme difficulty coping with change • Person may experience challenges in changing focus or action	• Speaks with few words of intelligible speech, rarely initiates interaction, makes unusual approaches to meet needs only, and responds to only very direct social approaches

(Autism Diagnosis, 2020)

Neurodiversity

The concept of neurodiversity, introduced by Singer in 1999, marks a significant shift in how we perceive and approach neurological differences within our society (Singer, 1999). It challenges traditional deficit-based models and instead embraces a more diverse approach to learning and neurology. The neurodiversity movement advocates for social justice, asserting that individuals with ASD should be supported in ways that empower them to function successfully in the world, without the aim of changing them into non-autistic individuals or isolating them from society (Cascio, 2012). Central to the neurodiversity perspective is the recognition that there is no one-size-fits-all definition of "neurologically normal." Instead, it acknowledges that a spectrum of functional behaviors exists among children with autism, and these differences should be respected and accommodated (Cascio, 2012).

Research has shown that students with ASD often exhibit slower rates of skill acquisition and face challenges in maintaining these skills over time (Arnold-Saritepe et al., 2009). Studies have specifically examined the maintenance of academic, behavioral, social, and communication skills in children with ASD, highlighting the unique difficulties they may encounter compared to typically developing children (Arnold-Saritepe et al., 2009; Cascio, 2012). As a result, children with ASD often require a range of resources, including special education classes and personalized therapeutic services, throughout their academic journey. As Cascio (2012) suggests, a personalized approach that addresses the unique educational needs of each child with ASD can foster the greatest potential for growth. By adopting a neurodiversity perspective, educators and advocates can work towards a more inclusive and accommodating educational environment that respects the diverse neurological makeup of all individuals.

Individuals with Disabilities Education Act

The Individuals with Disabilities Education Act or IDEA, is a federal law that plays a crucial role in ensuring that eligible students with disabilities receive specialized educational services (IDEA, 2004). IDEA mandates that schools address the academic needs of these students, providing them with a foundation for successful learning (IDEA, 2004; White, 2017). To qualify for Special Education services under IDEA, a child must meet two criteria: 1) have a disability and 2) require special education to make progress in their educational program (IDEA, 2004; White, 2017). IDEA encompasses early intervention services for children up to the age of three and offers special education services within public schools, where individualized education plans (IEPs) are developed to support students' unique needs (Gartin & Murdick, 2005; U.S. Department of Education, 2006; IDEA, 2004). IDEA is guided by several key principles, each aimed at protecting the rights of students with disabilities and ensuring they receive the appropriate educational services:

- Free and Appropriate Education (FAPE): IDEA mandates that eligible students have the right to a free and appropriate public education. This principle underscores the importance of providing educational services that meet the individual needs of each student (IDEA, 2004).
- Least Restrictive Environment (LRE): IDEA emphasizes the placement of students in the least restrictive environment possible. This means that students with disabilities should have opportunities to learn alongside their non-disabled peers whenever appropriate (IDEA, 2004).
- Parent Participation: IDEA recognizes the vital role of parents in the education of students with disabilities. Parents have the right to actively participate in the development of their child's IEP, ensuring that it aligns with their child's unique needs and goals (IDEA, 2004).

- Established Safeguards: IDEA incorporates safeguards to protect the rights of students with disabilities and their families. These safeguards include procedures for dispute resolution and mechanisms to address concerns or violations of IDEA rights (IDEA, 2004).

IDEA, initially adopted in 1975 and amended in 2004 as the Individuals With Disabilities Education Improvement Act (IDEIA), serves as a critical legislative framework ensuring that students with disabilities have access to the educational services they need to thrive (IDEA, 2004). By upholding these principles, IDEA advocates for the inclusion and equitable education of students with disabilities within the public education system.

Individualized Education Plan

The Individualized Education Plan or an IEP is a personalized document crafted for each child with a disability, serving as a roadmap for educational programs to provide the necessary academic supports (Simon, 2006). Recognized as the cornerstone of the Individuals with Disabilities Education Act (IDEA), the IEP plays a central role in planning and delivering services and interventions to students with disabilities (Gartin & Murdick, 2005).

The reauthorization of the Individuals with Disabilities Education Improvement Act (IDEIA) in 2004 played a pivotal role in aligning IEP requirements with the goals of the No Child Left Behind Act (NCLB) of 2001 (Blackwell & Rossetti, 2014; Gartin & Murdick, 2005; U.S. Department of Education-Office of Special Education Programs, 2006). This alignment ensured that the content of the IEP primarily focuses on addressing a student's academic needs, shifting away from a sole emphasis on behavioral or functional concerns related to the student's disability.

To qualify for an IEP, a child must have a diagnosis falling within the thirteen disabilities listed in Table 1.4 (IDEA, 2004). These disabilities encompass a wide range, including Specific

Learning Disability, Autism Spectrum Disorder, Emotional Disturbance, and others, each requiring tailored educational plans and support.

Table 1.4

Qualifying Disabilities for an IEP

13 QUALIFYING DISABILITIES FOR AN IEP
1. Specific Learning Disability (SLD)
2. Other Health Impairment (OHI)
3. Autism Spectrum Disorder (ASD)
4. Emotional Disturbance (ED)
5. Speech or Language Impairment
6. Visual Impairment including Blindness
7. Deafness
8. Hearing Impairment
9. Deaf-Blindness
10. Orthopedic Impairment
11. Intellectual Disability (ID)
12. Traumatic Brain Injury (TBI)
13. Multiple Disabilities

(Individuals with Disabilities Education Act, 2004)

An IEP is an individually designed plan for each eligible child with a disability, subject to annual review at an IEP team meeting, as per federal statutory and regulatory guidelines (Sec. 300.320 Definition of individualized education program, 2017). The essential components of an IEP include the student's current academic and functional performance, annual goals and objectives, a plan for monitoring progress toward these goals, details of services and supports provided to the student, and the extent of the student's participation in specialized interventions (Sec. 300.320 Definition of individualized education program, 2017; Blackwell & Rossetti, 2014). For students with ASD, these annual IEP goals and objectives are developed and

monitored with the assistance of educational team providers. The IEP is a critical tool that ensures that students with disabilities receive education tailored to their unique needs, thereby promoting academic success and enabling them to thrive within the educational system.

Distinguishing Between an IEP and a 504 Plan

An Individualized Education Plan (IEP) and a 504 Plan both aim to support students with disabilities, yet they serve distinct purposes and are governed by separate legal frameworks. An IEP is a comprehensive, written document designed specifically for public school students eligible for special education services. It is tailored to enhance the educational performance of these students, addressing their unique needs and goals (IDEA, 2004). If a student's disability meets the criteria for special education services, they are eligible for an IEP.

In contrast, a 504 Plan operates under Section 504 of the Rehabilitation Act of 1973, offering accommodations to qualified students with disabilities who do not meet the criteria for special education services (IDEA, 2004). This plan provides accommodations throughout a student's K-12 education, ensuring they receive necessary support. Importantly, the provisions of a 504 Plan extend into college and adulthood, safeguarded by legal mandates outlined in the Americans with Disabilities Act (ADA). While both IEPs and 504 Plans provide educational support for students with disabilities, they differ in fundamental ways:

1. Eligibility Criteria:
    - *IEP:* Students eligible for an IEP must meet specific criteria for special education services due to the severity of their disability.
    - *504 Plan:* Qualified students under a 504 Plan have disabilities that may not require special education services but necessitate accommodations to ensure equitable access to education.

2. Scope of Services:

- *IEP:* IEPs encompass a wide range of services, including specialized instruction, related services, and goals tailored to address a student's disability-related needs.
- *504 Plan:* 504 Plans focus on providing accommodations and modifications to the learning environment to ensure accessibility for students with disabilities.

3. Goal Setting:

- *IEP:* IEPs set specific, measurable, and individualized goals for students with disabilities, addressing their unique academic and functional needs.
- *504 Plan:* 504 Plans primarily concentrate on ensuring that students with disabilities have equal access to educational opportunities, with less emphasis on individualized goal-setting.

4. Documentation:

- *IEP:* IEPs are comprehensive, formal documents that outline specialized services, goals, and progress monitoring.
- *504 Plan:* 504 Plans are generally less formal and may consist of a written plan or even a simple letter outlining accommodations.

While both IEPs and 504 Plans aim to provide educational support, they are tailored to students with varying needs. IEPs cater to those who require specialized education services, while 504 Plans ensure equitable access for students with disabilities who may not meet the criteria for special education.

Educational Services

In the United States, the academic calendar features both planned and unplanned educational breaks for students, each with its own set of challenges and implications for

caregivers and education providers. Understanding these breaks is essential, as they can significantly impact the continuity of education.

Planned Educational Breaks

Planned breaks, such as winter, spring, and summer vacations, are a regular part of the academic calendar. While the duration of these breaks may vary, they are pre-scheduled, allowing caregivers and education providers to prepare in advance for the time when students will be away from school.

- *Caregivers:* Planned breaks give caregivers an opportunity to arrange alternative childcare, vacations, or educational activities for their children during the downtime. They can plan for any additional support their child may need during these periods.
- *Education Providers:* Education providers, including teachers and support staff, often use planned breaks for professional development, curriculum planning, and classroom preparation for the upcoming academic term. These breaks are integral to maintaining the quality of education.

Unplanned Educational Breaks

Unplanned breaks, on the other hand, are the result of unforeseen circumstances, including public health disasters, natural disasters, or other emergencies. These breaks disrupt the regular school schedule and can vary in duration, from days to months.

- *Caregivers:* Unplanned breaks can create significant challenges for caregivers. They may need to find last-minute childcare solutions or adapt to home-based learning if the break extends for an extended period. The suddenness of these breaks can be particularly stressful.
- *Education Providers:* Educational providers must respond quickly to provide remote learning resources, ensure students have access to essential services, and adapt their

teaching methods to accommodate distance learning during unplanned breaks. The COVID-19 pandemic in 2020 is a notable example of an unplanned break that forced a rapid shift to remote education.

Historical Examples of Unplanned Breaks

Unplanned breaks have occurred in the past due to various events:

- *9/11 Terrorist Attacks (2001):* In the aftermath of the September 11 attacks, schools in affected areas had to close temporarily due to safety concerns.
- *Hurricane Katrina and Rita (2005):* The devastation caused by hurricanes Katrina and Rita led to widespread school closures in the Gulf Coast region, displacing students and requiring educational providers to adapt to new circumstances.
- *COVID-19 Pandemic (2020):* The global pandemic resulted in nationwide school closures, requiring an unprecedented shift to remote learning and posing challenges for both caregivers and educational providers.

While planned educational breaks offer predictability and the opportunity for preparation, unplanned breaks can disrupt the educational process and require swift adaptation. Understanding the impact of both types of breaks is crucial for caregivers, education providers, and policymakers in ensuring the continuity of education during challenging times.

Impact of Public Health Disasters on Educational Services

Public health disasters, including those predating the COVID-19 pandemic, have had significant repercussions on educational services for children with disabilities, including ASD. These events disrupt the regular educational routines of students, posing unique challenges for caregivers and education providers. Several studies and historical events shed light on the consequences of such disruptions.

Regression in Skills During Breaks

In 2004, Hurricane Katrina forced New Orleans schools to close for the entire fall semester, leaving many students without access to education. When schools finally reopened, educators were confronted with a surprising outcome: despite the closure lasting a maximum of seven weeks, students returned with an average learning loss of nearly two years, with the most significant setback in mathematics (Curriculum Solutions, 2020). Arnold-Saritepe et al. (2009) also conducted research on the impact of both unplanned and planned academic breaks on children with ASD. Their findings indicated that children with ASD experienced regression in their skills during school breaks. This regression underscores the importance of consistent educational support and highlights potential setbacks when services are interrupted, emphasizing the need for strategies to ensure continuous support, especially during unforeseen disruptions like natural disasters.

Resources for Children with ASD During Emergencies

Edmonds (2017) explored the need for resources and support tailored to children with ASD during emergency disasters. Public health disasters often require immediate responses and evacuations, and children with ASD may have unique needs that must be addressed to ensure their safety and well-being during such events.

Post-Traumatic Stress Among Children with Disabilities

Studies have identified various aspects of post-traumatic stress among children with disabilities who experienced public health disasters. The 2005 natural disasters of Hurricane Katrina and Hurricane Rita, as well as the 9/11 acts of terrorism in 2001, had lasting psychological effects on children (Elsevier, 2019; DeVaney et al., 2009; Stough et al., 2017; Boon et al., 2011). While the primary focus during these events was on saving lives and ensuring physical health, the psychological well-being of individuals with autism and their

families was also significantly impacted. Increased stress, mental health challenges, and disruptions in services and supports were observed.

Balancing Physical Health and Psychological Well-Being

Public health disasters understandably prioritize the physical health and safety of individuals. However, it is essential to recognize that measures taken to ensure physical well-being can inadvertently affect the psychological well-being of individuals with autism and their families (Ameis et al., 2020; DeVaney et al., 2009). This highlights the importance of comprehensive disaster preparedness and response plans that consider the unique needs of individuals with disabilities, including those with ASD.

Disruption to Respite Care

Caregivers of children with ASD often rely on specialized educational supports not only for academic growth but also as a form of respite care (White et al., 2017). Respite care offers temporary relief to families and can be tailored to their specific needs. However, during public health disasters, many facilities providing respite care had to close due to health and safety concerns, leaving caregivers with fewer support options.

Public health disasters significantly impact the education and well-being of children with disabilities, especially those with ASD. These events disrupt routines, increase stress, and pose unique challenges for caregivers and educational providers. Comprehensive disaster preparedness plans must consider the needs of individuals with disabilities to ensure their safety and psychological well-being during such crises.

Challenges in Education Amidst the COVID-19 Pandemic

The Impact of School Closures

The COVID-19 pandemic, declared by the World Health Organization (WHO) in March 2020, had a profound and lasting impact on the education system, particularly for children

diagnosed with ASD. The immediate consequence was the closure of schools, an action taken globally to mitigate the spread of the virus. This abrupt disruption marked the beginning of a transformative period for children with ASD, caregivers, and education providers.

The Impact on Structured Routines

Children with ASD often benefit significantly from structured routines and specialized academic environments (Arnold-Saritepe et al., 2009). However, the sudden transition to virtual education upended these established routines. The closure of schools meant that children with ASD had to adapt to a new mode of learning, one that lacked the familiar structure and face-to-face interactions they were accustomed to (Kasari et al., 2012).

Caregiver Challenges

The closure of schools also had a profound impact on caregivers. In many cases, caregivers are essential members of the support system for children with ASD. The shift to virtual learning meant that caregivers were suddenly faced with multiple roles and responsibilities, including providing academic support, which was previously the domain of educators (Masonbrink & Hurley, 2020).

Multifaceted Stressors

The challenges faced by caregivers were compounded by the multifaceted stressors associated with the pandemic. Economic uncertainties, food insecurity, and concerns about public health heightened the stress levels experienced by caregivers (Masonbrink & Hurley, 2020). These additional stressors further complicated the task of providing effective support for children with ASD during virtual learning.

School Districts in the Washington DC Metro Region

The Washington DC tri-state metro region, encompassing the District of Columbia, Maryland, and Virginia, commonly referred to as the DMV, hosts a myriad of school districts.

This research delves into the contextual experiences of caregivers and education providers who implemented virtual education for children with ASD in a neighboring public school district within the tri-state region. The focus districts for this study are the District of Columbia Public Schools (DCPS) located in Washington DC, Prince George's County Public Schools (PGCPS) located in Maryland, and Fairfax County Public Schools (FCPS) located in northern Virginia.

District of Columbia Public Schools (DCPS) operates 116 schools and centers, catering to a student population exceeding 49,000 from prekindergarten through grade 12. Among these, over 200 special education students are on a certificate or non-diploma track. Noteworthy demographic statistics include more than 40 percent of the total student population classified as Economically Disadvantaged, 16 percent in Special Education, and 15 percent as English Learners (DCPS at a Glance, https://dcps.dc.gov/page/dcps-glance-enrollment).

Prince Georges County Public Schools (PGCPS) ranks among the 20 largest school districts in the United States and stands as the second-largest school system in Maryland, with 201 schools and centers. Serving a diverse student population exceeding 131,000 from prekindergarten through grade 12, the district reports approximately 60 percent of students as Economically Disadvantaged, 10.4 percent in Special Education, and 20.3 percent as English Learners (PGCPS Facts and Figures: 2022, https://www.pgcps.org/facts-and-figures/).

Fairfax County Public Schools (FCPS), one of the largest school divisions in the U.S., has 199 schools and centers, providing education to over 181,000 students from prekindergarten through grade 12. The student body exhibits linguistic diversity, with communication in over 200 languages. Relevant demographic data indicates that more than 27 percent of the total student population is Economically Disadvantaged, 14.4 percent are reported as Students with Disabilities, and over 20 percent are English Learners (About FCPS, https://www.fcps.edu/about-fcps).

Phased Reopening of DC Metro Schools

The phased reopening of schools during the COVID-19 pandemic in the Washington DC region and the broader DMV area (Washington DC, Maryland, Virginia) introduced a complex and dynamic educational landscape. The context was influenced significantly by the evolving pandemic and its impact on the region's COVID-19 positive rates. During 2020, the Washington DC region faced some of the highest COVID-19 positive rates compared to other areas (The Washington Post, 2020, May 22). These escalating positive rates posed substantial challenges to planning and implementing in-person learning, given the paramount concern for public health and safety.

The impact of these elevated positive rates reverberated across the educational landscape, causing Washington DC to repeatedly adjust and adapt its plans for reopening schools (The Washington Post, 2021, January 2). These frequent plan changes created uncertainty and posed a significant challenge for education providers, caregivers, and children with ASD. Education providers, caregivers, and children with ASD were all required to flexibly navigate the changing learning environments, and this became a unique educational challenge in the region.

One common strategy adopted by school districts across the United States, including those in the DMV area, was the phased reopening of schools. This approach encompassed a hybrid learning format, where some students returned to physical classrooms while others continued with virtual learning due to COVID-19-related restrictions (Masonbrink & Hurley, 2020). The hybrid model aimed to strike a balance between the need for in-person instruction and the imperative of maintaining safety in a pandemic environment.

For children with ASD, who often rely on established routines and structured environments, the shifting back and forth between virtual and in-person learning presented a distinctive set of challenges. Caregivers had to adapt to these changing circumstances, ensuring

that their homes could accommodate virtual learning one week and the return to in-person instruction the next. Education providers, too, had to adjust their teaching methods to cater to both virtual and in-person students effectively.

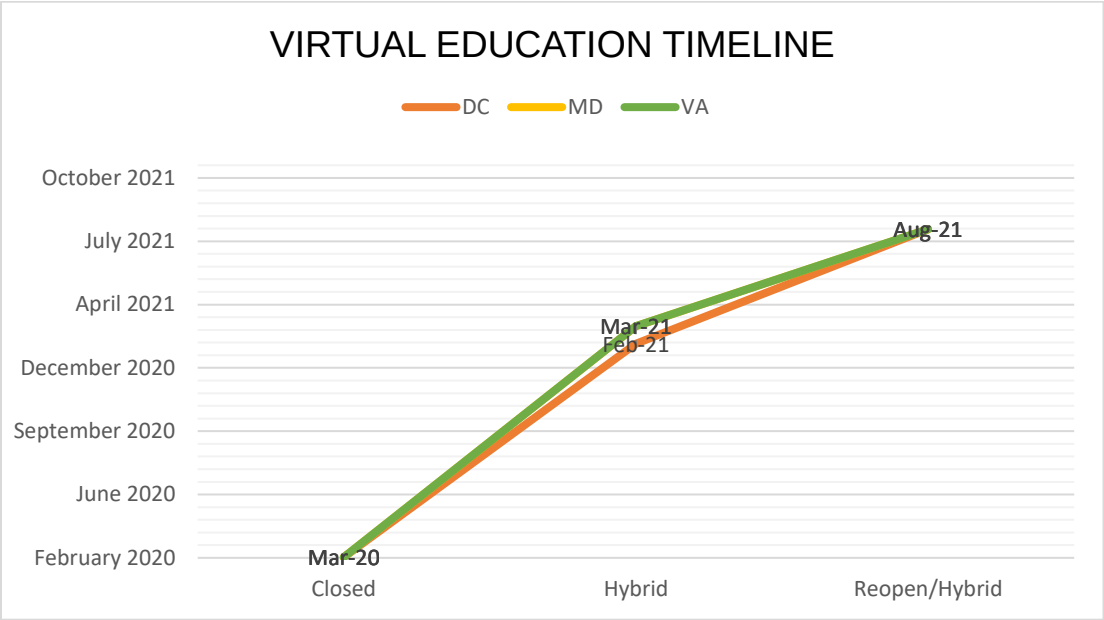
The situation in the Washington DC region, particularly the DMV area, was characterized by consistently low percentages of in-person learning offered to students (Burbio, 2023). This placed the region among the worst in the country regarding the provision of in-person instruction. The persistent challenges and uncertainties related to phased reopening and hybrid learning formats impacted children with ASD, their caregivers, and education providers. These challenges underscore the need for specialized support, resources, and strategies to ensure an inclusive and effective educational experience for children with ASD in a constantly evolving educational landscape. The ability to adapt and provide the necessary support for all interested-parties in this context becomes an imperative to ensure the educational well-being of children with ASD.

Navigating a Transformative Period

A visual representation of the virtual education timeline in the Washington DC metro region is depicted in Figure 1.1. Spanning a challenging and dynamic 18-month period, from the initial closure of schools to the phased reopening of educational institutions across the Washington DC region (comprising school districts within the District of Columbia, Maryland, and Virginia) (WTOP, 2021), this timeline serves as a poignant illustration of the disruptive and transformative forces that shaped the landscape of education for children with ASD during the COVID-19 pandemic. Moreover, this timeline further amplifies the compelling need for the development of evidence-informed strategies and support mechanisms in educational implementation to effectively navigate the complexities of this transformative period.

Figure 1.1

Virtual Education Timeline in DC Metro Region



(WTOP News, 2021)

Statement of the Problem

In March 2020, the onset of the COVID-19 pandemic prompted federal regulations mandating school closures to mitigate the spread of the novel coronavirus. These closures posed a significant challenge for children with Autism Spectrum Disorder (ASD) as they transitioned from traditional, in-person educational models to virtual education. The urgency to enforce stay-at-home orders required educational teams to swiftly adapt to a virtual platform, combining technological and educational resources to ensure the safety and health of students.

However, many educational programs found themselves inadequately equipped to navigate the implementation challenges posed by the sudden shift to distance learning during the public health crisis (Ameis et al., 2020). This was particularly pronounced for students with Individualized Education Programs (IEPs), as these crucial learning plans were initially designed

for face-to-face implementation, tailored to each student's specific learning needs. Consequently, the research problem addressed by this study is the lack of knowledge and understanding surrounding the effective implementation of virtual education for children with ASD. This knowledge gap is magnified by the unprecedented school closures resulting from the COVID-19 pandemic.

While several theories exist about coping skills for caregivers of children with ASD (Whitmore, 2016; Ameis et al., 2020), none of these theories adequately explain the potentially unique processes and experiences involved in implementing virtual education during a public health crisis like the COVID-19 pandemic. Furthermore, these unique experiences are compounded by contextual factors related to implementation, including navigating technology, obtaining educational and technological resources, personalizing educational interventions, fostering collaboration among Individualized Education Plan (IEP) teams, achieving IEP goals, and managing the complexities associated with changes in roles and resources; all in support of the educational needs of children with ASD.

In essence, this study seeks to address the gaps in knowledge and understanding surrounding the challenges and complexities associated with implementing virtual education for children with ASD in response to the COVID-19 pandemic. It aims to shed light on the unique experiences of caregivers and education providers, ultimately contributing to the development of evidence informed strategies and interventions that can better support best practices during the implementation of virtual education for children with ASD resulting from future public health crises causing school closures.

Purpose of this Study

Given the research problem, the purpose of this multi case study is to describe the contextual experiences of interested-parties in their implementation of virtual education to

children with ASD in the Washington DC metropolitan region during the COVID-19 pandemic. Additionally, this research aims to describe the contextual factors influencing the interested-parties' implementation experiences related to the development and implementation of educational interventions, team collaboration among IEP team members, the influence of educational interventions on IEP goal achievement, and changes in roles and resources during the COVID-19 pandemic.

Given this purpose, the study seeks to answer the following research questions:

1) How does virtual education influence the development and implementation of educational interventions for children with ASD?
2) How does virtual education influence team collaboration for children with ASD?
3) How has the transition from implementing traditional educational intervention methods to a virtual environment influenced IEP goal achievement for children with ASD?
4) How have the roles and resources of educational team providers and caregivers changed during the COVID-19 pandemic?

The results of this study will address an important knowledge gap in the body of research, as there is a lack of information into the contextual implementation experiences of interested-parties supporting the educational needs of children with ASD using a virtual platform during school closures resulting from global public health disasters.

Statement of Potential Impact

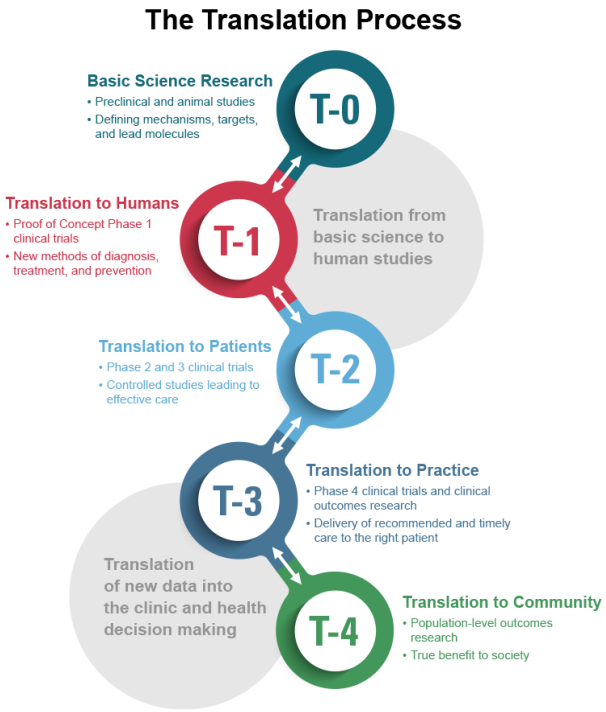
To gain a deeper understanding into the experiences of interested-parties of children with ASD, this study must consider the contextual factors surrounding the virtual education implementation process during school closures resulting from the COVID-19 pandemic. Therefore, this study will describe the following contextual factors: navigation of technology, educational resources, personalizing educational interventions, IEP team collaboration, achieving

IEP goals, and changes to roles and resources during the COVID-19 pandemic. By describing these contextual factors, this study can provide valuable insights that were significant to the interested-parties in their implementation of virtual education for children with ASD.

According to the National Center for Advancing Translational Sciences (NCATS), "translational science is the field of investigation focused on understanding the scientific and operational principles underlying each step of the translational process". Based on the translational process illustrated in Figure 1.2, this study resides in T3 research and will translate new data into the clinical and decision making process (NCATS Alliance, 2023).

Figure 1.2

The Translational Process



(National Center for Advancing Translational Sciences Alliance, 2023)

Similarly, la Velle (2015, p. 460) also shared that translational research in education has been described as "the movement of available research knowledge into active professional use".

Accordingly, the translational implications from this research are purposed for the following:

- Provide a deeper understanding of the contextual experiences of interested-parties implementing virtual education for children with ASD in the Washington DC metropolitan region during the COVID-19 pandemic, and
- Apply the practical contributions gained from this study to the body of research and build a foundation for the development of evidence informed-guidelines for the implementation of virtual education to address the unique needs of children with ASD.

Generating a deeper understanding supplemented by practical insight into the contextual experiences of interested-parties will optimize the translation of knowledge to inform evidence-based best practice implementation guidelines in virtual education for children with ASD.

Conceptual Framework

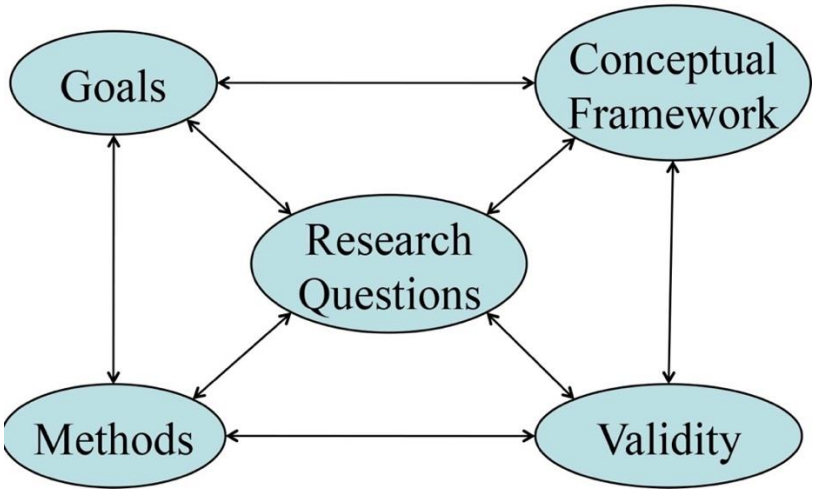
There are four primary options from which to derive a conceptual framework: (1) knowledge based on experience, (2) existing theory, (3) exploratory research, and (4) "thought experiments" (Maxwell, 2013 p. 44). This multi case research study will draw upon knowledge established through the experiences of educational team providers and parents/ caregivers implementing virtual education for children with ASD during the COVID-19 pandemic.

Research Design

According to Maxwell's interactive model of research design, there are five components used to address a specific set of concerns (Maxwell, 2013). Within this model as shown below in Figure 1.3, the research questions are at the center and linked to each component.

Figure 1.3

Interactive Model of Research Design



(Maxwell, 2013)

Based on Maxwell (2013), the research questions are rooted in the center and have the most direct influence on other components of the design, while also recognizing the other components directly influence the research questions. This model acknowledges that conducting research is not a linear process, but more of an iterative journey. The goals in a study should be informed by current theory and knowledge, while decisions about relevant theory and knowledge depend on goals and research questions (Maxwell, 2013). Furthermore, the conceptual framework selected for this study will support the goals of this study by addressing the four research questions and applying the findings to develop evidence-informed knowledge regarding the implementation of virtual education for children with ASD during the COVID-19 pandemic.

Consolidated Framework for Implementation Research (CFIR)

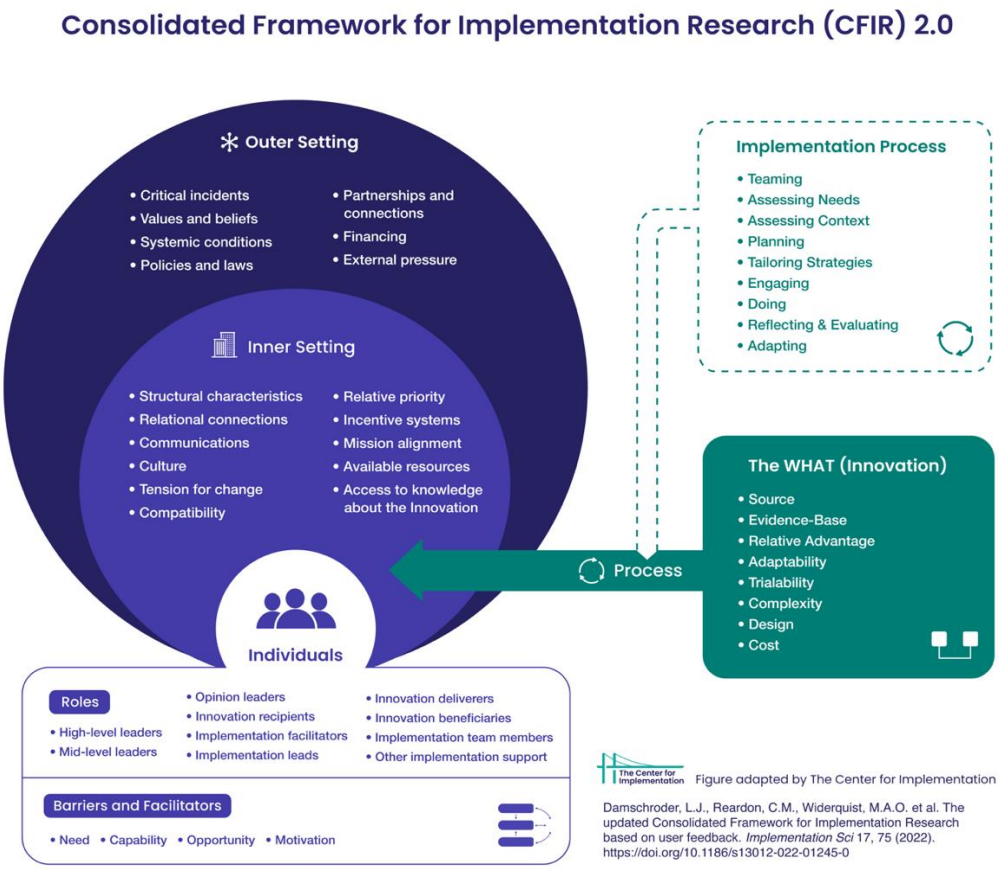
The conceptual framework guiding this study is the Consolidated Framework for Implementation Research (CFIR). This framework was developed for data collection from

individuals who have power or influence over implementation outcomes (Damschroder et al., 2022). CFIR was chosen as the conceptual framework for this research due to its alignment with the study's purpose and goals. Additionally, CFIR facilitates theory development and verification across various contexts, considering why an innovation or intervention succeeds or fails (Damschroder et al., 2022).

CFIR comprises 48 constructs organized into five domains (Figure 1.4). According to Damschroder et al., 2022, it is not necessary to assess every domain or construct in the framework for a given study. Thus, this research, can tailor its use of CFIR domains and constructs to align with its specific research purpose.

Figure 1.4

The Consolidated Framework for Implementation Research 2.0



(Damschroder et al., 2022)

Summary of Methodology

This research employed a multi-case study design (Creswell & Poth, 2018) using qualitative methods to describe the experiences of interested-parties in implementing virtual education for children with ASD during the COVID-19 pandemic. The research procedures encompass recruitment, data collection, data analysis, and validation strategies to ensure the credibility and trustworthiness of the results. Ethical approval from the Institutional Review Board (IRB) at The George Washington University will be obtained before commencing the study.

The study aims to recruit twenty-five participants, comprising of education providers and caregivers of children with ASD from the Washington DC metro region. Ongoing purposeful recruitment and snowball sampling will be employed to ensure a diverse sample. Participants will be selected based on predefined inclusion criteria, and informed consent will be obtained before participation in the study.

Data collection will involve one-hour virtual interviews with participants, guided by interview protocols. Two distinct protocols will be developed, one for caregivers and another for education providers, drawing on the Consolidated Framework for Implementation Research (CFIR). These interviews will be semi-structured with open-ended questions, allowing participants to provide detailed descriptions of their experiences. To support the multicase study approach, two methods of data collection will be employed for each participant. Caregivers will be asked to screen share their child's progress notes or report cards from the virtual education period, while education providers will screen share an educational activity used during virtual education. Memoing will be conducted immediately after each interview to capture crucial information for data analysis.

The collected data will undergo systematic data analysis, including data organization, reading and memoing of emerging ideas, code development, classification into themes, interpretation, synthesis, data visualization, and reporting (Creswell & Poth, 2018). Transcription of recorded interviews will be performed using Sonix ai (2022), and NVivo (NVivo QSR International, 2022) will be employed for qualitative data analysis, organization, and management. The data will be analyzed to develop initial codes, which will then be categorized into sub-themes. These sub-themes will be further refined and analyzed to identify patterns, leading to the emergence of themes that will be utilized to answer the four research questions.

Validation strategies will be employed to enhance the rigor of the study. Memos will be recorded immediately after each interview to ensure data alignment with participants' perspectives. Additionally, an independent researcher will randomly review the interview recordings and compare them to the transcripts to confirm data accuracy. Member checking will be conducted by sharing the transcribed interviews with participants to validate data accuracy. This process will also extend to sub-themes and emerging themes to verify the validity of the findings. The study's findings will contribute to developing evidence-based best practice guidelines for the implementation of virtual education for children with ASD during future public health disasters.

Limitations and Delimitations

This study acknowledges several limitations and delimitations that may influence its findings. Firstly, there is the potential for selection bias due to the use of ongoing purposeful sampling and snowball sampling, as participants who self-select or are referred by others may have unique perspectives that differ from those who do not participate (Creswell & Poth, 2017). Additionally, the study is susceptible to recall bias as it relies on retrospective data collection

based on subjective experiences during the COVID-19 pandemic, affecting the accuracy of participants' recollections (Althubaiti, 2016).

Furthermore, the data collected is geographically specific, focusing solely on the Washington DC metropolitan region, encompassing the District of Columbia, Maryland, and Virginia. This geographical limitation may not fully capture the diversity of experiences and contextual factors related to COVID-19 and virtual education in other regions, states, or countries (Yin, 2017). Moreover, the data may be influenced by region-specific contextual factors, such as varying rates of exposure to COVID-19, differences in vaccine education, availability of special education programming and resources, budgetary constraints, and local and state educational policies (Damschroder et al., 2022). These factors may limit the generalizability of the study's findings to other regions.

This study is also delimited in its scope, focusing exclusively on the experiences of education providers and caregivers of children with ASD during the COVID-19 pandemic. It does not encompass the experiences of other interested-parties or explore broader aspects of the pandemic's impact on education (Creswell & Poth, 2017). Additionally, the study is delimited to children with ASD, which may not fully represent the experiences of children with other disabilities (Yin, 2017).

Lastly, this research is limited by its retrospective nature, relying on participants' recollections of past events during the pandemic, which can be influenced by their current perspectives (Althubaiti, 2016). Despite these limitations and delimitations, this research endeavors to provide valuable insights into the experiences of interested-parties in the Washington DC metropolitan area regarding the implementation of virtual education for children with ASD during the COVID-19 pandemic, contributing to the existing body of knowledge in the field of implementation research (Damschroder et al., 2022).

Definitions of Key Terms

- Academic Breaks:
    - Planned: School closures in the United States that are documented on educational calendar and consist of Spring Break, Summer Break and Winter Break
    - Unplanned: School closures in the United States that are not documented on the educational calendar and results from weather, emergency closings due to safety or public health disasters
- ASD: Autism Spectrum Disorder refers to a broad range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication. According to the Centers for Disease Control, autism affects an estimated 1 in 54 children in the United States today (*Autism Diagnosis Criteria: DSM-5*).
- ESY: Extended School Year; as part of the IEP process, the IEP team must determine if a student needs a program of special education and related services extending beyond the normal school year called extended school year services. The Department of Education (Sec.300.320 *Definition of Individualized Education Program*, 2017) determined that ESY services are provided to students in the summer who meet the following criteria:
    1. Need to maintain critical life skills because they are at risk for losing those skills
    2. At risk for losing emerging skills as a result of program interruption
    3. At risk for experiencing significant regression/ recoupment of previously learned skills without the provision of such services
- Evidence-based: interventions, policies, practices, or strategies that have proven efficacy, or impact, and effectiveness, or impact under real-world conditions (Brownson, 2012)
- Face-to-face interaction: social communication carried out with other present individuals without mediating technology (Crowley & Mitchell, 2013)

- Framework: outline of several constructs and their relationships centered around a phenomenon (Nilsen, 2015)
- IDEA: Individuals with Disabilities Education Act ensures that all children with disabilities are entitled to a free appropriate public education to meet their unique needs and prepare them for further education, employment and independent living (IDEA, 2004)
- IEP: Individualized Education Program is a document that outlines the legal requirements of what your child needs to be successful AND details what individual strengths and challenges make up their unique style of learning (Sec.300.320 *Definition of Individualized Education Program*, 2017).
- Implementation Science: study of methods to integrate evidence based strategies and interventions into routine practice (Nilsen, 2015).
- Model: describes a phenomenon, typically graphically, in a deliberately simplified fashion (Nilsen, 2015)
- Respite Care: provision of care intended to relieve caregivers for a short time or provide them a break in their daily routine (Whitmore, 2016)
- Translational Research: occurs along a continuum and involves the application of knowledge from basic science discovery to public health impact (Drolet & Lorenzi, 2011)
- Virtual Education: a learning environment where teacher and students are separated by time and/ or space and the teacher provides course content through methods such as Internet, multimedia resources, and videoconferencing. Students get the content and communicate with the teacher via the same media (Tavakol, 2012 p. 152).

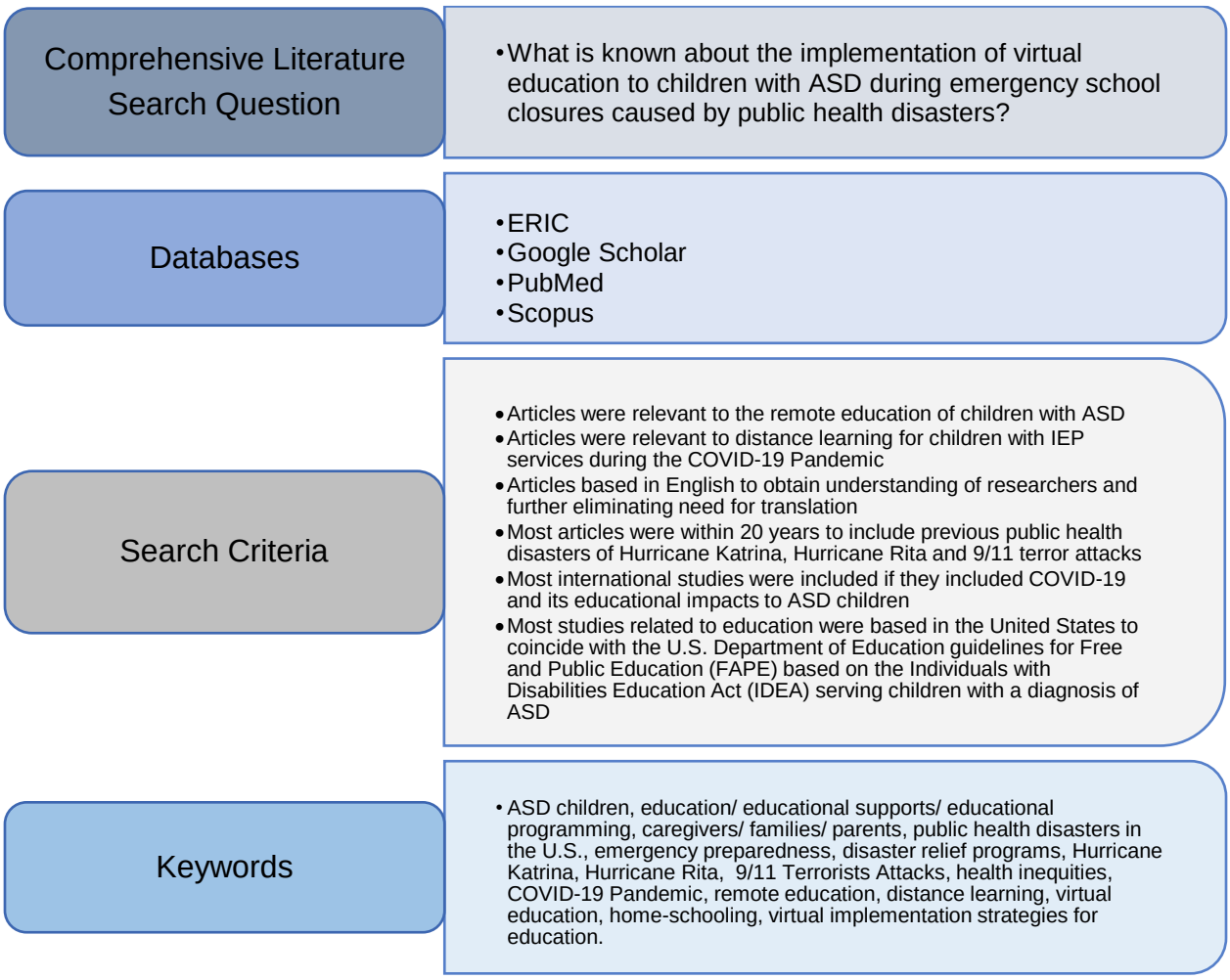
Chapter 2: Review of Literature

Introduction

The search methods for conducting this literature review have been iterative as new research surrounding COVID-19 is constantly emerging. The strategies used for this literature review included the following: inquiry utilizing a comprehensive literature search question, searching multiple databases, utilizing relevant search criteria, and utilizing relevant keywords in the literature search illustrated below in Figure 2.1.

Figure 2.1

Search Strategies for Literature Review



A comprehensive literature search was conducted asking the following question: "What is known about the implementation of virtual education for children with ASD during emergency school closures caused by public health disasters?" The databases of PubMed, Scopus, ERIC and Google Scholar were explored for relevant literature utilizing the following search criteria.

- Articles were relevant to the remote education of children with ASD
- Articles were relevant to distance learning for children with IEP services during the COVID-19 Pandemic
- Articles based in English to obtain understanding of researchers and further eliminating need for translation
- Most articles were within 20 years to include previous public health disasters of Hurricane Katrina, Hurricane Rita and 9/11 terror attacks
- Most international studies were included if they included COVID-19 and its educational impacts to ASD children
- Most studies related to education were based in the United States to coincide with the U.S. Department of Education guidelines for Free and Public Education (FAPE) based on the Individuals with Disabilities Education Act (IDEA), serving children with a diagnosis of ASD

Keywords used: ASD children, education/ educational supports/ educational programming, caregivers/ families/ parents, public health disasters in the U.S., emergency preparedness, disaster relief programs, Hurricane Katrina, Hurricane Rita, 9/11 Terrorists Attacks, health inequities, COVID-19 Pandemic, remote education, distance learning, virtual education, home-schooling, virtual implementation strategies for education.

Critique of Scholarly Literature

Public Health Disasters Impacting Education

Natural Disasters and acts of terror have been shown to have a substantial impact on school age children (Kirylo, 2006; DeVaney et al., 2009; & Stough et al., 2017). Studies surrounding the global events of Hurricane Katrina and Hurricane Rita in 2005 and 9/11 Terror attacks in 2001 have examined the educational impact on children with ASD. As a result, the following challenges were identified: lack of planning for large-scale disasters by school districts, service delivery needs that strained school resources and services due to the numbers of displaced students, lack of availability of displaced student records to new school districts, financial difficulties because of the cost of providing services to additional students and/or funding cuts as a result of the hurricanes, and the need for flexibility in meeting federal requirements for No Child Left Behind (Stough et al., 2017, Kirylo, 2006, Elsevier, 2019, Edmonds, 2017, U.S Government Accountability Office, 2006). Additionally, when considering the effects of hurricanes on students with disabilities, the National Council on Disability asserted that, "One of the most crucial challenges for disaster recovery efforts is to continue the education of student evacuees while rebuilding educational services" (U. S. Government Accountability Office, 2006; p. 19).

The research asserts that school emergency plans often do not incorporate the needs of students with disabilities during natural disasters or terrorism (Stough et al., 2017; Boon et al., 2011). Based on a one year follow up study on the educational system post-impact of Hurricane Katrina, the researchers emphasized that disasters of this magnitude occur infrequently (DeVaney et al., 2009). The study further recognized that school personnel might not have the necessary knowledge and skills to fully anticipate problems that might occur, know what steps to take to prepare for a disaster, and/or to address the needs of school personnel, students, families,

and communities during recovery (DeVaney et al., 2009). Similarly, a study recognized lower literacy and educational levels impacting children's understanding of natural disaster or dangerous situations resulting from terrorism (Stough et al., 2017). Additionally, the children's cognitive capacity and developmental stage influence children's threat appraisal, attention and concentration (Stough et al., 2017).

Elsevier (2019) reported that grief reactions among children surrounding the 9/11 terror attacks were related to a shared trauma experience and constituted a unique aspect of psychological distress. Many studies have identified various aspects of post-traumatic stress among children with disabilities as a result of experiences related to the 2005 natural disasters from Hurricane Katrina and Hurricane Rita and the 9/11 acts of terrorism (Elsevier, 2019; DeVaney et al., 2009; Stough et al., 2017; Boon et al., 2011). However, there has been a lack of literature on the unique needs of children with autism that faced the same situations. Additionally, prior literature has focused more on Post-Traumatic Stress Disorder (PTSD) and mental health of school age children with and without disabilities.

As these notable disasters impacted public health and children with disabilities, they were localized to a specific region. Hurricane Katrina and hurricane Rita, both occurred in 2005 and impacted the state of Louisiana and its neighboring region. The 9/11 terror attacks impacted New York city and also its neighboring metropolitan region. These events had no impact on a national or global level on a vulnerable population of children with disabilities, particularly children with ASD.

However, the novel coronavirus or COVID-19 was declared a pandemic by the World Health Organization in March 2020. The COVID-19 pandemic transformed the operation of local communities and global societies, impacting educational services for all children with ASD (Amaral & de Vries, 2020). Measures for social distancing were implemented, closures of

businesses and schools were authorized, leading to economic uncertainty. While the public health goal was to protect the global population and mitigate spread of the coronavirus disease; such measures had inadvertently impacted children with ASD and their families. The families of children with ASD were confronted with mental health challenges resulting from disruption of educational services and supports (*COVID-19 and its Impact on the SPARK ASD Community,* 2020). The literature has confirmed that children with autism and their families have been particularly impacted by the lasting effects of the COVID-19 pandemic (Den Houting J., 2020; Pellicano & Stears, 2020; Eshraghi et. al., 2020).

Approaches

A number of approaches have been examined to understand the maintenance of structured patterns and adherence to routines as being the hallmark needs of individuals with ASD. Existing research supports theories of "sustaining balanced health" (Sturmberg & Martin, 2013 pg. 252), person-environment fit (Lai et al., 2020) and parent-child interactions (Crowell et al., 2019; Dykens et al., 2014) as factors that may influence the well-being of children with ASD and play a fundamental role in their functioning at school.

Sturmberg & Martin (2013) advocate for a holistic approach to context, which includes incorporating subjective experiences into systems thinking to sustain a balanced state of health. The person-environment fit approach is derived from the concept of promoting a goodness of fit between parent expectations and children's temperaments (Lai et al., 2020). Optimizing person-environment fit involves enhancing the sense of control and environment predictability for children with ASD while allowing for uncertainty and flexibility needed to engage in their educational work (Lai et al., 2020).

Several studies have explored parent-child interactions within transactional associations (Holmes et al., 2020; Kissler et al., 2020; Crowell et al., 2019). These studies have linked the

severity of the child's disorders to the proliferation of stress, which manifests in anger and depression in parents (Benson & Karlof, 2008). Previous research has also examined the stress experienced by parents of children with ASD, who may have profound social communication, emotional, and behavioral difficulties, as well as challenges in obtaining appropriate supports and services (Crowell et al., 2019). While these approaches have identified environmental factors influencing behavioral interactions, they do not adequately describe the implementation experiences of the interested-parties who are supporting these environmental factors and behavior interactions of children with ASD within the context of virtual education, particularly during an ongoing public health crisis like the COVID-19 pandemic.

Multidisciplinary Team

Multidisciplinary teams consist of a range of experts in their respective fields contributing their knowledge towards a shared interest or shared goal. The multidisciplinary approach, seen in IEP teams, is viewed as the cornerstone for collaborations (Dillenburger et al., 2014). For children with ASD, the implementation of interventions to address goals found within their IEPs is often developed and delivered through a multidisciplinary team. The diversity of membership within the team can contribute to building interrelationships with multiple interested-parties who can support the current needs and future growth of children with ASD. Although research supports the benefits of multidisciplinary team collaboration to address the educational needs of children with ASD (Dillenburger et al., 2014), there is no information to support team effectiveness using a virtual platform, as was required during the COVID-19 pandemic.

Knowledge Producing Teams

In fact, the COVID-19 pandemic has transformed the process of conducting team meetings, requiring interested-parties to enhance their knowledge in using technology for

purposeful engagement with virtual education. This integration of contextual factors to advance knowledge usage is supported by convergence research, a hallmark of Team Science, as it incorporates knowledge, methods, and expertise from different disciplines (National Science Foundation, 2016). This multidisciplinary approach allows multiple interested-parties to address complex health problems while combining multiple research networks. The integration of knowledge provides a catalyst for framing research questions and adopting a new scientific language (Chambers et al., 2016). Convergence research propels transdisciplinary approaches and provides a holistic approach toward translational healthcare, utilizing knowledge integration and knowledge synthesis (National Science Foundation, 2016).

As the integration of knowledge is pursued; the formation of a knowledge-producing team may emerge as new knowledge is created and shared among interested-parties. The knowledge- producing team serves to combine task-orientated goals, share equipment, technologies, and develop professional and interpersonal relationships within their unique context and content situations (Mohammed & Dumville, 2001). Furthermore, the knowledge-producing team becomes equipped to manage the complexities associated with the provision of educational supports using a virtual platform during the COVID-19 pandemic. The emerging knowledge developed from understanding the contextual experiences of interested-parties can support its translation for developing evidence-informed implementation guidelines in virtual education for children with ASD. Additionally, this research will further disseminate knowledge and contribute to educational policy planning for interested-parties implementing virtual education to children with ASD during school closures resulting from future public health crises and/ or pandemics.

Team Membership

In the academic process to support the educational needs of children with ASD, various interested-parties participate as determined by an IEP team. The high diversity of membership and specialty among each interested-party provides team collaboration, facilitation of academic development, guidance for delivering special education and related services, and providing supplementary aids to meet the child's educational needs. The multidisciplinary nature of an IEP team allows for contributions from different disciplines, communities, or professions and can address complex issues that may arise during the collaborative process (Cash, 2003). This collaboration becomes a formal process during transition planning to assist the child with ASD prepare to be an independent young adult. Under IDEA (2004), a student's IEP must include transition services by age sixteen however, planning can often start earlier. White (2017) suggested that many IEP teams begin working with students as early as middle school to help them explore their interests and possible careers. White (2017) also noted that some transition services can be provided by outside organizations, not just the school. Thus during transition planning, the IEP team may expand to include interested-parties from the community including: counselors, employment agency staff, and job specialists (White, 2017). Figure 2.2 illustrates the diversity in membership for a child with ASD.

Figure 2.2

Team Membership Diversity

(Cash, 2003)

The IEP team consists of "mandatory" and "permissive" members represented in Figure 2.3. The mandatory members are required to be present during the meeting and consist of the following:

- The parents of a child with a disability;
- One regular education teacher (if the child is, or may be, participating in the regular education environment);

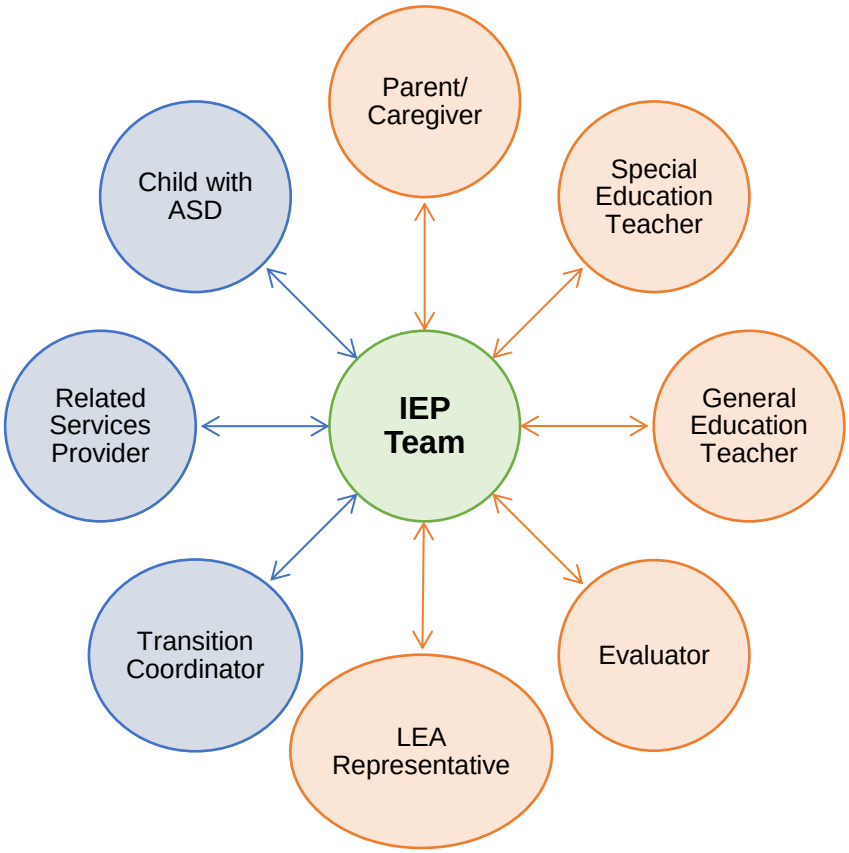
- One special education teacher (if the child is, or may be, participating in the special education environment);
- A representative of the local education agency (LEA) who is qualified to provide, or supervise the provision of, specially designed instruction to meet the unique needs of children with disabilities; knowledgeable about the general education curriculum; and knowledgeable about the availability of resources of the LEA;
- An evaluator or designated educational professional who can interpret the instructional implications of evaluation results

Permissive members are not required to be present during IEP meetings but are permitted if they have valuable information to share about the child to the IEP team. Permissive members consist of the following:

- A transition coordinator if the child is 16;
- Related service professionals who have knowledge or special expertise regarding the child
- Whenever appropriate, the child with a disability

Figure 2.3

IEP Team Members



(Permissive Members; Mandatory Members)

(Individuals with Disabilities Education Act, 2004)

According to the IDEA (2004), without all of the mandatory members present, the proposed IEP may either be improperly designed or not implemented. This issue may be due to not receiving all of the necessary input and/ or the district not having the necessary resources. If there are no permissive members, the meeting can still go forward. Research supports that parents have the motivation to make sure that an IEP meeting is properly assembled, and school districts have the motivation to ensure that the IEP cannot be challenged on these grounds (Lee, 2014; IDEA, 2004). As a result, the child with a disability can benefit by receiving supportive educational services if the IEP team follows the IDEA law.

Educational Environment

The educational environment often provides opportunities for specialized education and behavior regulation through social interactions and mental health care (Golberstein et al., 2020). In contrast, research has also shown that children with autism face challenges due to academic difficulties, co-occurring ADHD or anxiety (Lai et. al., 2019), and bullying from peers (Holden et al., 2020; Forrest et al., 2020). These factors result in children experiencing trauma, depression, anxiety, and suicidality (Holden et al., 2020; Hedley et al., 2017).

Currently, there is no research data on how the transition to distance learning resulting from COVID-19 pandemic impacted children with ASD. However, based on existing data and theories, we can conclude that disruption to daily routines and restrictions on preferred activities have had detrimental effects (Curtin et al., 2015; Must et al., 2017; Grove et al., 2018). Moreover, the lack of individualized professional support in a regulated environment may have induced a loss of learning. Research has shown that disruption in routines may contribute to the exacerbation of problematic restricted and repetitive behaviors and interests (RRBIs) (Boyd et al., 2012), including sleep problems (Schreck & Richdale, 2020) and aggression (Fitzpatrick et al., 2016). According to the data, we expect the COVID-19 pandemic to affect children with ASD with increased challenges in behavior, dysregulation of sleep, attention, anxiety, depressive symptoms and increased intake of psychotropic medications (Hill et al., 2014).

The challenges of behavior, communication and cognition prevent children with ASD from engaging in online platforms due to their high support needs (Johansson et al., 2020). The literature supports that low-cost and low-intensity parent-mediated interventions involving coaching parents on strategies for interaction with their child with ASD can have immediate effects on social behavior and communication (Nevill et al., 2018). Although specialized education to support children with disabilities is legally mandated in the United States by the

Individuals with Disabilities Education Act (IDEA) of 2004, its access and quality may be inconsistent even when there is not a public health crisis (Barger et al., 2019). These inconsistencies further amplify the challenges in variability for the virtual implementation of educational services for children with ASD. Therefore, the complexities faced by interested-parties who implemented educational interventions to children with ASD during the COVID-19 pandemic were magnified.

Resource Equity

Providing support to virtual education not only depends on digital access but also caregiver availability in the home (Cidav et al., 2012). Caregivers were required to facilitate engagement with learning, thereby taking time away from work and placing constraints on their employment (Cidav et al., 2012). The data supports that individuals with higher education and optimal financial resources are much more likely to have technological access and therefore benefit from digital education (Veinot et al., 2018). However, this information is pre-pandemic, and the data did not recognize the heightened awareness of educational programs seeking technology-based resources to maintain learning skills of children, including vulnerable populations such as children with disabilities. Additionally, while access to virtual education is still developing, its variability in delivery can worsen health inequity (Golberstein et al., 2020), an area which may have been further amplified during the COVID-19 pandemic. Current research supports adopting a digital age framework and encourages health professionals to advocate for equalizing access to technology (Crawford & Serhal, 2020).

According to the data, the greatest gains in children with ASD is achieved by 3 years of age, with higher rates of progress gained from early intervention services (Pickles et al., 2014). However, those who are disadvantaged due to socio-economic or socio-cultural factors, may not have access to available services within an acceptable timeframe (Salomone et al., 2016).

Furthermore, as children get older, their medical needs change, and it is reported that youth with autism have more emergency department visits, primary care visits and psychiatric care visits with higher healthcare expenditures than any other youth with special healthcare needs (Liu et al., 2017; Weiss et al., 2018). Complex mental health conditions are more prevalent in ASD cases, and their rates increase with age (Lai et al., 2019). Accordingly, the physical and mental health of children with ASD, along with their family members, added to the complexity of obtaining equitable medical resources during the COVID-19 pandemic.

The literature described by the American Academy of Pediatrics discusses the medical home concept to address a variety of general medical and psychiatric conditions (Todorow et al., 2018). The care for individuals with ASD emphasizes care coordination, communication between families and clinical teams, along with community agencies, education, or employment settings (Rast et al., 2018). However, its recognized that specialized academic programs do not follow a medical model in their team approach; rather, they follow an educational model, as observed through the coordination of an IEP team (Lee, 2020). Therefore, supporting equitable resources towards the educational services of children with ASD during public health disasters may not be prioritized compared to the medical needs of the population. The COVID-19 pandemic will have prolonged impacts on the population of children with ASD, regardless of their medical needs or educational needs, (Kissler et al., 2020).

Conceptual Framework

This research will adopt the Consolidated Framework of Implementation Research (CFIR) as its conceptual framework. CFIR is designed to systematically assess the multilevel implementation context and identify factors that may influence the implementation and effectiveness of interventions (Damschroder et al., 2009). Developed by Damschroder and

colleagues, CFIR integrates scientific principles from Implementation Science and Team Science, making it well-suited for this implementation study.

CFIR is a determinant framework that provides a common language and a standardized list of 48 constructs categorized into five major domains (Damschroder et al., 2022). It can be applied in both qualitative and quantitative research, guiding data collection, analysis, interpretation, and reporting of implementation-related findings.

In alignment with the concepts proposed by Damschroder et al. (2022), this study will identify and define relevant CFIR constructs within the five domains: 1) Innovation, 2) Inner Setting, 3) Outer Setting, 4) Individuals, and 5) Implementation Process. These CFIR domains and their corresponding CFIR constructs are presented in Table 2.1.

Table 2.1

CFIR Domains and CFIR Constructs

CFIR DOMAINS	CFIR CONSTRUCTS
Innovation The "thing" being implemented	• ***Adaptability***: can be modified, tailored, or refined to fit local context or needs • ***Complexity***: reflected by scope and nature
Inner Setting Setting in which the innovation is implemented	• ***Structural Characteristics*** (physical infrastructure): layout & configuration of space to support functional performance • ***Relational Connections***: networks & teams • ***Communications:*** formal & informal sharing practices • ***Culture:*** shared values, beliefs & norms
Outer Setting Setting of the existing inner setting	• ***Local Attitudes:*** sociocultural values & beliefs • ***Local Conditions:*** economic, environmental, political and/ or technological conditions that support implementation • ***Policies & Laws***: legislation & regulations that support implementation
Individuals Roles & characteristics of individuals	• ***Implementation Leads:*** Individuals who lead efforts to implement the innovation • ***Implementation Team Members:*** Individuals who collaborate with Implementation Leads to implement the innovation, includes Innovation Deliverers & Innovation Recipients. • ***Innovation Deliverers***: Individuals who are directly or indirectly delivering the innovation. • ***Innovation Recipients:*** Individuals who are directly or indirectly receiving the innovation.
Implementation Process Activities & strategies used to implement the innovation	• ***Teaming:*** Join together, intentionally coordinating and collaborating on interdependent tasks, to implement the innovation • ***Assessing Needs:*** Collect information about needs of deliverers & recipients to guide implementation & delivery of innovation

(Damschroder et al., 2022)

The CFIR domain of Innovation or Intervention is defined as the "thing" being implemented and the associated CFIR constructs are adaptability and complexity. Adaptability

refers to the extent to which the innovation can be modified, tailored or refined to fit the local context or needs. Complexity reflects the scope and nature of the innovation.

The CFIR domain of Inner Setting is defined as the setting that the innovation is implemented and the associated CFIR constructs include the following: structural characteristics, relational connections, communications, and culture. Structural characteristics are the physical infrastructure including the layout and configuration of physical spaces to support functional performance. Relational connections encompasses networks and teams within the setting. Communication pertains to both formal and informal sharing practices. Culture represents the shared values, beliefs and norms within the setting.

The CFIR domain of Outer Setting is defined as the setting of the existing inner setting and the associated CFIR constructs include the following: local attitudes, local conditions, and policies and laws. Local attitudes relates to the sociocultural values and beliefs in the external contexts. Local conditions involves economic, environmental, political, and technological conditions that support implementation. Policies and laws refer to legislation and regulations that facilitate or hinder implementation.

The CFIR domain of Individuals is defined as the roles and characteristics of individuals that support change. The associated CFIR constructs are the following: implementation leads, implementation team members, innovation deliverers and innovation recipients. The implementation leads are individuals who lead implementation efforts. The implementation team members are individuals who collaborate with implementation leads to implement the innovation and include innovation deliverers and innovation recipients. The innovation deliverers are individuals who are directly or indirectly delivering the innovation. The innovation recipients are individuals who are directly or indirectly receiving the innovation.

The CFIR domain of Implementation Process is defined as the activities and strategies used to implement the innovation. The associated CFIR constructs are teaming and assessing needs. Teaming involves joining together, intentionally coordinating and collaborating on the interdependent tasks to implement the innovation. Assessing needs encompasses the collection of information about the needs of deliverers and recipients to guide implementation and delivery of the innovation.

CFIR is adaptable to various phases of the implementation process, such as pre-implementation, during implementation, or post-implementation, and can serve as the foundation for developing testable hypothetical models focusing on specific constructs and their interrelationships (Damschroder et al., 2022).

The framework allows for its adaptation in its utilization for guiding data collection as applicable for this research study. The framework will be utilized in developing separate interview protocols for participant groups, one aimed for caregivers and the other aimed for educational providers. Furthermore, because CFIR incorporates the five CFIR domains along with corresponding CFIR constructs, it enables data collection and analysis on the contextual factors surrounding the implementation of virtual education experienced by interested-parties of children with ASD. According to the literature, CFIR can increase scientific knowledge about the effectiveness of implementation strategies (Powell et al., 2014). Therefore, CFIR proves to be the optimal choice to guide data collection and data analysis in order to achieve the goal of this qualitative multi-case research.

Theoretical Framework

This research study draws upon theoretical foundations in disability theory and network learning theory to guide its conceptual framework and approach. These theories offer valuable

perspectives for understanding the implementation of virtual education for children with Autism Spectrum Disorder (ASD) during the COVID-19 pandemic.

Disability Theory

Disability theory provides a lens through which researchers can examine inclusion in schools and the provision of educational services for children with disabilities. It has evolved from a medical model to a community-based model that emphasizes the environmental response to individuals with disabilities. This perspective views disability not as a defect but as a dimension of human difference. Researchers employing disability theory consider questions related to labels, stigma, community benefit from data collection, effective communication methods, and respectful data reporting. By incorporating disability theory into this study, the research aims to support the neurodiversity of all children with ASD and describe the contextual factors associated with the implementation of virtual education during the pandemic (Creswell & Poth, 2018; Mertens, 2009).

Connectivism

This study loosely aligns with network learning theory, specifically connectivism. Connectivism is a prominent theory for e-learning environments and emphasizes the role of technology and socialization in learning. According to connectivism, learning is a network phenomenon influenced by diverse opinions and information sources. It rests on principles such as the importance of connecting specialized nodes or information sources, learning residing in non-human appliances, the capacity to know being more critical than current knowledge, the need to nurture and maintain connections for continuous learning, and the ability to see connections between fields and concepts. Connectivism also emphasizes the currency of knowledge and views decision-making as a learning process. This theory is particularly relevant in the context of virtual education during the COVID-19 pandemic, where technology plays a

central role in learning and knowledge dissemination (Siemens, 2005; Goldie, 2016; Mpungose, 2020).

Transdisciplinary Approach

The study's goal of gaining a deeper understanding of the contextual experiences of interested-parties in implementing virtual education for children with ASD during the pandemic aligns with convergence research. Convergence research integrates knowledge, methods, and expertise from various disciplines to address complex health problems. It encourages deep integration across multiple disciplines, allowing experts to collaborate on common research challenges, combine theories and methods, and create a shared scientific language. This transdisciplinary approach supports the pursuit of knowledge integration and synthesis, which is valuable for informing evidence-based best practices in healthcare, particularly in the context of public health crises and pandemics (National Science Foundation, 2016; Chambers et al., 2016). By synthesizing these theoretical perspectives, this research aims to provide a comprehensive understanding of the challenges and opportunities associated with implementing virtual education for children with ASD during the COVID-19 pandemic. The insights gained will be translated to inform the development of evidence-informed best practices guidelines for interested-parties facing school closures due to future public health disasters or crises.

Revisiting the Literature

Prior to the COVID-19 pandemic, research on the educational experiences of interested-parties serving children with Autism Spectrum Disorder (ASD) during public health disasters was limited, with most studies focusing on coping skills of children with ASD in the aftermath of localized disasters such as Hurricane Katrina or the 9/11 Terror Attacks (Elsevier, 2019; DeVaney et al., 2009; Stough et al., 2017; Boon et al., 2011). However, the global impact of COVID-19, affecting educational needs on a broader scale, prompted a shift in research focus

(Stadheim et al., 2022). As of 2023, new research has emerged to address the consequences of the COVID-19 pandemic on children with ASD and their families:

1. Parental Perceptions: Fatehi et al. (2023) conducted a study examining parents' perceptions of the pandemic's consequences on their children with ASD. The research highlighted parental concerns about resource adequacy and the need for community supports and mental health services.
2. Remote Learning Experiences: Averett (2021) explored the experiences of parents, including those with children with ASD, during Coronavirus-related remote learning. While this study encompassed various disabilities, it found that children with ASD faced particular challenges with remote learning, including distractions and difficulties with focus at home. Parents reported the need to provide constant support, especially since paraprofessional assistance was not available during remote learning.
3. Caregiver Well-Being: Research by Pecor et al. (2021) revealed a greater decrease in the quality of life among caregivers of children with ASD compared to those of neurotypical children before and during the pandemic. Caregivers of ASD children experienced increased stress, distress, anxiety, depression, emotional dysregulation, and decreased mood during the COVID-19 period. The study also emphasized the correlation between caregiver anxiety levels and the severity of ASD-related behavioral problems in their children.
4. Family Needs: Stadheim et al. (2022) examined the experiences of children with ASD and their families during the pandemic to identify their needs. The findings indicated that families of children with ASD required increased support to address child regression and parent distress, greater flexibility in educational and clinical services, access to

parent/caregiver training, and public support for low-income and marginalized populations.

In addition to studies focusing on families, recent research has also explored the experiences of educators working with children with ASD during the pandemic:

5. IEP Modifications: Hurwitz et al. (2022) investigated how educators adapted Individualized Education Programs (IEPs) and interventions to provide academic and social-emotional support to students with autism. The study found that educators made modifications to IEPs, including specifying how services were provided (virtual, hybrid, or face-to-face), adjusting service minutes for flexibility, and eliminating social goals that were difficult to address during the pandemic. Educators also reported modifications to evidence-based practices (EBPs), such as changes in reinforcement methods, materials, collaboration with parents, and progress monitoring across settings.

These recent studies shed light on the multifaceted challenges faced by children with ASD, their families, and educators during the COVID-19 pandemic. They also emphasize the importance of providing adequate support and resources to address the unique needs of this community in times of crisis.

Inferences for Forthcoming Study

Public health disasters, such as natural disasters and acts of terror, have historically disrupted educational services for children with Autism Spectrum Disorder (ASD). Studies conducted in the aftermath of events like Hurricane Katrina, Hurricane Rita, and the 9/11 Terror attacks revealed the challenges faced by children with ASD, including issues related to school district preparedness, resource strains, record availability, financial difficulties, and flexibility in meeting federal requirements (Elsevier, 2019; DeVaney et al., 2009; Stough et al., 2017; Boon et al., 2011; U.S. Government Accountability Office, 2006). However, these events were localized

to specific regions, limiting the understanding of their national or global impact on children with ASD.

In contrast, the COVID-19 pandemic, declared by the World Health Organization in March 2020, had a profound and lasting impact on educational services for children with ASD worldwide. To mitigate the virus's spread, schools, businesses, and organizations were mandated to close, leading to a swift transition from traditional in-person education to virtual learning for children with ASD. Caregivers, who are crucial members of the educational team, suddenly found themselves managing multiple roles in the face of an emerging public health crisis (Masonbrink & Hurley, 2020). Similarly, education providers had to adapt to using technology to engage and deliver specialized services through virtual platforms. This abrupt shift disrupted the structure of educational engagement for children with ASD, who often struggle with behavior regulation and communication, making virtual learning a significant challenge (Centers for Disease Control and Prevention, 2019). Furthermore, many families faced additional pandemic-related stressors, such as food insecurity and unemployment, leaving them with limited time and resources to support virtual education (Masonbrink & Hurley, 2020).

While research has highlighted the social benefits of inclusive education for children with ASD when learning alongside their typically developing peers (Frederickson, 2010), empirical evidence supporting the benefits of home-based learning for children with ASD in the absence of face-to-face social interaction is scarce (Simmons & Campbell, 2019). Although some studies have explored disaster preparedness for children with ASD, there is a notable gap in research concerning the implementation of remote educational services during public health disasters and the translation of disaster relief guidelines into guidelines for virtual education. This knowledge gap extends to global public health disasters that necessitate school closures and the abrupt shift to virtual learning for children with ASD. Consequently, caregivers, who rely on their child's

academic institution to implement specialized Individualized Education Plan (IEP) services, were faced with the challenge of supporting their child's educational needs at home without the guidance of implementation guidelines or access to specialized in-person services due to COVID-19-related school closures.

The COVID-19 pandemic presents an opportunity for stress inoculation (Lai & Szatmari, 2019). This unique period underscores the use of virtual platforms and highlights the challenges faced by interested-parties involved in the implementation of virtual education for children with ASD. Therefore, this study aims to describe the contextual experiences of interested-parties in several areas, including the development and implementation of educational interventions, collaboration among IEP team members, the influence of educational interventions on IEP goal achievements, and changes in roles and resources during the virtual implementation process. By describing these contextual experiences, this research seeks to provide evidence-informed knowledge regarding the implementation of virtual education for children with ASD during the COVID-19 pandemic.

Chapter 3 will discuss the methodology used for this study including participant recruitment, participant selection, data collection, data analysis, validation strategies and ethical considerations.

Chapter 3: Research Methodology

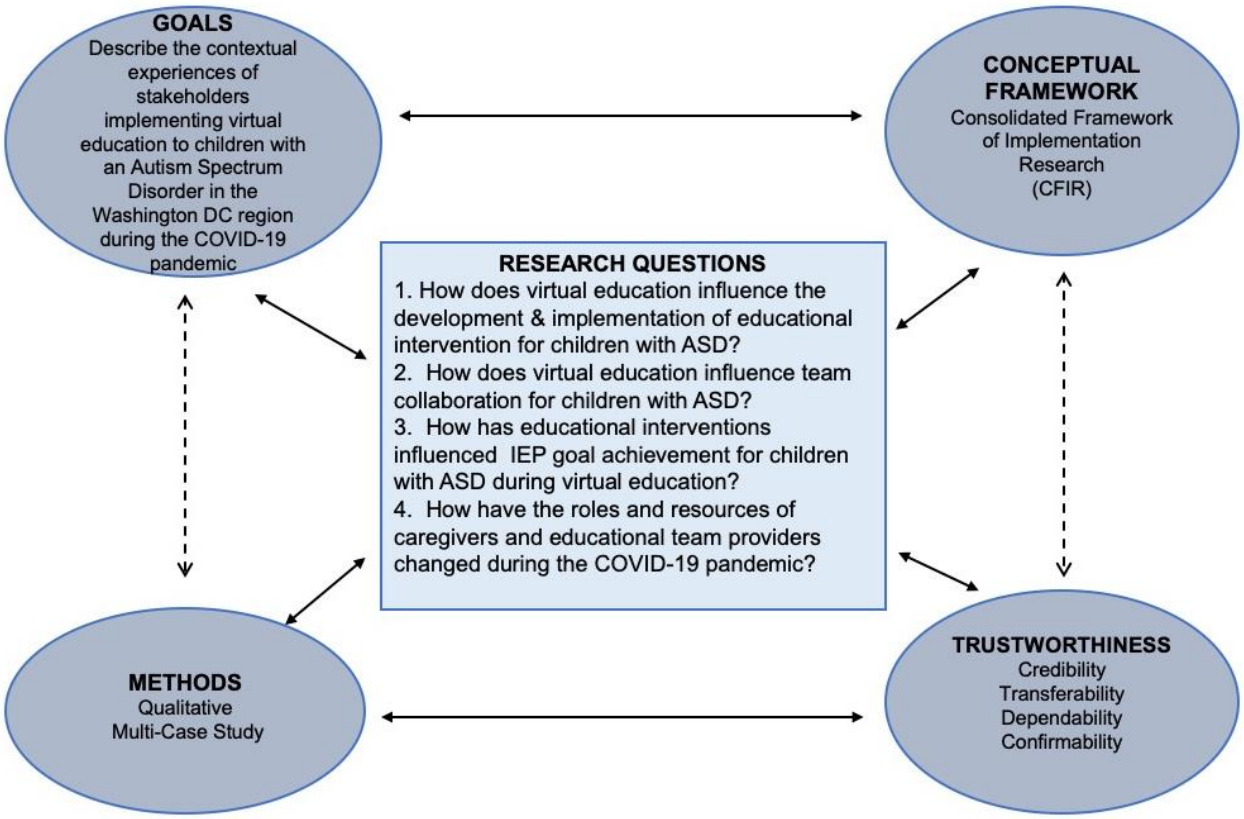
Overview of Methodology

This chapter delves into the methodology employed in this dissertation, which aimed to explore the intricate dynamics surrounding the implementation of virtual education for children with ASD during the unprecedented global COVID-19 pandemic. The research design chosen for this study was a multi-case study, which facilitated the use of multiple qualitative methods suited to unravel the complexities of a global pandemic's influence on the implementation process and its impact on the educational needs of children with ASD. The methodology encompassed participant recruitment based on predefined inclusion criteria, the creation of distinct interview protocols for caregivers and educational providers, data collection, data analysis techniques, validation strategies, and ethical considerations.

The research design and methodology adopted in this study were guided by Maxwell's Interactive Model of research design, as detailed in Figure 3.1. Maxwell (2013) posits that research questions serve as the central pivot around which all other elements of the design revolve. Simultaneously, the design's other components significantly influence the research questions, resulting in a dynamic interplay. This model recognizes that research is a continuous, iterative journey rather than a rigidly linear process (Maxwell, 2013).

Figure 3.1

Research Design of Study



(Maxwell, 2013)

Qualitative Inquiry

The research problem addressed in this study stems from a significant knowledge gap concerning the implementation of virtual education for children with ASD in the context of school closures resulting from public health disasters. To address this problem, this study sought to answer the following research questions:

- Research Question 1: How does virtual education influence the development and implementation of educational intervention for children with ASD?

- Research Question 2: How does virtual education influence team collaboration for children with ASD?
- Research Question 3: How has the transition from implementing traditional educational intervention methods to a virtual environment influenced IEP goal achievement for children with ASD?
- Research Question 4: How have the roles and resources of caregivers and education providers changed during the COVID-19 pandemic?

These research questions serve to guide the qualitative inquiry for this study, allowing for a comprehensive exploration of the experiences, challenges, and adaptations associated with virtual education implementation for children with ASD. Through a qualitative lens, this study aimed to unearth rich insights and narratives that illuminate the multifaceted aspects of virtual education during a global public health crisis. The qualitative inquiry approach is particularly well-suited for capturing the complexities and nuances of the participants' experiences, shedding light on their perspectives and practices in the face of unprecedented challenges.

Multi-Case Study Approach

This research adopts a qualitative study design, specifically employing a multi-case study approach, to investigate and provide insights into the experiences and challenges faced by interested-parties when implementing virtual education for children with ASD during the COVID-19 pandemic. Qualitative research is firmly rooted in constructivist and interpretivist ontologies, driven by the premise that individuals construct their realities through their unique experiences, resulting in the existence of multiple, context-dependent realities.

A multi-case study approach encompasses several defining features, as articulated by Yin (2014) and Creswell and Poth (2018). First, this research focuses on real-life cases that are ongoing, ensuring that the data collected accurately reflects the dynamic nature of the

phenomena under investigation. Time does not dilute the relevance of the information gathered. Second, each case within this study is delimited by specific parameters, whether they pertain to a particular location or a predefined timeframe. These boundaries help maintain the contextual relevance of the study.

Moreover, this study employed in-depth data collection methods, drawing from a variety of sources to provide a comprehensive understanding of the cases. This approach ensured that a rich and multifaceted view of the cases was obtained. This multi-case study leveraged the context of the cases to gain a deeper understanding of the phenomena being studied. This contextual richness was achieved by integrating insights from multiple data sources, enabling a holistic view of the complexities associated with each case.

Furthermore, the qualitative multi-case study design, as per Creswell and Poth (2018) and Yin (2014), facilitated the expansion of multi-case descriptions and the identification of emergent themes within the real-life contemporary context being studied. Cases, in this context, are not limited to individuals but extend to concepts embedded within the sampled context, referred to as theoretical sampling (Creswell & Poth, 2018). As new data ceases to contribute to the expansion of categorical aggregation, theoretical saturation is attained, leading to the emergence of themes that encapsulate the essence of the phenomena under investigation (Creswell & Poth, 2018).

The qualitative multi-case study approach was deemed the most suitable methodology for this research due to its capacity for in-depth exploration, adaptability to dynamic contexts, incorporation of diverse data sources, and emphasis on uncovering emergent themes. This approach facilitated an organic exploration of the complexities in virtual education for children with ASD. Moreover, it effectively captured the rich and varied experiences of interested-parties

involved throughout the implementation process, particularly in the challenging circumstances of the COVID-19 pandemic.

Implications for Dissemination

The qualitative methods employed in this study aligned closely with the endeavor to answer the four research questions and integrate contextual factors into the research process. Consequently, the research aimed to comprehensively describe the experiences of interested-parties engaged in the implementation of virtual education, with a specific focus on supporting the educational needs of children with ASD across various dimensions. These dimensions encompassed the development and implementation of educational interventions, fostering team collaboration within IEP teams, the achievement of IEP goals, and the shifts in roles and resources among caregivers and education providers. The translational implications stemming from this research are manifold and geared towards the following key objectives:

1. Deeper Understanding of Contextual Experiences**:** The study sought to provide a profound understanding of the contextual experiences of interested-parties involved in the implementation of virtual education for children with ASD within the Washington DC metropolitan region during the COVID-19 pandemic. This understanding served as a foundational insight into the challenges and successes faced by interested-parties in a real-world, crisis-driven scenario.
2. Practical Contributions and Evidence-Based Knowledge**:** The practical insights garnered from this research were intended to contribute significantly to the body of knowledge in the field. These insights could be translated for forming the basis in the development of evidence-informed implementation guidelines tailored to the unique needs of children with ASD in virtual education settings. By anchoring guidelines in empirical findings, this research strived to enhance the quality and efficacy of virtual education practices.

This research underscored the importance of translating knowledge into actionable recommendations for interested-parties, thereby optimizing the implementation of evidence-based best practices in virtual education for children with ASD. By providing a nuanced understanding of the contextual experiences of interested-parties, coupled with practical insights, this research could disseminate knowledge to inform policy planning in the realm of education. The dissemination of knowledge could prove to be invaluable for interested-parties tasked with implementing virtual education for children with ASD during school closures resulting from future public health crises and pandemics.

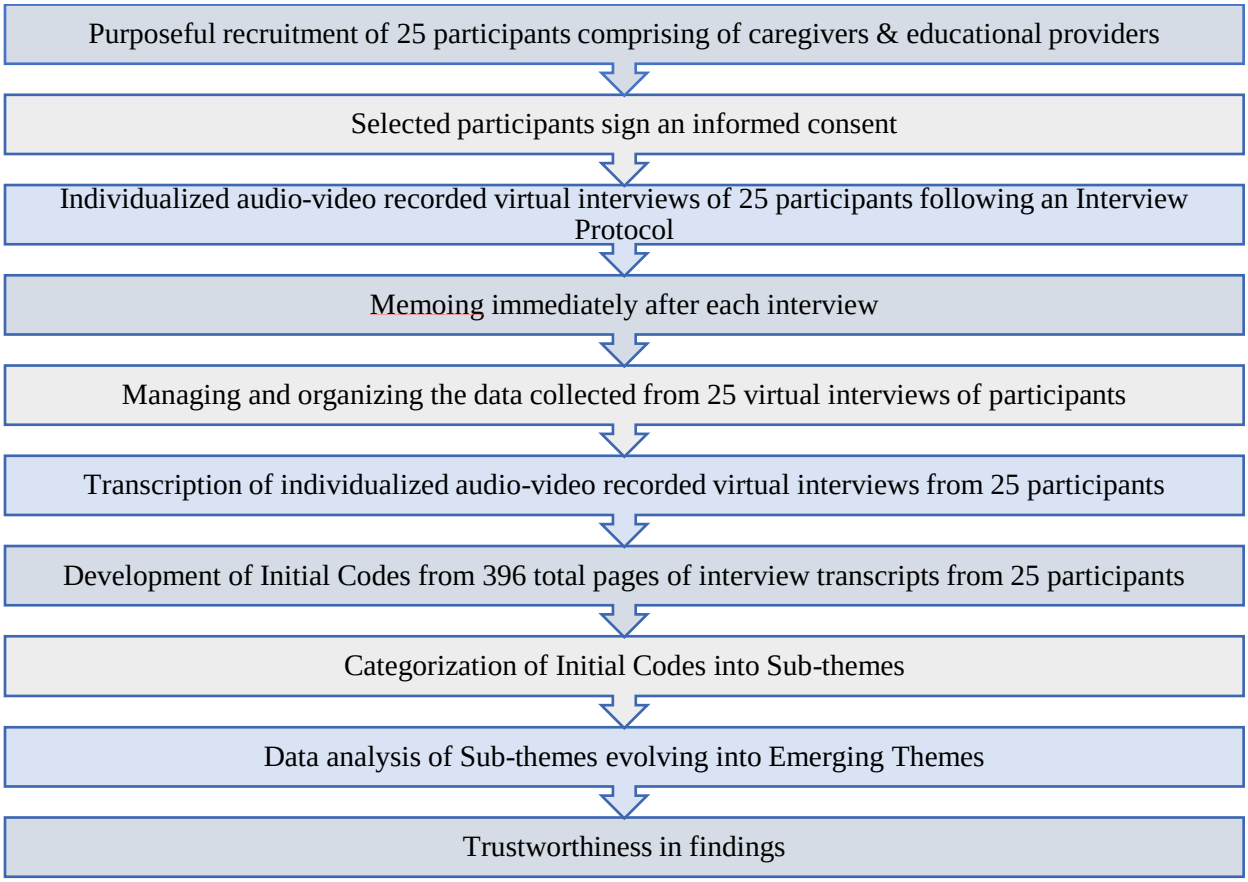
This research sought to contribute to the growing body of knowledge in the field of virtual education for children with ASD, with the ultimate goal of informing the development of evidence-based implementation guidelines for best practices and educational policy planning. The dissemination of knowledge gained from the findings will empower interested-parties to navigate the challenges posed by future public health crises and ensure that children with ASD receive the support they need for their educational journey.

Research Procedures

This qualitative study encompassed a set of distinct research procedures, which included participant recruitment, data collection, and data analysis. In addition to these core procedures, validation strategies were meticulously applied to the data to ascertain the trustworthiness and credibility of the findings. This section provides an overview of the research procedures illustrated in Figure 3.2, and offers a detailed discussion of each procedure within the context of this study.

Figure 3.2

Overview of Research Procedures



Participant Recruitment

This research study adopted an ongoing and purposeful recruitment approach, employing snowball sampling to identify and enlist twenty-five participants who experienced implementing virtual education for children with ASD within the Washington DC metropolitan region during the COVID-19 pandemic. Snowball sampling is a method that involves identifying cases of interest through recommendations from individuals who possess knowledge about information-rich cases (Creswell & Poth, 2018). In order to achieve maximum variation within the total sample size, the selection process aimed to encompass a diverse combination of caregivers and

educational providers hailing from Washington DC, Maryland, and Virginia. The selection criteria was meticulously defined to ensure the inclusion of eligible participants.

Each professional contact within the field of education served as a gatekeeper and initial point of contact for the researcher, guiding them towards other potential eligible participants (Creswell & Poth, 2018; Atkinson, 2014). The recruitment process involved the creation of two distinct online information flyers, one tailored for caregivers represented by Appendix A, and the other for education providers represented by Appendix B. Eligible participants received the appropriate flyer based on their role in relation to the child with ASD. These information flyers offered an overview of the study's purpose, participant eligibility criteria, study requirements, and contact details. Prospective candidates interested in participating in the study had the option to reach out to the researcher via the provided contact information for further details and to express their willingness to participate. Prospective participants were required to meet a set of predefined inclusion criteria, as outlined in Table 3.1 below.

Table 3.1

Inclusion Criteria for Participant Selection

PROSPECTIVE CANDIDATES FOR THIS STUDY MUST:
• Be 18 years of age or older
• Engage in a one hour audio and video recorded virtual interview
• Sign an informed consent if selected for this study
• Be a **caregiver*** or **educational provider**** who has supported IEP based services virtually to one or more children with an Autism Spectrum Disorder within the Washington DC metropolitan region (Washington DC, Maryland, and Northern Virginia) during the COVID-19 pandemic
• ***Caregivers** will be required to screen share IEP progress reports or report cards from their child's participation in virtual education during the COVID-19 pandemic (*reports must be de-identified)
• ****Educational providers** will be required to screen share audiovisual educational materials used in virtual education for children with ASD during the COVID-19 pandemic (**materials must be de-identified)

Participant Selection and Informed Consent

In this study, a purposeful selection process was employed to choose twenty-five participants who met the inclusion criteria. The aim of this approach was to ensure maximal variation within the sample, thereby diversifying the participant pool. Each prospective participant was required to provide informed consent before enrolling in the study. The informed consent document comprehensively outlined the nature of the study, including associated risks and the voluntary nature of participation in human subjects research. It also detailed the potential benefits of participating in the study and the participants' right to withdraw their consent at any point during the research.

Throughout the recruitment process and during the course of the study, participants were given ample opportunities to ask questions and have any concerns addressed to ensure that they were well-informed and comfortable with their involvement. The twenty-five participants who were interviewed for this study included both caregivers and education providers from the District of Columbia, Maryland, and Virginia. Each participant was assigned an interview number based on the order in which they were interviewed. To maintain confidentiality during the interview and data analysis processes, pseudonyms were used to replace participants' actual identities (Creswell & Poth, 2018; Saldana, 2013). Additionally, a classification code was assigned to each participant to indicate whether they were a caregiver (C) or an education provider (EP) along with their job title. The location of each participant was identified as being from the District of Columbia (DC), Maryland (MD), or Virginia (VA). This comprehensive process ensured that the participants were appropriately selected, informed and assigned pseudonyms to protect their confidentiality during the study. Table 3.2 provides a list of the selected participants for this study.

Table 3.2

List of Study Participants

Interview #	**PARTICIPANT** (*pseudonym used for confidentiality)	**CLASSIFICATION** C= Caregiver EP= Education Provider	**LOCATION**
1	Pam	C	MD
2	Sarah	EP- Special Education Teacher	MD
3	Becky	EP- Special Education Teacher	MD
4	Kate	EP- Speech Language Pathologist (SLP)	VA
5	Sally	C	MD
6	Leah	C	DC
7	Nancy	C	DC
8	Doris	C	MD
9	Susan	EP- Applied Behavior Analysis (ABA) Provider	MD
10	Carla	EP- Applied Behavior Analysis (ABA) Provider	DC
11	Janet	C	DC
12	Aaron	C	DC
13	Abby	EP- Occupational Therapist (OT)	MD
14	Cecile	C	MD
15	Daniel	C	MD
16	Diana	EP- Special Education Teacher	DC
17	Mia	C	MD
18	Molly	C	MD
19	Debbie	EP- Special Education Teacher	MD
20	Claire	EP- School Psychologist	MD
21	David	C	MD
22	Kim	C	DC
23	Robin	C	DC
24	Grace	C	MD
25	Jenifer	C	MD

The study participants were selected from three geographic regions: the District of Columbia (DC), Maryland (MD), and Virginia (VA). A breakdown of the participants by region and their respective roles as caregivers and education providers is presented below in Table 3.3.

Table 3.3

Participants Demographics by Region and Role

Participants	District of Columbia	Maryland	Virginia	Total
Caregivers	6	10	0	16
Education Providers	2	6	1	9
Total	8	16	1	25

The District of Columbia contributed eight participants in total, consisting of six caregivers and two education providers. In Maryland, there were a total of sixteen participants, with ten being caregivers and six educational providers. Virginia had one participant in the educational provider role. Thus, the study included a total of sixteen caregiver participants and nine educational provider participants, comprising a total of twenty-five selected participants. This demographic information provides an overview of the distribution of participants across regions and roles in the study.

Data Collection

In a multi-case research study, multiple forms of data collection are typically employed to gain comprehensive insights (Yin, 2014). This study employed two of these data collection methods, specifically virtual interviews and the collection of relevant documents, to gather information from both caregivers and education providers. Caregivers were asked to provide virtual interviews and share their child's progress report or report card from virtual education during the COVID-19 pandemic, while education providers participated in virtual interviews and shared an audio-visual educational activity implemented during virtual education for their

students with ASD. According to Creswell and Poth (2018), documents and audio-visual materials serve as valuable supplements to interviews and observations in qualitative research.

Virtual Interviews Amidst a Pandemic. The data collection process for this study unfolded through twenty-five virtual interviews conducted during the hybrid learning period, spanning from September 2021 to December 2021, a pivotal juncture in the throes of the COVID-19 pandemic. These virtual interviews represented the cornerstone of data acquisition and were methodically aligned with the four research questions. Given the constraints posed by the pandemic, virtual interviews emerged as the most viable means of interaction. Each interview was meticulously crafted to follow a semi-structured design, characterized by open-ended questions designed to elicit rich and contextually relevant responses. These questions were intentionally tailored to probe into the specific dimensions of the research inquiries.

Crucial Role of Technology. Practical considerations dictated that these virtual interviews be conducted using a secure online platform. This technological underpinning ensured the seamless execution of interviews while upholding the strictures of data security and confidentiality. Both audio and video recording mechanisms were employed, preserving not just the auditory content but also the visual cues and nuances that enrich qualitative research.

Dynamic Interactions. Participants were not just passive recipients but active partners in upholding the confidentiality of the shared information. They were duly reminded of the imperative to create an environment conducive to focused conversation, devoid of disturbances and distractions. This shared commitment to confidentiality was a fundamental tenet of the research process. These virtual interviews represented more than just a data collection method; they were dynamic interactions that captured the essence of interested-parties' experiences during a critical juncture in the COVID-19 pandemic.

Interview Protocols. To facilitate the interviews, two interview protocols were developed and approved by the Institutional Review Board (IRB) at The George Washington University. The Interview Protocol designed for caregivers is shown in Appendix C and the Interview Protocol tailored to education providers is shown in Appendix D. Each protocol contained approximately seven open-ended questions, aligned with the CFIR domains, to guide the discussions and gather relevant data. Caregivers were required to screen share their child's IEP progress report or report card from the virtual education period, while education providers were required to screen share an educational activity implemented during virtual education for students with ASD.

The conceptual framework of CFIR guided the development of open-ended interview questions for both protocols, ensuring alignment with the study's purpose. Each participant's identity was replaced with a pseudonym to maintain confidentiality. All interviews, involving sixteen caregivers followed the Interview Protocol shown in Appendix C, and nine educational providers followed the Interview Protocol shown in Appendix D, were recorded and transcribed. Following each interview, memos were created to capture unique details and insights, aiding in the reflection on interview dynamics providing valuable data from the interview process. The interview recordings were then uploaded to transcription software, Sonix AI (Sonix AI, 2022), and manually reviewed for accuracy. The resulting interview transcripts were electronically secured and served as the basis for thematic data analysis. This comprehensive data collection approach ensured that the experiences and perspectives of caregivers and education providers regarding the implementation of virtual education for children with ASD during the COVID-19 pandemic were thoroughly documented and analyzed.

Data Analysis Spiral

The analysis of data in multi-case study research, as described by Creswell and Poth (2018), is a process aimed at comprehensively understanding the complexity of each case by employing various strategies to collect and analyze information. This approach involves a "data analysis spiral" (Creswell and Poth, 2018, pg. 186), which contrasts with the linear approach often found in quantitative data analysis. Instead, the spiral method revolves around iterative, insightful cycles, allowing researchers to thoroughly describe their findings (Creswell and Poth, 2018). The data analysis for this qualitative study followed a five-step process guided by the data analysis spiral illustrated in Figure 3.3:

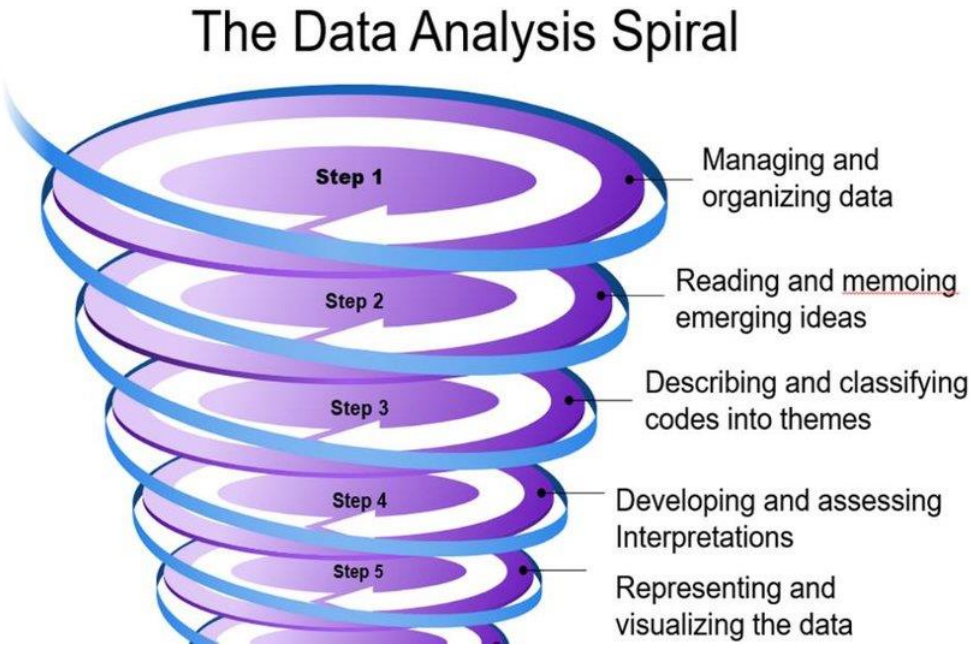
1. Managing and Organizing the Data: The first step involves the careful organization and management of the collected data. This included transcribing interviews, ensuring data integrity, and structuring it for further analysis.
2. Reading and Memoing Emergent Ideas: In this step, researchers immerse themselves in the data by reading and memoing. Memoing involves making notes, reflections, and observations on emerging ideas, patterns, or significant insights within the data.
3. Describing and Classifying Codes into Themes: The next phase centers on coding, where researchers systematically categorize and classify segments of data into meaningful codes. These codes are then organized into themes that represent recurring patterns or concepts within the data.
4. Developing and Asserting Interpretations: With themes identified, researchers proceed to develop interpretations of the data. This step involves making sense of the findings, exploring connections between themes, and generating meaningful insights.

5. Representing and Visualizing the Data: The final step focuses on presenting the data in a clear and compelling manner. Researchers may employ various visualization techniques, such as charts, graphs, or diagrams, to communicate the findings effectively.

By following this data analysis spiral, researchers ensure a comprehensive and iterative exploration of the collected data, allowing for a deep understanding of the experiences and insights shared by participants in the study (Creswell & Poth, 2018).

Figure 3.3

The Data Analysis Spiral



(Creswell and Poth, 2018, pg. 186)

Data Analysis Process

The first step in the data analysis process for this multi-case research involved managing and organizing the extensive dataset collected from twenty-five virtual interviews, including both audio-visual recordings and transcribed interview texts. To ensure data integrity, ethical research principles were closely adhered to, preserving the confidentiality and security of the information

obtained from each participant. Electronic data files were meticulously created and organized for each participant, guided by these principles.

The second phase encompassed reading through the transcribed interviews and memoing emergent ideas. These memos served as more than just descriptive summaries; they aimed to synthesize the data into higher-level analytic meanings, reflecting the richness and depth of the participants' narratives. The memos were thoughtfully documented alongside the margins of the interview transcripts to facilitate analysis, following the guidance of experts like Saldana (2013).

The third step involved the classification of initial codes based on the context and description of the cases. The data was loosely analyzed to observe for similarities and differences among the various cases within their respective contexts.

The fourth phase of data analysis centered on developing and evaluating interpretations derived from the initial coding. This involved the use of categorical aggregation, a process of grouping complex information into categories or classes, which assisted in uncovering the larger significance embedded within the collected data. This phase aimed to abstract beyond initial codes and themes to discern deeper insights and patterns.

The final step in data analysis entailed the visualization and representation of findings through direct interpretations. Natural generalizations were developed and conveyed based on what was learned from the implementation experiences of the participating interested-parties. This process aimed to provide a coherent and comprehensive understanding of the data, enabling the synthesis of the participants' experiences and insights.

Data Analysis Using NVivo. The data analysis phase in this research was robustly supported by the utilization of NVivo (NVivo QSR International, 2022) which proved invaluable in handling and organizing the extensive dataset. A total of 25 participants contributed to 396 transcript pages and 1,361 minutes of interview time, as summarized in Table 3.4.

Table 3.4

Interview Transcript Data from Participants

PARTICIPANTS	TRANSCRIPT PAGES	TRANSCRIPT MINUTES
Caregivers	280	941
Education Providers	116	420
Total	396	1361

All interview transcripts were meticulously uploaded into NVivo and categorized according to participant roles, namely caregivers and education providers. The data analysis process closely adhered to the qualitative analysis procedures advocated by Boyatzis (1998) and Saldana (2013).

Initially, the data extracted from transcripts within the caregiver category underwent a comprehensive coding process. Coding involved the placement of statements that were pertinent to addressing the research questions into NVivo nodes, which functioned as codes. A total of 1,130 excerpts from the sixteen caregiver transcripts were identified as relevant and organized into NVivo nodes during this stage. Statements conveying similar meanings were grouped under the same code, resulting in 34 distinct codes represented in Appendix E.

Similarly, data from the transcripts of 9 education providers underwent initial coding. Pertinent statements were categorized into 34 codes based on 581 excerpts extracted from the nine education provider transcripts. These codes were succinctly labeled to encapsulate the content they represented in Appendix F.

The subsequent phase of data analysis focused on the development of sub-themes, following the methodologies outlined by Boyatzis (1998) and Saldana (2013). The 34 initial codes generated during the previous stage were further analyzed to form coherent sub-themes. Each sub-theme was labeled with a succinct phrase, effectively describing the data encapsulated within it.

Finally, the culmination of the data analysis process entailed synthesizing the sub-themes to unveil emerging themes, guided by the principles elucidated by Boyatzis (1998) and Saldana (2013). Through this analytical step, sub-themes housing the initial codes derived from interested parties' narratives were systematically analyzed and consolidated. Consequently, themes that organically surfaced during the data analysis were identified as emerging themes.

The utilization of NVivo software greatly facilitated the management, structuring, and analysis of qualitative data for this research. Its visual displays offered an effective means of comprehending codes and categories, and its robust security features ensured data confidentiality and privacy. Furthermore, NVivo's seamless integration with the Consolidated Framework for Implementation Research (CFIR) allowed for the orderly organization of data in accordance with the five CFIR domains, thereby enhancing the overall thematic data analysis process. This rigorous analytical approach for qualitative data ensured that the research findings authentically captured the complexity and depth of interested parties' experiences when implementing virtual education for children with ASD during the COVID-19 pandemic.

Validation Strategies

The credibility, transferability, dependability, and confirmability of the findings were integral to establishing trustworthiness in this dissertation's research. Shenton's (2004) strategies for achieving these aspects are discussed to elucidate the methods employed.

Credibility

Credibility was diligently maintained by establishing rapport with the participants and gaining an in-depth understanding of the research environment. This approach fostered trust between the researcher and participants. Virtual interviews were scheduled flexibly, accommodating the participants' availability, and data analysis continued until data saturation

was achieved. This iterative process allowed the researcher to purposefully align the data to gain a comprehensive understanding of the context underpinning the research.

Transferability

Transferability ensured that the research findings can be applicable in various contexts. Detailed findings that encompassed methodologies, coding processes, and thematic results will enable other researchers to replicate or adapt this research. Given that this study revolved around the context of school closures resulting from the COVID-19 pandemic, the findings can be transferred to other potential public health disasters that may also necessitate school closures.

Dependability

Dependability was affirmed through consistent findings in the data analysis. An independent researcher reviewed both data collection and data analysis processes, randomly assessing them for accuracy and consistency. The separate interview protocols crafted for caregivers and education providers can be reproduced and serve as templates for future studies, contributing to the dependability of this research.

Confirmability

Confirmability underscores the need for the researcher to maintain objectivity while describing the participants' lived experiences. Robust data storage, comprising interview recordings, interview transcripts, coding tables, and thematic tables, was meticulously maintained and can be shared upon request, reinforcing confirmability. Moreover, trustworthiness in the findings was enhanced through member checking. All interview transcripts from the twenty-five participants were subject to member checking to ensure the accuracy of transcribed data from the audio and video recordings. Additionally, an independent researcher randomly reviewed the recordings and cross-verified the data with the interview transcripts. Thematic data analysis was also subjected to member checking by participants,

allowing them to confirm the accuracy of findings and provide additional data that might not have been adequately represented during the analysis. Member checking was particularly valuable in this qualitative multi-case study, as it empowered participants to validate the thematic findings derived from their contextual experiences and contribute valuable information that might otherwise have been overlooked during data analysis.

Ethical Principles Guiding Human Participants

This study meticulously adhered to ethical principles and obtained approval from the Institutional Review Board at the George Washington University, ensuring full compliance with human subjects research guidelines. The researcher's commitment to ethical standards was upheld throughout the study's duration, with validation strategies in place to maintain data collection and analysis trustworthiness. All virtual interviews were conducted using a private and secure platform in a distraction-free environment, fostering the confidential sharing of information between the researcher and participants. To protect participants' privacy, pseudonyms were employed to replace their names during the de-identification of data.

The research study exemplified several key ethical principles, including:

1. Beneficence (Doing Good): The study aimed to benefit both participants and society by enhancing understanding in the field of virtual education for children with ASD during public health crises.
2. Non-Maleficence (Preventing or Mitigating Harm): Measures were in place to minimize potential harm to participants, ensuring their safety and well-being throughout the study.
3. Fidelity and Trust: A fiduciary relationship between the investigator and participants was established based on trust, promoting ethical conduct and transparency.

4. Personal Dignity and Autonomy: Participants were treated with respect and had the autonomy to make informed, voluntary, and competent decisions regarding their participation. Their personal information was handled with utmost privacy.

Incorporating these ethical values into the study's methodology, data collection, analysis, and reporting of results was paramount. Additional ethical principles integral to the study included:

- Respect for Participants: Participants' perspectives and experiences were highly regarded and respected.
- Informed Consent: Participants were provided with comprehensive information about the study, ensuring they fully understood their involvement.
- Audio/Video Recording Permission: Specific permission was obtained for audio and/or video recording through secure virtual platforms.
- Cooperation without Coercion: Participants willingly cooperated without any form of coercion or intimidation.
- Right to Discontinue: Participants had the unequivocal right to discontinue their participation in the study at any point.
- Transparency of Funding: The study's funding sources were fully transparent.
- Avoidance of Harm: Stringent measures were in place to prevent harm to participants.
- Preservation of Anonymity: The identities of participants were carefully protected.
- Right to Review and Amend Records: Participants had the right to review and make changes to their records.
- Information Security: Data was handled with the utmost security and confidentiality.
- Empowering Support: Participants were provided with support throughout their participation.
- Moral Administration: The study adhered to moral and ethical standards in all aspects.

- Complaint Systems: Mechanisms for addressing participant complaints were established.
- Appropriate Research Methodology: The chosen research methodology was deemed appropriate for ethical research.
- Full Reporting: Procedural strategies and findings were reported in their entirety (Vanclay et al., 2013).

These ethical principles were integral to ensuring the integrity and ethical conduct of the research, ultimately upholding the rights and well-being of the study's human participants.

Summary

This chapter delved into the methodology employed in this study, encompassing participant recruitment, data collection, data analysis, theoretical principles guiding the research, validation strategies, and ethical principles associated with human subject research. Twenty-five participants, consisting of sixteen caregivers and nine education providers who met established inclusion criteria, were purposefully selected for the study. Each participant underwent an informed consent process and participated in an one-hour, audio and video-recorded virtual interview conducted via a secure online platform. These virtual interviews adhered to two separate interview protocols designed for caregivers and education providers. The interview protocol development was guided by the Consolidated Framework for Implementation Research (CFIR) and featured open-ended questions. Memoing occurred after each interview to capture significant participant comments. Recorded interviews were transcribed using Sonix ai and reviewed for accuracy. These 25 participants contributed to 396 pages of verbatim transcripts, which were imported into NVivo for thematic data analysis.

Thematic data analysis in this study involved the management, shaping, and analysis of data using NVivo's qualitative research features. The process began with the development of codes based on relevant participant statements for addressing the four research questions.

Subsequently, these codes were categorized into sub-themes and labeled to succinctly describe the data contained within each sub-theme. Finally, the sub-themes were synthesized to identify emerging themes by observing patterns in the data analysis.

The methodology adopted in this research contributes to the relevance of its findings for future studies conducted during public health disasters affecting school closures. Trustworthiness was ensured through validation strategies that focused on credibility, confirmability, dependability, and transferability. Member checking was employed, with each participant receiving their interview transcript for verification in accuracy. Triangulation of data sources, including virtual interviews, memos, and screen-sharing of report cards and educational activities, enhanced the credibility of the study. Strategies such as reflexivity, triangulation, and member checking were employed to reduce research bias and maintain objectivity in data collection and analysis, further confirming the findings. The study adhered to ethical principles governing human subject research, as dictated by the Institutional Review Board at the George Washington University.

Chapter four offers a deep dive into the research findings, contextualizing them within the framework of the adopted methodology. The validation strategies underscored the trustworthiness of these findings, reinforcing their credibility and authenticity. Through direct quotations, the chapter bridges the gap between data collection and research outcomes, providing a compelling narrative that sheds light on the experiences of interested-parties in implementing virtual education for children with ASD during the COVID-19 pandemic.

Chapter 4: Results

Introduction

This chapter presents the results from the qualitative data analysis. This study aimed to answer the following four research questions:

1. How does virtual education influence the development & implementation of educational intervention for children with ASD?
2. How does virtual education influence team collaboration for children with ASD?
3. How has educational interventions influenced IEP goal achievement for children with ASD during virtual education?
4. How have the roles and resources of caregivers and educational team providers changed during the COVID-19 pandemic?

An overview of the thematic data analysis, including notable similarities in initial codes between participant groups, is provided at the beginning of this chapter. Subsequently, themes that emerged from the data analysis are discussed, with an explanation of the identified codes and subthemes. Contributions in the form of quotes related to each subtheme are used to describe and provide the experiences of participants. Finally, a discussion on trustworthiness of key findings will conclude this chapter.

Thematic Data Analysis

Interview Transcripts & Similarities in Initial Codes

The data collected from twenty five participants resulted in a total of three hundred ninety six pages of interview transcripts, totaling one thousand three hundred sixty-one minutes of interview time. Sixteen caregiver participants contributed nine hundred forty one transcript minutes, resulting in two hundred eighty total pages of interview transcripts. The data

transcribed from the caregiver group led to the development of thirty four initial codes displayed in Appendix E. Nine education provider participants contributed four hundred twenty transcript minutes, resulting in one hundred sixteen total pages of interview transcripts. The data transcribed from the education provider group also resulted in the development of thirty four codes represented in Appendix F. An unexpected finding emerged upon examination of the codes from the two different interested-parties group: the initial codes were remarkably similar.

Upon a closer examination of the two table of initial codes, it became evident that the initial codes between the two participant groups exhibited significant similarities. To verify this surprising finding, member checking of the interview transcripts was conducted. Each participant received their interview transcript via email for verification of the data obtained during their virtual interview. All twenty five participants responded in agreement with data presented in their interview transcript. Based on the confirmation of these similarities found in Appendix E and Appendix F, the initial codes were synthesized into one table. To represent these similarities in the initial codes, the code number of each code for caregivers (C) and education providers (E) was labeled next to the code for Interested-Parties (IP) illustrated in Appendix G.

Data Analysis Results

The initial codes of interested-parties found in Appendix G were categorized and developed into eight distinct sub-themes. Each sub-theme received a concise descriptive label, as illustrated in Appendix H. Subsequently, further data analysis involved the grouping of these eight subthemes, ultimately leading to the emergence of three overarching themes represented in Appendix I. These themes are as follows, 1. Transition to Virtual Education, 2. Team Communication, and 3. Implementation of Virtual Education. A visual representation of the

results from the thematic data analysis is provided by Figure 4.1, and the coding matrix can be found in Figure 4.2.

Figure 4.1

Results from Thematic Data Analysis

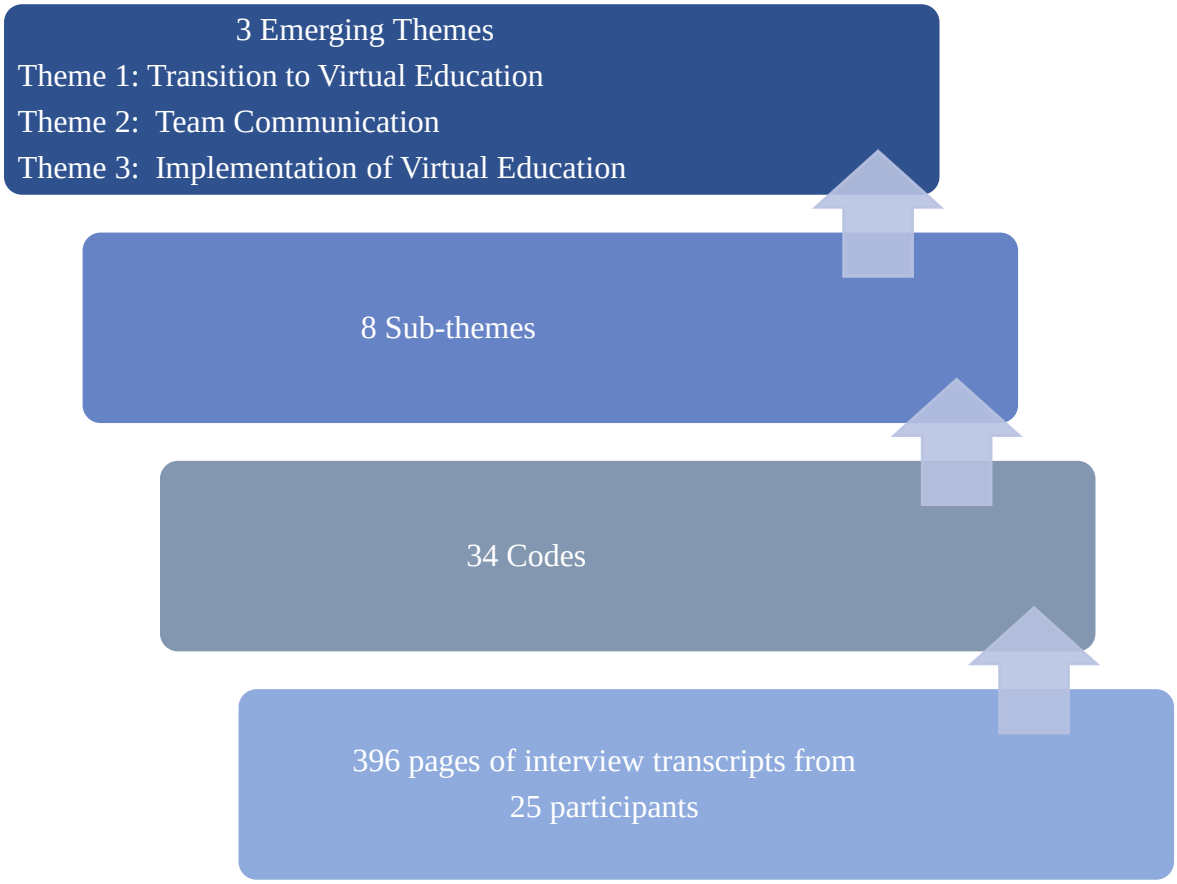
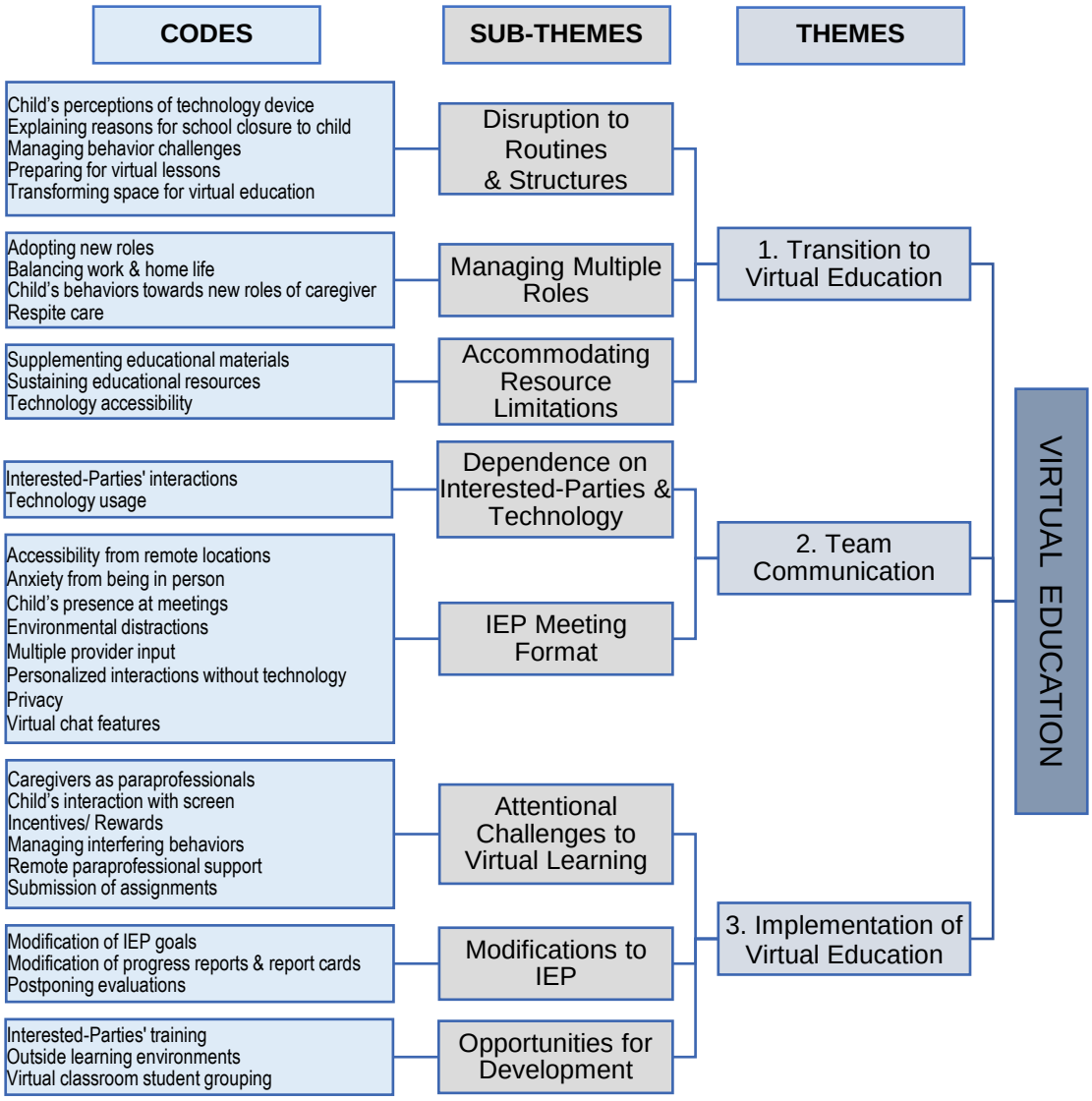


Figure 4.2

Coding Matrix



Theme 1: Transition to Virtual Education

Theme one, transition to virtual education, focused on three areas: 1) disruption to routines & structures, 2) managing multiple roles and 3) accommodating resource limitations shown in Figure 4.3. The onset of the COVID-19 pandemic led to swift school closures in

March 2020. The hasty transition from in person education to online learning, presented challenges for both caregivers and education providers.

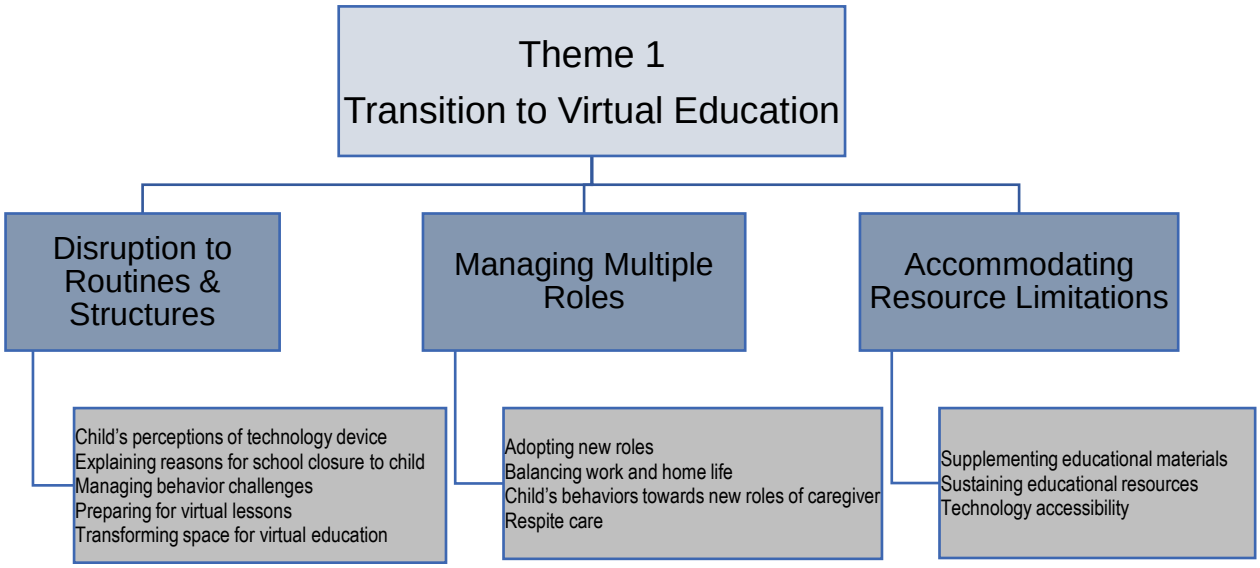
The initial challenge discussed by caregivers was related to the disruption of routines and structures in their children's lives due to the shift to virtual education. Many children exhibited aversive behaviors in response to these disruptions. Furthermore, caregivers themselves has to manage the demands of working remotely while simultaneously taking on multiple educational service roles to support their child's virtual education.

For education providers, the transition also meant the disruption of their routines and structures. This involved adjusting to new methods of providing education including preparing for virtual lessons and delivering virtual therapy services to students with ASD. Engaging students through online platforms posed a significant challenge. Similar to caregivers, education providers reported difficulties in simultaneously managing multiple roles associated with working from home.

Another area affected by this transition was accommodating resource limitations, particularly regarding educational and technological resources. Although schools districts provided laptops to students, many caregivers and education providers found accessing the associated technological tools to be challenging. They discussed their unfamiliarity with navigating a virtual platform that was now required for education. Additionally, both caregivers and education providers had to locate additional materials to supplement the provided educational resources in order to enhance children's engagement with virtual lessons.

Figure 4.3

Theme One: Transition to Virtual Education



Disruption to Routines and Structures

The emergent need for school closures to mitigate spread of the COVID-19 virus resulted in an abrupt disruption to the established routines and structures of caregivers within their home environments. Caregivers, along with their children, were forced to transition to an unfamiliar virtual learning setting, which disrupted established routines and structures.

Explaining Reasons for School Closure to Child. One initial challenge that caregivers reported was their inability to explain to their children the ongoing COVID-19 pandemic that led to school closures. Due to the limited understanding that most children with autism display, they frequently struggled to comprehend why their established school routine had been disrupted. For example, Leah, a caregiver, faced this challenge with her daughter, who had difficulty grasping the situation:

> "I think that concept was probably the most hard to grasp, like she kept asking, when am I going back to school? When am I going to see my friends? When am I going to see my teachers? And, a child with disabilities, it's kind of a struggle explaining to her"
>
> (Leah, Caregiver)

Janet, another caregiver, expressed that her daughter would even go as far as getting dressed for school, indicating her readiness to leave home and attend school. Janet further shared that her daughter initially expressed disinterest in the changes in routines associated with transitioning to virtual education and said the following:

> "Initially, she did not want to participate in virtual education. She wanted to go back to school, she would go so far as to get herself completely dressed, put her backpack on, to indicate that she is ready to go to school. So that's a change we did see in the early part of the pandemic was her being a little bit more proactive in terms of getting herself ready, But her goal was to get to the building" (Janet, Caregiver)

Similarly, education providers also faced challenges in adapting their routines and structures to teach using a virtual platform. Many education providers discussed the initial difficulties associated with introducing virtual school and virtual learning. Diana, an education provider, shared her experience of using animated storytelling to explain purpose of virtual learning to her students, acknowledging the challenges in making it understandable and engaging.

> "I would create a story out of a concept. So for example, if the concept is safety. I would create an animation about germs and explain why we must wash hands and stay indoors to be safe. Because germs are everywhere so we cannot be outside. I used songs and videos to make it fun but it was hard and confusing for them"
>
> (Diana, educational provider)

Managing Behavior Challenges. Nonverbal children with ASD are highly dependent on routines to help structure their activities throughout the day (Johansson et al., 2020). Caregivers of nonverbal children with ASD also find established routines helpful in maintaining predictable schedules and behavior patterns. The abrupt changes to routines caused by virtual education have presented challenges for many caregivers of nonverbal children with ASD, as their children were unable to verbally express their frustrations. Nancy, a caregiver, reported

observing maladaptive behaviors in her nonverbal daughter due to changes in her school routines:

> "The only way of communication is through crying whenever we will pull out that laptop because my child likes to go to school. She wakes up in the morning, she grabs her backpack, she's standing at the door meaning she's ready to go. So having to take that backpack from her, bring out a laptop, having to force her to sit down, she would just cry. That's how she demonstrated her feelings, crying and throwing tantrums"
>
> (Nancy, Caregiver)

Similarly, Daniel discussed challenges associated with his child's nonverbal behaviors. He shared the difficulties he faced whenever he showed his on his school laptop:

> "He'd slam his laptop down, sometimes he'd knock the computer over. Or sometimes, he'd start hitting you or hitting himself, to express that he was not interested and he was not going to participate because he knew what that laptop meant" (Daniel, Caregiver)

Grace, expressed how the sudden change in routines caused her son to demonstrate adverse physical behaviors:

> "these behaviors that we're having now are a result of the break of routines because he got up one morning and starting hitting himself. The routine has always been he gets up, he takes a shower, he dresses up and then he eats breakfast and gets ready to go get on the bus. But during these days, that could not happen" (Grace, Caregiver)

Similarly, education providers also faced behavior challenges from their students with ASD due to changes in routines and structures. Sarah, an education provider, shared that her students enjoyed circle time every morning, but during virtual education, those same students would not come near the screen to participate.

> "it was difficult for them to adapt to this big change in their world. My students were not used to seeing their teachers on the computer screen or learning through a virtual format. So attempting to engage them to the screen, even though their favorite songs during circle time wouldn't bring them to the screen" (Sarah, Education Provider)

Child's Perception of Technology Device. The disruption to established routines and structures also led to difficulties in developing new routines for virtual education. In addition to behavior issues, caregivers found the sudden pivot to an online platform created challenges as

their children now had to associate their teacher, peers and class learning activities with a computer, a device that was previously only used for playing games. David, a caregiver to a son with ASD and Attention Deficit Hyperactivity Disorder (ADHD), expressed that technology devices were always used for sustaining attention to play games. With the switch to virtual education, his son now had difficulty with associating that same technology used for playing games to learning.

> "He always thought his laptop was used for a fun activity. So making that transition to now having to sit and do educational activities and listen to somebody talk where he's used to playing games, was very difficult for him" (David, Caregiver)

Grace, a caregiver, also shared that she used technology devices as an incentive tool, which made it challenging to engage her son in virtual lessons:

> "I would say it was quite challenging because he was using a device that has always been used as an incentive and not as a learning tool" (Grace, Caregiver)

Education providers also shared similar experiences in engaging their students in virtual lessons. Many expressed that the computers often used in classrooms were game-based, featuring animations and songs. Therefore, seeing their teacher and peers on the screen for the first time caused aversive behaviors towards screen engagement for students with ASD. Becky, an education provider, shared that some of her nonverbal students would demonstrate aversive behaviors toward seeing her and their peers on the screen:

> "Initially, there was a lot of pushing down on the keys or tapping on the screen to either get us off the screen or to play a game because that is familiar to them when they see the computer screen" (Becky, Education Provider)

Transforming Space for Virtual Education. In addition to making changes to their routines, caregivers also had to make structural changes within their home for virtual education.

Some caregivers, like Leah, had to convert an existing space used for different purposes into a new space to support their child's virtual learning:

> "I turned her playroom into kind of like a classroom, but she didn't have a desk so I had to buy a desk and kind of rearrange some things around so she could have a place to actually sit and do her work. And it's kind of adjoining to the living room. So I mean, we're in an apartment, so it's not that far away. But this way I have my desk, she has her desk, you know, that way she can feel like this is my space" (Leah, Caregiver)

This change in physical space to accommodate virtual education again sparked changes in their child's behavior. Grace, a caregiver, shared that her son associated their home as a place for comfort, not a structured school environment:

> "The behaviors escalated during virtual learning. And it could also be possible because home is not a school environment. It's not set up to be a school environment, it's a home environment. So there's a comfortability factor of what's expected at home versus what's expected at school. And also our environment at home is not that structured for learning like a school environment where you have a complete classroom setting. But over here. You have a bedroom just a few feet from where he's supposed to be learning. And there's a TV screen where he gets entertainment, so he's not comprehending. Okay, I have to be in school through this screen but there is also the TV screen here and I can go watch TV, so it was quite challenging" (Grace, Caregiver)

Sally, a caregiver, also discussed their home being perceived by her son as place to relax, not for learning. She further shared that the environmental distractions associated with being at home caused difficulties in her son's ability to engage with his virtual education:

> "We tried creating a quiet space for him. But being at home, there's a landline. There are other people in the house. And so there's still constant noise. There's distractions, people are cooking, there are smells of food. So all of that, it's not just, Oh, we're in school, we're here. And there's that mentality, OK, we're in school but we're learning at home. This is their place where they're more relaxed, you know? He would get up when he would want, he'd go to the bathroom, he'd go to the kitchen, so it was hard to engage- it was always a redirection" (Sally, Caregiver)

Most education providers discussed having designated spaces for their work prior to virtual education. Some education providers, such as Susan, shared having to expand their current

space to accommodate additional materials and supplies for preparing and delivering virtual lessons.

> "Since my apartment is small, I turned my wall into a learning area for adding materials. I also ended up getting a table with wheels to make a more portable workstation"
> (Susan, Education Provider)

Another education provider, Debbie, talked about having to transform her workspace in order to supervise her son as he participated in his virtual learning:

> "As I'm doing virtual lessons for my students, my son also has ongoing virtual class so I had his desk with his supplies on my left and my supplies on the right. We both wore headphones but I often had to mute myself or my class just to redirect him because he would always get distracted" (Debbie, education provider)

Preparing for Virtual Lessons. Education providers faced disruptions to their routines due to the sudden shift to online teaching and the need to prepare lessons and activities through an unfamiliar virtual platform. Many education providers expressed a lack of necessary training for effectively delivering virtual lessons to students with ASD. Furthermore, their educational training, which primarily involved strategies for sensory-based physical interactions and hands-on skill development, was challenged by the transition to virtual education. Debbie, an education provider, expressed her frustration with this transition:

> "There were definite challenges, mainly because it was something that many of us hadn't experienced before. There was no outline, no example of how to do it or what to do and so we kind of just had to figure it out as we went and that made it extremely difficult"
> (Debbie, Education Provider)

Some caregivers found it useful to have a visual agenda to prepare for virtual lessons. Pam, for example, kept her son's agenda on the wall near his clock so they could keep track of his schedule and breaks. However, she noted that the consistency of the agenda was frequently disrupted due to schedule changes:

> "His agenda actually mirrored the school agenda for his class. Only thing, it changed all the time so that kind of threw him off. So, like every change that happened in his class that didn't reflect what was on the agenda kind of upset him" (Pam, Caregiver)

Managing Multiple Roles

When discussing the previous sub-theme of routines and structures, the management of multiple roles was peripherally addressed. Roles often dictate how individuals allocate their time throughout the day. Balancing work and home life, adopting new roles, managing child's behavior in response to new roles, and arranging respite care all played a critical part in multiple role management during virtual education.

Balancing Work and Home Life. Caregivers discussed the challenges they faced in balancing their work demands, home responsibilities, and managing their child's virtual education. This was equally true for education providers, as many of them had school-aged children at home. Although most caregivers reported working remotely during the pandemic, the added responsibility of performing job-related tasks while also overseeing virtual education was a significant challenge. Grace, a caregiver to a nonverbal child with ASD who also worked in the education field, shared her difficulties:

> "It was very challenging for me because first he has behavior problems and I have to sit there with him while he is in class. And it was the most challenging part for me as an educator because I have to sit there with an online class while he is on his own side. So once I drift away from him to concentrate on my own task as a teacher, he gets away from the screen and when I try to bring him back, he becomes violent. So it was very challenging and I honestly found most of the work was being done by me in terms of responding" (Grace, Caregiver)

Similarly, Daniel, another caregiver, found it difficult to manage his work demands while also supporting his son's virtual education:

> "It felt like we were taking time away from our jobs, but not being successful either way. So it was sort of like, is the tradeoff worth it if we can't get him to focus and we're missing our jobs by trying? And nevertheless, we're not being successful. It was like two

> bad outcomes as opposed to us working. And at least we're able to get our work, our job done" (Daniel, Caregiver)

Leah, a caregiver and single parent, had to work full-time while also providing direct support for her daughter's virtual education:

> "I felt like in order for her to really sit and do what we need her to do, I have to physically be sitting next to her and get her to do it. But I'm also a single mother and I work full time. So I was working and it was very challenging" (Leah, Caregiver)

Adopting New Roles. In addition to balancing work and virtual education, caregivers and education providers were forced to adopt various new roles and responsibilities. Caregivers faced challenges in providing specialized educational services that were originally provided by their child's school, as they did not have the training or experience. Nancy, a caregiver, described her frustration with having to learn specialized educational skills to support her daughter's virtual education:

> "We had to learn all these things that have nothing to do with what we went to college for. So we pretty much had to teach ourselves how to be ABA therapists, how to be occupational therapists, speech therapists, all these professionals that neither dad nor I are in the field for" (Nancy, Caregiver)

Similarly, some education providers were also parents and had to balance their roles as educators for children with ASD with their own child and family responsibilities. During the transition to virtual education, the responsibilities of being both an educator and a parent had to coexist within the same environment. Debbie, and education provider and a mother, shared her experience:

> "I'm a mom, working from home is different than someone else working from home, that's not a mom. My son is five, and does a forty five minute zoom every three days a week. Luckily, it corresponded with when I was supposed to be on Zoom. However, it's difficult because I'm trying to do virtual lessons as a classroom teacher, but my kid is home and I'm trying to help him navigate as his mom. It's not conducive for us at home. We don't have the time, energy and effort, especially when you're trying to learn these programs as you go. When I'm home, my kid is probably hanging over me while I'm teaching on Zoom, which is just not the same" (Debbie, Education Provider)

Child's Behaviors towards New Caregiver Roles. Furthermore, as caregivers assumed various roles as educators to support their child's virtual education, their children of exhibited resistance to the change in roles. Children expressed confusion about why their parents were now their teachers and encountered difficulties in engaging in virtual lessons. Cecile, a caregiver to a child with ASD and ADHD, shared that her son was not receptive to the transition of having his mother redirect him to pay attention during his virtual education. She described her experience:

> "So you're teaching me now, and you're my mom, how will that work?" He got very confused, and I'm sure I'm not the only parent with that difficulty. I'm sure a lot of kids with ASD were just confused from everything" (Cecile, Caregiver)

Respite Care. The transition to virtual education also eliminated respite care for caregivers, as children with ASD were now at home instead of in the school building. Many caregivers relied on their child's school day as a form of respite care, as the child was educated inside the school building. However, during virtual education, caregivers faced a daily struggle to balance work, home responsibilities, and managing their child's virtual learning without any form of respite care. Doris, a single parent and caregiver to her son, discussed the daily struggle with managing the various roles during her son's virtual education. She reflected on the challenges during her experience:

> "I did have to manage because I'm A mom, I'm a teacher, I'm a cook and you know, I'm a therapist. I have to be there when he's having all these meltdowns. I can't just say, 'Hey mom, he's having a bad day.' You know, I'm right there the entire time" (Doris, Caregiver)

Cecile, another caregiver, shared that she eventually had to quit her job because she was exhausted from managing the various roles and responsibilities associated with her son being at home. She described her frustration:

> "Yes. like any parent, I think I was drained. I was drained down after putting him to bed and then having to now do everything I had to do. And then having no time, I was like, Geez, you know, at least when I was working, that was my ME time. I would work for like four hours but sometimes I would have to work eight hours. But that was my me time, you know? And, I didn't have that anymore. It was very stressful because you're running from one way to another so it's very stressful. But I think being a 24 hr. mom and you don't have a way out, it impacts you emotionally" (Cecile, Caregiver)

Furthermore, strict quarantine measures were in place due to the ongoing pandemic, resulting in the closure of many places for socialization to mitigate the spread of the COVID-19 virus. Social media and online community groups became valuable support systems for building social skills and engaging with other families with school-aged children. Leah, a caregiver, utilized social media for socializing while also developing her daughter's reading skills. She described her experience:

> "We are on Facebook Live to read a story and we share it with everybody. Sometimes, with permission, different kids join or maybe an author will join, so that was really fun. Her reading got so much better and she was even able to read the Facebook comments" (Leah, Caregiver)

Accommodating Resource Limitations

Technology Accessibility

Educational and technological resources were provided to children and education providers by their school districts to support virtual education. This included educational materials and laptops to enhance accessibility and facilitate learning from home. However, caregivers often found these resources inadequate and lacking, both in terms of technology support and educational curriculum. Furthermore, many households were ill-equipped to handle the technological demands of virtual lessons. Aaron, a caregiver, expressed concerns about the quality of internet access provided to teachers:

> "The schools provided laptops and tablets with LTE for the students, but didn't do the same for the teachers. So, I had teachers with poor internet connections, or they had multiple people in their households sharing limited bandwidth, causing pixelation and disruptions during their lessons. You know, it's the basics, both ends need to have reliable internet access" (Aaron, Caregiver)

Some caregivers were unable to prepare for virtual education in advance by subscribing to necessary technology services, leading to their children being unable to use the provided laptops immediately. Leah, a caregiver, shared her experience of not having internet access at the beginning of virtual education:

> "The major issue with technology that I had was that, I actually didn't have internet in my apartment when COVID first hit. Then like when all the kids were sent home, I had to deal with getting internet in our home, and that was a big challenge" (Leah, Caregiver)

The lack of a stable internet connection affected children's engagement with virtual lessons. Some families resorted to using their smartphones to access their child's virtual lessons, resulting in potential distractions. Sally, a caregiver, observed many families using smartphones instead of laptops and pointed out the challenges they faced due to limited internet access:

> "Although the school provided the Chromebooks, issues like internet speed and connectivity were beyond their control. Some families has no internet at home, so they relied on their phones for their children's assignments. Parents would sometimes receive phone calls during their child's Zoom session, further distracting the child. Despite efforts to use 'do not disturb' mode, notifications would still pop up, creating additional distractions" (Sally, Caregiver)

Similarly, education providers experienced challenges with maintaining student's attention during virtual lessons dur to unstable internet connections. Diana, an education provider, noted that unreliable internet connections often disrupted virtual lessons:

> "Many families did not have a stable internet connection so it was difficult to maintain the student's attention to the screen. Often times their screen would freeze so they would have to restart and login again causing disruption to the class and affecting other students online" (Diana, education provider)

Supplementing Educational Materials

Another area of concern for caregivers was the need to supplement the educational materials provided by their child's school. Some caregivers, like Molly, sought additional educational resources to better support their child academically during virtual education:

> "I just started researching on google and amazon for items, like the ABC boards, learning books, and leapfrogs. I was researching everything in the books according to his age and ability" (Molly, Caregiver)

Others, like Janet, supplemented the materials received from the school due to a lack of engaging content and poor quality. Janet described her experience with supplementing educational materials to enrich her daughter's virtual learning experience:

> "I really took on ownership of buying materials and supplements because all we received were the bare minimum. So, I pulled up Common core goals for grades kindergarten through second grade and spent a lot of time on homeschooling websites to kind of see just how homeschooling families handle homeschooling both for neurotypical and neuroatypical kids and tried to put together what we thought that we could manage and what makes sense" (Janet, Caregiver)

Some education providers preferred to supplement the materials provided by the school with additional resources specifically tailored to the educational needs of students with ASD. Sarah, an education provider, enjoyed teaching creatively and often supplemented materials to enhance the learning experience:

> "I feel like I'm always supplementing, but that's just the teacher I am. I don't think the school didn't provide for me; it was just me going the extra mile to provide something special for my students. I think it was just me going, 'Oh, I'm really going to teach it this way', I love finding unique ways to teach my students" (Sarah, Education Provider)

Sustaining Educational Resources

In addition to supplementing academic and technological resources, caregivers and education providers faced challenges in maintaining these items for continued use. Children's physical behaviors, often resulting from routine changes or frustration with virtual education,

sometimes led to the destruction of school property, particularly their technological devices

Claire, an education provider, acknowledged that the destruction of technological devices by her students often resulted in their absence from virtual lessons as they no longer had access to them.

> "Well, in the beginning, it was very difficult. We have to be mindful of the population we serve. Many of our students lacked resources and access to Wi-Fi. When our students got frustrated, they sometimes destroyed property, including Chromebooks or devices. These limitations were straining because now we're missing sessions"
>
> (Claire, Education Provider)

Mia, a caregiver, explained that her son damaged his Chromebook multiple times, necessitating replacements to enable his participation in virtual lessons:

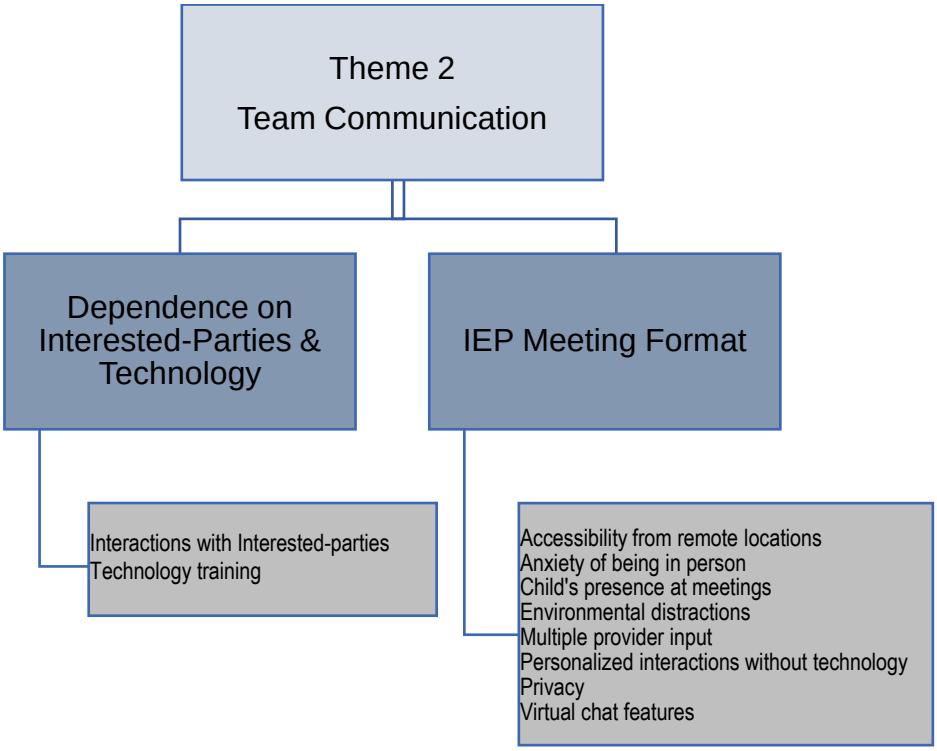
> "I got a Chromebook from the school for his virtual lessons. But he destroyed it so I had to return it back to them. Then they gave us another one, but he somehow removed all the keys from the keyboard. I don't how he did it, but somehow he did. I looked over at his Chromebook one day and all the keys were just gone, like missing. I don't know what he did with it and he also didn't know or couldn't tell me what he did with all the keys. So the second one they gave us had to be returned too. So then, I ended up buying a computer myself so he could continue his lessons, interact with his friends, and see his teacher on the screen" (Mia, Caregiver)

Theme 2: Team Communication

Theme two, team communication, encompassed two main areas as discussed by participants: dependence on interested-parties and technology, and IEP Meeting Format shown in Figure 4.4. Many caregivers faced challenges due to the lack of physical access and face-to-face interactions with members of their child's Individualized Education Plan (IEP) team. Additionally, they expressed unfamiliarity with the technology required for effective team communication. The use of technology for communication was also mandated for IEP meetings, which were compelled to be held virtually. Both caregivers and education providers had mixed preferences regarding the virtual IEP meeting format, with some favoring it for its accessibility from remote locations and other preferring an in-person format for more personalized interactions.

Figure 4.4

Theme Two: Team Communication



Dependence on Interested-Parties and Technology

Interactions with Interested-Parties

Some caregivers mentioned that relying solely on technology created communication barriers between them and education providers. These caregivers believed these barriers stemmed from the absence of face-to-face interactions. Molly, a caregiver, expressed missing the ease of in-person communication with education providers compared to the virtual format, which was limited to using email to interact with her son's IEP team. She explained how the virtual format delayed responses to her emails and hindered immediate communication, unlike the convenience of face-to-face interactions.

> "I didn't get the response back to my emails quickly, like I would've wanted it. It took a minute to get it. If he was in school, I could talk with them anytime, just walk up to the school and see them, it was so much easier " (Molly, Caregiver)

Comparatively, education providers discussed how the virtual communication environment reduced collaboration among team members during virtual education, with the main focus being on maintaining students' attention for their virtual lessons. However, some providers found innovative ways to collaborate more efficiently with team members. For instance, Shelly, an education provider, mentioned adapting to new methods for collaborating with IEP team members based on their schedules.

> "I don't think we were collaborating as much because we saw the kids for a shorter amount of time in their day. So it was really hard for me to worry about how my kid was doing in speech when I only saw them for two and a half hours every day. And I'm trying to cram as much math and science into their life at one time. But if I really had an important question let's say for speech, I knew the schedule of my speech person" (Shelly, Education Provider)

In contrast, Becky, another education provider discussed increased communication and collaboration to manage the virtual environment for students with ASD. This was because of the lack of in-person interactions and the need to share critical information regarding rapid changes in student behavior within a virtual school day.

> "It was a challenge because there was so much that we had to figure out, but I think we communicated more because we were virtual. We have to be in communication at all times because something could change within moments" (Becky, Education Provider)

Technology Training

Some caregivers admitted they were not trained to use the technology effectively to support their child's virtual education. They heavily relied on communication with their child's teachers for guidance on navigating the virtual education platform. Robin, a caregiver, depended on her son's teachers to assist her in understanding the technology features necessary for his virtual education. She mentioned the difficulties she faced in supporting her son in this new virtual educational environment.

> "I was depending on them a whole lot during that time. They were depending on me because half of the time, I didn't know what to do with the screen. I didn't know what to do with volume. I didn't know what to do with this and that. And there's a point in the classroom that he had to raise his hands. I didn't know where to reach for my hands, oh, my goodness, it was very difficult" (Robin, Caregiver)

Similarly, education providers discussed the challenges they faced in self-learning the technology required for delivering virtual lessons. They not only had to learn how to navigate the technology themselves but also had to instruct their students and families on its usage. Debbie, an education provider, shared her frustrating experience with technology related challenges in virtual education.

> "In the beginning- it was like, how do I navigate? How do I teach these kids to unmute themselves? How do I get them to stay on the screen? How do I reach them when we're used to seeing them in person and being able to touch them or soothe them, or relax them? How do we now do all of those things virtually when we are so accustomed to doing it in person? I was highly dependent on the families because they were right there, by their child" (Debbie, Education Provider)

IEP Meeting Format

Accessibility from Remote Locations

With the shift to virtual education came virtual IEP meetings. The IEP team members received online invitation with meeting links and specified dates and times for these virtual meetings. Some caregivers and education providers preferred attending virtual IEP meetings due to their accessibility from remote locations, which eliminated attendance barriers.

Anxiety of Being In Person

Some education providers acknowledged that in-person IEP meetings could evoke anxiety among families, which virtual meetings might alleviate. Debbie, and education provider, mentioned that virtual meetings may decreased anxiety levels as they eliminated the need for face-to-face interactions, making it more comfortable for some families to participate.

> "I honestly think that doing meetings virtually worked better for us. I think that there's a natural level of anxiety that exists when we were all coming together to sit around a table to speak with parents and discuss their child in a way that they might not be prepared for. So I think some of that anxiety was decreased tremendously by not being in person. Also, I've had several IEP meetings where families were not present and did not participate. So, I think this gave them another avenue to participate"
>
> (Debbie, Education Provider)

Multiple Provider Input

Virtual IEP meetings offered benefits such as obtaining input from multiple providers working with the child. Daniel, a caregiver, shared his positive experience with virtual meetings, explaining how they allowed providers from different locations to join, which might have been challenging in person.

> "I feel like it's kind of beneficial to allow that virtual access and it probably just makes scheduling it easier, you know? Like, I was able to have my son's therapist at XXX join in the zoom meeting. He probably could not make it to wherever the main office is, because there's just a lot more collective commuting time and difficulty scheduling, and I don't think it changes the dynamic of the meeting" (Daniel, Caregiver)

Virtual Chat Features

Virtual IEP meetings allowed the use of various technology features, such as chat, to engage with team members without disrupting the meeting. Kate, an education provider, emphasized that this wouldn't have been possible during in-person meetings, where such features would interfere with the proceedings.

> "Being allowed to chat (virtually) would not be possible during in-person IEP meetings because it would interfere with the meeting. So there were a lot of pluses to do it virtually because let's say someone was not in school that particular day, they might still be able to log in from their computer. So that might be easier to facilitate as well, maybe more availability. Also, if the student had caregivers or other team members on their IEP outside of the school, it was probably easier to get everyone to attend those meetings virtually as well. Another plus was being able to type in a chat box. So let's say someone else is talking, and you want to add something but not interrupt, you can type it in the chat box" (Kate, Education Provider)

On the other hand, there were many caregivers and education providers who preferred in-person IEP meetings due to various challenges associated with virtual meetings. The challenges included: technology problems, privacy concerns, scheduling conflicts and a perceived lack of personalized interactions during virtual education.

Personalized Interactions without Technology

David, a caregiver, noted the lack of personalized interactions and interruptions from technology issues during his virtual IEP meetings. He preferred in-person meetings due to the smoother flow of dialogue and the ability to establish a more personal rapport with educators.

> "It's just about having more personal interaction. With Zoom, everyone is dependent on technology and you have the glitches, so it just doesn't flow as well as if it were in person. Also, there were some people that didn't have their camera on and only their audio, so you miss the visual interaction. You don't even know who's talking, sometimes the name is there, but it's nice to place a face to a name. So there were several people that didn't have their camera on. At times, you could tell some members were doing other things during the zoom meeting, they would take a few seconds to respond or say, oh I'm here, so many things going down that wouldn't have happened during in person meetings. I prefer in person meetings, because I could see everyone and build rapport with the educators in a personalized way to support establishing his IEP goals" (David, Caregiver)

Environmental Distractions

Sally, a caregiver, expressed her preference for in-person IEP meetings because they allowed her to focus solely on the meeting. Virtual meetings often occurred during her work hours. Furthermore, her work environment lacked privacy and was noisy, making it difficult to concentrate on important discussions.

> "A lot of times these virtual meetings were during my work schedule. There is a difference of having a meeting and going into the school and just being focused there. But again, I had these meetings during work so I also have other noise going on. And even though I'm in the meeting, people around you don't realize and so they start talking to you, and then they're like, Oh, sorry, you're in a meeting. And so that's a distraction and also another thing, they're hearing your conversation, so it's also a lack of privacy. If we were in person, I would go inside of the building without distractions and have that privacy to do just one thing" (Sally, Caregiver)

Privacy

Some education providers also favored in-person IEP meetings over virtual ones because they recognized that caregivers' home environments were often unpredictable and not conducive to confidential discussions. Claire, an education provider, discussed how confidentiality could be compromised during virtual meetings when participants were not in controlled environments.

> "Zoom was more convenient, but being mindful, there were times when parents were in the car or they were at work, so lots of distractions. Whereas before in person, we have more of a controlled environment to conduct these meetings versus virtual and in the parents environments. It could be super unpredictable and we're sharing confidential information. Sometimes I can't confirm whether or not their space is confidential, so that was another challenge" (Claire, Education Provider)

Child's Presence at Meetings

Caregivers mentioned their preference for in-person meetings as they allowed their child to engage with IEP team members and understand their goals and academic plans better. Virtual meetings didn't provide the same opportunity, either because parents were working, and the child was not present, or because the child refused to participate. This lack of child engagement was seen as a drawback of virtual IEP meetings. Two caregivers, Molly and Sally, both shared their experiences of bringing their children to in-person IEP meetings to allow them to be part of the IEP process, which they found valuable.

> "Sometimes during those in person IEP meetings, I would also bring my son in. So he would be part of the meeting and he could hear and they could explain to him in sentences that he could understand. Like, what the goals were, and during virtual meetings, he was not able to be present because I was at work and so it wasn't the same in that aspect as well" (Sally, Caregiver)

> "I rather it would have been at the table. I feel that with virtual, you're not getting that much out of it versus him being there at the table. They can see where I'm coming from, when I tell them stuff about him. But when I'm on the computer, he's not doing as much. So, I think being in person was really important" (Molly, Caregiver)

Theme 3: Implementation of Virtual Education

Theme three, implementation of virtual education, explores the challenges and opportunities encountered during the implementation of virtual education for children with Autism Spectrum Disorder (ASD). This theme is discussed across three key areas: attentional challenges to virtual learning, modifications to the Individualized Education Plan (IEP), and opportunities for development displayed in Figure 4.5.

During the implementation of virtual education, caregivers and education providers discussed attentional challenges demonstrated by children with ASD. Both caregivers and education providers gained unique perspectives into the children's interactive experiences within the virtual learning environment. Caregivers had the opportunity to observe how their children interacted with teachers and peers, a viewpoint not typically accessible in a traditional in-person classroom. Education providers observed how students interacted with their parents and family members in the home environment, shedding light on their remote learning experiences. Both caregivers and education providers discussed challenges encountered during the implementation of virtual education, including maintaining children's engagement with the screen, managing interfering behaviors from students during virtual lessons, and utilizing the support of paraprofessionals.

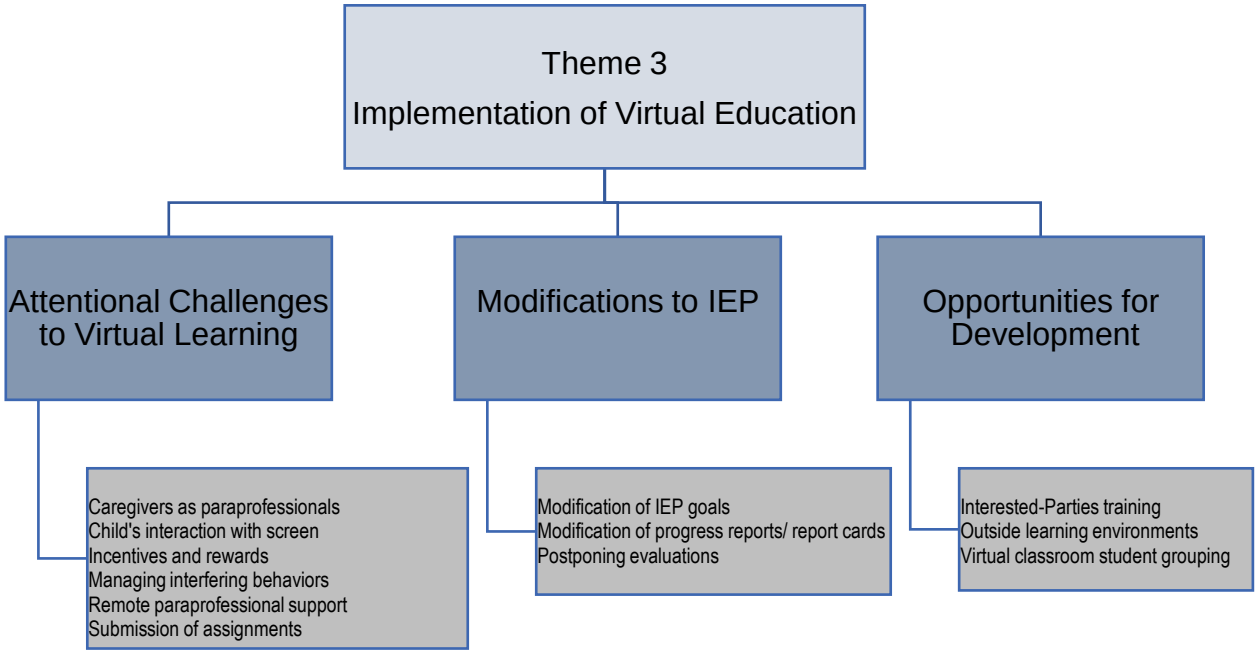
As virtual education became the norm, participants found it necessary to modify Individualized Education Plan (IEPs) to align with the new mode of instruction. This led to collaboration and goal modification. IEP teams worked together to adjust educational goals to suit virtual service delivery, ensuring progress assessment and compliance with regulations, such as the Individuals with Disabilities Education Act (IDEA) and school district policies. Progress reports and report cards were also adapted to reflect student performance based on the modified IEP goals. Education providers faced challenges related to conducting standardized evaluations

or re-evaluations in the virtual setting due to challenges with screen engagement for children with ASD, leading to the postponement of required assessments.

As participants reflected on their experiences with virtual education, three key areas for implementation were identified as opportunities for development. These three areas were: outside learning environments, interested-parties training and virtual classroom grouping. Participants discussed that integration of these areas into the implementation process would provide educational support and enhance the virtual education experience for children with ASD.

Figure 4.5

Theme Three: Implementation of Virtual Education



Attentional Challenges to Virtual Learning

Child's Interaction with Screen

Participants reported attentional challenges faced by children with ASD during virtual learning. Caregivers often mentioned that their children found the screen interface unengaging, making it a constant struggle to keep them seated during virtual lessons. Some caregivers of

nonverbal children noted that their child exhibited physical actions, such as pushing or hitting their caregiver's hand or simply walking away from the device when they had reached their limit of screen engagement. Daniel, a caregiver to a nonverbal child, described the behavioral challenges he encountered when trying to engage his son with the screen:

> "If you tried to redirect him too much, he'd start to have problem behaviors. It was like a delicate balancing act, trying to figure out realistic expectations. When my son does start displaying problem behaviors, they could escalate quickly with self-harm, aggression towards others, throwing things, upsetting all the furniture in his room, or even removing his clothing. So yes, it was a constant juggling act. The difference between connecting with my son virtually and in person is like night and day" (Daniel, Caregiver)

Education providers also faced challenges in maintaining student's engagement with the screen during virtual teaching. They acknowledged that students were often distracted due to various factors, including environmental disturbances at home, disruptions caused by other students on the screen, technological issues, sensory dysregulation, visual fatigue from prolonged screen time and other distractions that hindered student's participation in virtual education. Despite being aware of these potential distractions, educators did not always succeed in keeping students engaged. Kate, an education provider, explained how the lack of physical proximity made it difficult to engage or redirect her students during virtual lessons. She mentioned that some students' homes were filled with environmental distractions, causing them to lose focus or walk away from the screen:

> "a prerequisite to actually being able to meet targets is being able to have engagement and attention through a platform that these students were completely unfamiliar with and also removing that interpersonal physical proximity connection made it a lot more challenging because there are certainly other things in their environment that I don't have access to be able to control. And to a certain degree, they're given a little bit more leeway and reign to elope into their environment and engage with lots of distractions" (Kate, Education Provider)

Given the challenges in maintaining attention during virtual lessons, education providers found that working in small groups with children was more effective than teaching an entire class.

These small groups were conducted in breakout rooms, accessible through the online platform. Claire, an education provider, shared her experience with engaging small groups of students through virtual lessons:

> "There were challenges mainly due to attendance, meaning that the group schedule could be throughout the school day so students may log in for their morning lessons and then by the time it's their scheduled group session, they may have logged out for various reasons" (Claire, Education Provider)

Remote Paraprofessional Support

Some children with ASD receive educational support from a paraprofessionals who assist them with educational activities and learning under the guidance of classroom teachers. However, during virtual education, paraprofessional support was also provided remotely. Education providers discussed their experiences and the challenges of utilizing remote paraprofessional support for students with ASD during virtual lessons. Debbie, an education provider, expressed the difficulty she faced in effectively utilizing remote paraprofessional support for her virtual lessons:

> "Our main challenge was that all our staff was working remotely. It's really hard to explain to a dedicated aide how to support a student virtually and what that looks like. Our students don't understand a lot of things, so many of the physical prompts and cues we were accustomed to providing in-person were no longer feasible online. So, we had to rely more on our verbal skills, which of course we are capable of using our words, but our students are not always capable of understanding, making it very difficult to get through the day" (Debbie, Education Provider)

Caregivers as Paraprofessionals

During virtual education, children with ASD still required hands-on assistance to engage with their lessons, as paraprofessional support could only be provided remotely. Some caregivers were able to provide individualized support to help their children sustain attention and engagement with virtual lessons. Sarah, an education provider, recognized the challenging

behaviors demonstrated by her students and how these behaviors affected their participation in virtual lessons. She described her experience with parents becoming paraprofessionals:

> "The biggest challenge was maintaining focus- getting a child to sit and pay attention to me through a screen was difficult. We not only has to manage behaviors but also had to have parents step in as paraprofessionals, guiding their child to stay engaged and complete the tasks. So, the most challenging part was not necessarily the lessons themselves, but ensuring that active participation" (Sarah, Education Provider)

Due to the demands of working remotely and juggling multiple responsibilities, many caregivers were unable to consistently provide their children with ASD the necessary individualized support. These caregivers observed their children's lack of engagement with virtual education due to the absence of hands-on support from paraprofessionals. Sally, a caregiver, expressed that her son received support from a paraprofessional at school but lacked that support at home. She noted various environmental distractions that prevented her son from participating in virtual lessons:

> "He could not stay in front of a screen for an extended period of time. He would get up, get distracted, and want to end all classes. We tried redirecting him, but it was difficult. He was more engaged during in-person learning because he had one-on-one support. During virtual learning, it was much harder because he did not have that one-on-one support" (Sally, Caregiver)

Managing Interfering Behaviors

Managing interfering behaviors posed another challenge during virtual teaching and learning. These disruptive behaviors created distractions and prevented children from participating in virtual lessons. Education providers reported that interfering behaviors were a daily occurrence, requiring remote support from paraprofessionals for behavior management in breakout rooms. This allowed student to regulate their behaviors under the supervision of a paraprofessional while enabling the education provider to continue with virtual lessons. Debbie, an education provider, facilitated access to breakout rooms for paraprofessionals to manage

interfering behaviors exhibited by some of her students. She also discussed the supportive role of parents in managing their child's interfering behaviors from home:

> "When students needed a break from the group, we would use breakout rooms. I felt like the paraprofessionals were most useful for this because they were able to have that one-on-one time with the student. Sometimes it was one-on-one interaction, and at times, it involved two paraprofessionals working with the student. But that separation from the group helped a lot. We also had to rely on parents differently than what we have been accustomed to doing. So many parents played a significant role in managing behaviors or supporting us in ways that were not possible through a computer screen"
>
> (Debbie, Education Provider)

Some caregivers faced the added challenge of managing the virtual education of multiple children in their home, including a child with ASD. They had to navigate through difficulties caused by interfering behaviors in one child while facilitating virtual learning for another. Jenifer, a caregiver to her son with ASD, often encountered this situation while trying to keep her son away from her daughter, who was also participating in virtual education:

> "Throughout the entire time it was difficult just because, my daughter was having school downstairs and she was in the living room. So, when he was on a break, he would want to run down and then he had to be chased out. I was like, no, you just go back upstairs, so we were up in the master bedroom and he sat at my chair and desk. If he leaves the room, then it's like, no, he has to go back up because he's disturbing her. So that made him feel a little claustrophobic. It made me feel claustrophobic. So that was difficult and not like a long term good scenario because, I used to do work during the day. But, you know, I couldn't do that because I needed to be watching him and sitting beside him or making sure he stays there" (Jenifer, Caregiver)

Pam, a caregiver, encountered a different challenge by not allowing her two year old daughter to distract her son with ASD during his virtual lessons. She faced the daily task of striking a balance between keeping her daughter occupied while trying to support her son through his virtual lessons.

> "I had to set up different areas for both him and his sister to keep them separated because she had a habit of going, trying to work with him. So like my main goal was to keep them separate so he can focus more on his work, but that involved me taking time away from him to focus on keeping her away from him" (Pam, Caregiver)

Incentives and Rewards

Caregivers found using incentives or rewards greatly helped with engaging their children with virtual lessons. The incentives varied depending on the severity level of ASD the child presented. Two caregivers of children having different ASD severity levels shared their experiences with offering incentives. Janet, a caregiver, sat next to her daughter during her virtual lessons. Her daughter has level one mild ASD and Janet mentioned:

> "For the most part, she would attend. I mean, sometimes we would have to try to use rewards with her. Like, hey if you do a good job in class, then we can go get some ice cream or something. So, there's just a fair amount of discipline where it's like, Look, this is school, even though we're at home, it's still school and you still have to do the work"
>
> (Janet, Caregiver)

On the other hand, Grace, a caregiver to her nonverbal son with level two moderate ASD, shared her experience with her son's short attention span:

> "I did the first, then this, so I usually have a phone next to me, and I say math or reading, then phone. And sometimes, they used to have short breaks, and I'd say, it's almost break time, pass, then phone. He would sit there for the next 5 minutes and 6, 7, 8 minutes. So the attention span was very short. Even with the incentive, he would not sit there for more than 10 minutes without getting agitated and wanting to walk away"
>
> (Grace, Caregiver)

Submission of Assignments

Education providers implemented alternative methods for completing and submitting assignments due to the numerous competing demands placed on families by virtual education. Flexibility in assignment completion and submission proved to be effective because many students with ASD struggled to focus during virtual lessons. Becky, an education provider, arranged alternative methods for her students' families to submit assignments. She shared her experience:

> " Since our classwork package was sent home, the parents would take pictures and email their child's work. Some parents send it back to the school. We also used online platforms, like Google Classroom" (Becky, Education Provider)

Modifications to IEP

According to the Individuals with Disabilities Education Act (IDEA, 2004), an annual IEP meeting must be held for children receiving IEP services. During this meeting, the IEP team discuss the child's current level of performance, goals, and educational programming. Consequently, every child identified with a disability impacting their education is entitled to receive services to enable them to access their education (IDEA, 2004). When the World Health Organization declared COVID-19 a pandemic in March 2020, school closures resulted in the virtual delivery of educational services. However, children with an IEP had goals that were written prior to March 2020, and those goals were based on in-person delivery of educational services.

Modifications of IEP Goals

As the uncertainty of shifting back to in-person instruction advanced, IEP team members recognized the need to make modifications to the IEPs' for students with ASD. The IEP goals were adapted to the virtual setting. Some education providers chose to modify only a select few goals rather than addressing all the goals on the child's IEP. Debbie, an education provider, explained the process of goal modification used by her IEP team:

> "Instead of trying to attack the entire IEP for each individual student, we worked as a team and selected specific goals from our classes to address. So, for many of us, there were several goals that needed modification because they did not seem achievable in the virtual setting" (Debbie, Education Provider)

Modifications to Progress Reports & Report Cards

By modifying IEP goals, progress reports and report cards also had to be adjusted to accurately reflect the child's performance in a virtual setting. Claire, an education provider, described how her IEP team included a clause for modifying goal progression and behavior intervention plans for students during virtual education:

> "We had to incorporate a clause that explained the challenges in monitoring progress due to the COVID 19 pandemic. The goals and their progression now considers unique circumstances. We also adapted behavior intervention plans, originally designed for in-person learning, to address behaviors observed virtually rather than in-person"
>
> (Claire, Education Provider)

However, some caregivers were not in agreement with the skills reflected on their child's modified progress report, Pam expressed that her son's modified progress report indicated higher skills than what she observed at home during virtual education:

> "It's a good progress report, but I don't think it a true representation of what he should have got because I was having issues with his reading and writing. Also, I noticed that he wasn't turning in his work because he wasn't doing the reading" (Pam, Caregiver)

In contrast, Robin a caregiver, observed her child's performance during virtual education and believed that he performed at a higher level than what was documented on his progress report:

> "Some of the goals that I thought he accomplished were not reflected in the progress report. The goals they think he needs more work on are, in my opinion, already achieved. There seems to be a disconnect between what I see and what they are reporting"
>
> (Robin, Caregiver)

Postponing Evaluations

Children with an IEP are required to undergo re-evaluations every three years, as mandated by the Individuals with Disabilities Education Act (IDEA, 2004). However, during the period of virtual education, the re-evaluation dates had to be postponed. Education providers encountered difficulties in obtaining accurate evaluation data virtually, as many children would not actively engage with the evaluation process through a screen. Molly, a caregiver, expressed frustration that the education providers conduction the evaluations were unfamiliar with her son and could not assess his performance because he refused to participate in the evaluation through the computer:

> "They didn't know him, and we were meeting on Zoom, but they couldn't even meet him because he wouldn't come to the computer. So it was challenging because they couldn't conduct the evaluation on Zoom. They had to wait until he returned to school, and they still are waiting for him to do that evaluation" (Molly, Caregiver)

Sally, a caregiver, explained that her son was also unable to be evaluated due to the difficulties of engaging virtually, leading to skill regression:

> "It was extremely challenging for him to engage on Zoom, and as a result, they couldn't assess him accurately. They couldn't establish an up-to-date IEP, so what happened was they relied on scores from previous years, which are no longer valid. Consequently, they had to revise his goals based on their observations. Unfortunately, instead of my son making progress, he regressed and lost skills" (Sally, Caregiver)

Opportunities for Development

Throughout this study, many caregivers and education providers reflected upon their challenges and discussed areas for potential improvement that could have enhanced the virtual education experience for children with Autism Spectrum Disorder (ASD). Three specific areas were highlighted by participants as crucial for better engagement in virtual education for children with ASD: interested-parties training, virtual classroom grouping and incorporating outside venues to facilitate learning and social interaction.

Interested-Parties' Training

Education providers expressed that, despite having access to technology tools, they were often not adequately trained in their usage. They recognized that the rapid shift to virtual education left little time for training. However, they emphasized that proper training would have enabled more effective utilization of technology tools to engage children with ASD in virtual lessons. Debbie, an education provider, voiced her thoughts on the technology tools provided by her school:

> "We had the tools in place, but I don't think we were adequately trained in using them effectively. It was challenging to maximize the tools, especially Near Pod. Having more training on how to create and use these tools would have been beneficial"
>
> (Debbie, Education Provider)

Similarly, caregivers sought training as they were often unfamiliar with basic technological skills required to access their child's virtual lessons. They also expressed anxiety about navigating the virtual education platform used by their child's school. Janet, a caregiver, expressed frustration with the lack of training provided to parents and the absence of resources to help reinforce skills with their child:

> "We needed regular parent training, especially in a virtual environment. The school could have organized sessions to ensure parents understood how to support their children effectively. They could have provided a list of supplemental resources as well"
>
> (Janet, Caregiver)

Virtual Classroom Student Grouping

Many education providers emphasized the importance of grouping students based on their virtual capabilities for more effective engagement in virtual education. They observed that the same groups of students with ASD who functioned well in traditional in-person instruction did not necessarily perform the same way in a virtual environment. Debbie, an education provider, further explained the significance of tailored virtual groupings:

> "We realized that students who excel in-person may not do as well virtually, and vice versa. Grouping students based on their virtual capabilities, rather than relying on their in-person abilities, would make a big difference in their ability to engage in their virtual learning" (Debbie, Education Provider)

Outside Learning Environments

The COVID-19 pandemic and the resultant social distancing measure limited social interactions and outdoor activities for children with ASD. This lack of physical activity and social engagement has adverse effects on their well-being. Caregivers expressed the need for

organized outdoor learning spaces to provide opportunities for physical activity and social interaction. Mia, a caregiver, emphasized the importance of social interaction for her son:

> "My son didn't get the same physical activity or social activity that he used to have in his school. I wanted for him to communicate with people because the problem is that loneliness, sometimes he doesn't want to be by himself or playing by himself. He wanted to be with other people" (Mia, Caregiver)

Daniel, another caregiver, suggested supervised outdoor learning activities that could facilitate social and physical interaction while maintaining social distancing:

> "an organized outdoor learning activity could bring kids and educators together and it can still follow rules of social distancing for making it safe" (Daniel, Caregiver)

Sally, a caregiver, shared the severe impact of the lack of social interaction on her son's mental health, leading to multiple hospitalizations:

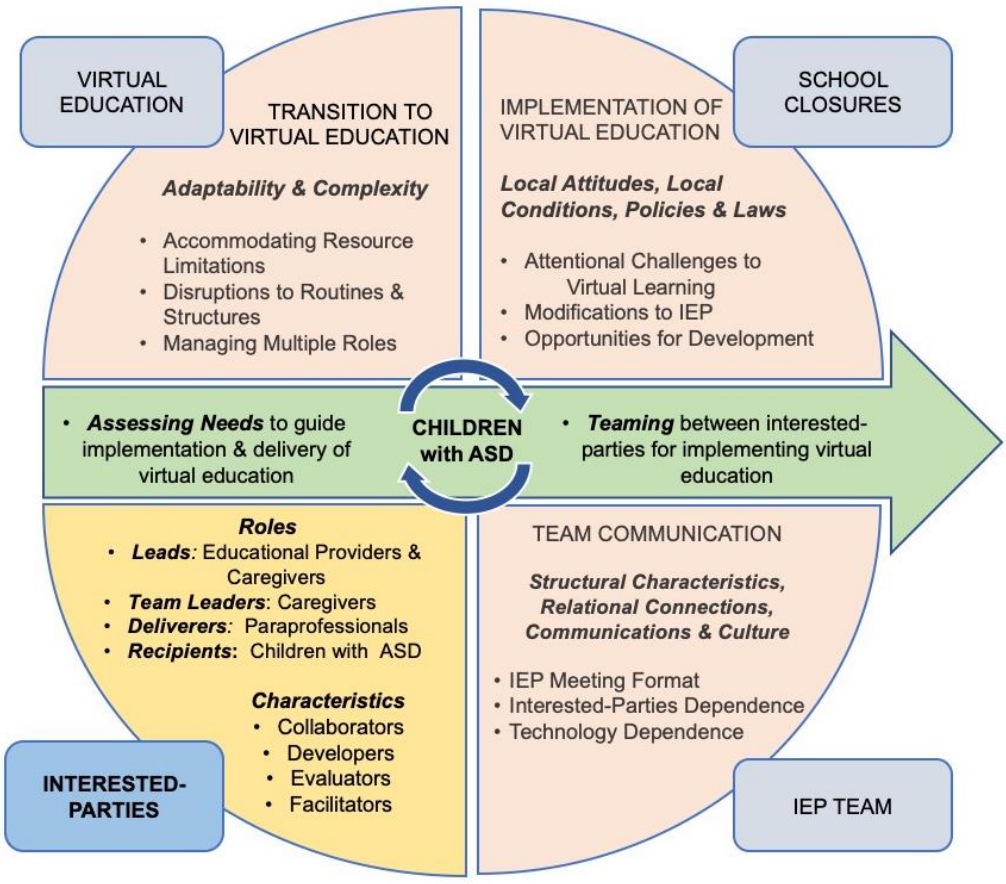
> "with my son, it got to a point where not having that social contact or physical contact of being around somebody affected him severely. Unfortunately, we had to hospitalize him a couple of times for periods of days to try to help him, and we discovered that he had depression to a point where he was physically sick and also mentally sick" (Sally, Caregiver)

Application of CFIR to Research Findings

The CFIR is a widely recognized framework in the field of implementation science and is frequently employed to guide and analyze the implementation of innovations and interventions within various settings. This section highlights the integration of research findings with the CFIR domains and their related constructs, showcasing the framework's applicability in the context of virtual education for children with ASD. In Figure 4.6, the visual representation for the application of the CFIR to the research findings is provided, presenting a comprehensive overview of the interplay between the CFIR domains and the central processes involved in the virtual education setting. This integration serves as a tool to better understand the complex dynamics of implementing virtual education programs for children with ASD.

Figure 4.6

Application of CFIR to Research Findings



(Damschroder et. al., 2022)

The figure illustrates four interconnected quadrants, each representing a specific CFIR domain and its associated constructs. These domains and constructs have been carefully selected to align with the research objectives and questions, providing a structured framework for analysis and interpretation (Damschroder et al., 2022).

1. Virtual Education (Innovation): The first quadrant, dedicated to the Innovation domain, delves into the specifics of the virtual education approach. It addresses questions related to the novel aspects of this approach, such as the technologies and methods used for teaching children with ASD.

2. IEP Team (Inner Setting): The second quadrant, focusing on the Inner Setting domain, explores the role of the Individualized Education Program (IEP) team within the implementation of virtual education. This quadrant contains insights related to the organizational structure, collaboration, and dynamics of the IEP team.
3. School Closures (Outer Setting): The third quadrant deals with the Outer Setting domain, which examines the impact of external factors, in this case, school closures, on the implementation of virtual education. It includes discussions on how external factors influence the adoption of virtual education for children with ASD.
4. Interested-Parties (Individuals): The fourth quadrant emphasizes the Individuals domain, encompassing various interested parties involved in the virtual education process. It sheds light on the perspectives, roles, and contributions of these individuals in the implementation of virtual education for children with ASD.
5. Assessing Needs & Teaming (Implementation Process): At the center of this integrated model lies the fifth CFIR domain, symbolizing the pivotal role it plays in the entire framework. This central domain underscores the significance of "Assessing Needs and Teaming" during the implementation process. This domain holds a unique position, indicating its critical importance in ensuring the successful implementation of virtual education for children with ASD.

Furthermore, the model explicitly highlights the interconnectedness of these domains, emphasizing the integral role played by "Individuals" and the "Implementation Process." These two domains are highlighted and positioned as the heart of this research, underscoring their fundamental importance in addressing all four research questions. The "Individuals" domain represents the diverse interested-parties involved, while the "Implementation Process" is central to the effective deployment of virtual education initiatives.

The application of the CFIR to the research findings provides a structured and comprehensive framework for understanding the dynamics and complexities of implementing virtual education for children with ASD. By aligning research results with CFIR domains and constructs, the study offers a valuable contribution to the field of implementation science, shedding light on the factors that influence the success of such programs. This approach ensures that the research findings are situated within a well-established theoretical framework, enhancing their practical relevance and applicability.

Trustworthiness in Findings

The data for this research study was analyzed through the transcription of virtual interviews with twenty five participants, consisting of sixteen caregivers and nine education providers. The researcher's personal bias, stemming from a professional pediatric healthcare background was identified. To maintain objectivity during data analysis and mitigate research bias, bracketing was implemented as an iterative process throughout the study. Additionally, memos were recorded immediately after each virtual interview to document noteworthy comments and facilitate deeper engagement with the data (Creswell & Poth, 2018).

Analyzing the data from open-ended questions in each virtual interview allowed for a deeper understanding of each participant's contextual experiences and the achievement of saturation (Creswell & Poth, 2018). Each participant's transcribed interview was shared via email and verified for accuracy. Responses were emailed back for agreement of transcript data among all participants. Moreover, an independent reviewer randomly listened to interviews and verified transcripts.

Upon the completion of interviews, memo notes, recordings, and transcriptions, the data was analyzed in alignment with the study's goal: describing the contextual experiences of interested-parties during virtual learning of children with ASD during the COVID-19 pandemic.

To further ensure the trustworthiness of the data in this qualitative multi-case research study, the strategies shared by Shenton (2004) addressing credibility, transferability, dependability and confirmability are discussed.

Creditability

The study's credibility is established through the researcher's extensive 23-year career as an Occupational Therapist, with a dedicated focus on pediatrics for the past 15 years. Specializing in serving children with various disabilities, particularly those with ASD, the researcher has worked in diverse educational settings, including both public and nonpublic contexts. This hands-on experience provides valuable insights into the daily challenges and therapeutic needs of the target population.

The researcher's acknowledgment of their positionality adds transparency, allowing readers to discern potential biases, perspectives, and insights inherent in the study. Additionally, the study's foundation is reinforced through a comprehensive literature review, demonstrating a commitment to understanding and building upon existing research. This integrated approach ensures the study's credibility, being not only informed by practical expertise but also firmly grounded in a thorough understanding of the existing research landscape.

Triangulation. Triangulation of data was completed by sharing the three emergent themes with an educational team member not affiliated with this study. They provided expert, unbiased opinions in agreement with the identified themes. Triangulation of data sources was utilized through individualized semi structured virtual interviews of caregivers and education providers, during which they screen shared progress reports or educational interventions. As discussed in Chapter two, the literature was revisited, and many of the identified themes from this study aligned with the current literature.

Member Checking. Member checking occurred in two non-consecutive phases during this study. In the first phase, all twenty five participants responded, agreeing with the accuracy and content of their transcribed interviews. In the second phase, participants verified the accuracy of thematic findings, including eight subthemes and three emerging themes resulting from data analysis. Out of 25 participants, 17 responded in agreement with the thematic findings, providing a 68% response rate for member checking. In contrast, 7 participants did not respond to the email request, resulting in a 32% non-response rate for member checking. Additionally, two caregiver participants identified hybrid learning as a notable omission from the findings, highlighting the challenges it posed for children with ASD during the constant shifts between in-person and virtual education.

Transferability

Qualitative caution was exercised for transferability due to the specific nature of findings, as suggested by Shenton (2004). The external validation strategy for this study focuses on relatability through context. Participants, including caregivers and education providers, shared their lived experiences during individualized interviews conducted via secure virtual platforms with audio and video capabilities. The contextual information provided by participants described their experiences and offered insight into implementing virtual education for children with ASD during the COVID-19 pandemic. This relatability through contextual information allows for an understanding of the research for comparison in similar public health disasters. Transferability in this study considers participants, interview protocols, data collection, data analysis and possible limitations to provide information for future research.

Dependability

Dependability is demonstrated throughout this research to establish that future researchers can reproduce this study (Shenton, 2004). The methodology, including virtual

interviews, data collection, and data analysis is described in detail to facilitate reproducibility. The interview protocols for caregivers and education providers can serve as template models for researching the implementation of virtual education for children with ASD during future public health disasters or global pandemics, similar to the COVID-19 pandemic. Furthermore, dependability is addressed through reflection on the overall effectiveness of the qualitative multi-case research process.

Confirmability

Objectivity is an important part of qualitative research design (Shenton, 2004). This study aimed to reflect the lived experiences of caregiver and education provider participants while mitigated investigator bias as much as possible. To reduce bias, member checking was conducted in two non-consecutive phases. The first phase ensured the accuracy of interview transcripts, while the second phase, conducted after thematic data analysis, aimed to reliably reflect participants' experiences through identified sub-themes and emerging themes. Method triangulation and bracketing were used throughout this study to validate interviews, memo notes, and verbatim transcripts of caregivers and education providers by verifying comparisons. Reflective commentary, including a detailed description of the methodology and a personalized researcher's lens, allowed for determining objectivity in the provided data for this research.

Summary

The primary objective of this research was to gain a deeper understanding of the contextual experiences of interested-parties involved in implementing virtual education for children with an autism spectrum disorder (ASD) in the Washington DC region during the COVID-19 pandemic. Interview transcripts from the twenty five participants, comprising 16 caregivers and 9 education providers, resulted in the identification of thirty four initial codes. Notable similarities in these initial codes revealed that both caregivers and education providers

encountered similar challenges during the implementation of virtual education. These thirty four initial codes were further analyzed and categorized into eight subthemes. Thematic data analysis and the grouping of these subthemes led to the emergence of three overarching themes in this study represented in Figure 4.2. Participants encountered significant challenges in three distinct areas: the transition to virtual education, team collaboration, and the actual implementation of virtual education.

The first theme, transition to virtual education, encompassed challenges in three specific areas: 1) disruptions to routines and structures, 2) managing multiple roles, and 3) accommodating resource limitations shown in Figure 4.3. Participants described the sudden shift to virtual education disrupted established routines and structures. Caregivers expressed frustration at their children's difficulty in understanding the reasons behind school closures due to the global pandemic, leading to behavior challenges and difficulties in establishing new routines. Consequently, caregiver and education providers had to assess the environmental and educational needs of the children to support their participation in virtual education. This included ensuring access to adequate technology, as many participants lacked internet services in their homes, hindering their access to virtual lessons. Participants also had to adapt home spaces to facilitate virtual education. Moreover, many participants had to balance their work demands while simultaneously supporting virtual education, necessitating collaboration between caregivers and education providers, particularly in terms of educational resources.

The second theme involved challenges related to team communication. These challenges revolved around two key areas: 1) dependence on interested-parties and technology, and 2) format of Individualized Education Program (IEP) meetings shown in Figure 4.4. Caregivers discussed difficulties in having to rely primarily on technology to communicate with their child's teachers. In contrast, education providers faced challenges in engaging their students on-screen,

relying on caregivers for this purpose. Additionally, participants had varying preferences regarding the format of IEP meetings. Some preferred in-person meetings for the personal interaction they allowed, while others favored virtual meetings for the ease of access from remote locations.

The third theme pertained to challenges encountered during the implementation of virtual education. These challenges encompassed three specific areas: 1) attentional challenges to virtual learning, 2) modifications to IEP, and 3) opportunities for development shown in Figure 4.5. Participants discussed difficulties related to various aspects of virtual teaching and learning, particularly the behavioral challenges displayed by children with ASD during their interactions with screens. Education providers had to modify IEP goals and progress reports to reflect each child's performance within a virtual setting. Based on participants' experiences, a few opportunities for development were identified to enhance the virtual education experience for children with ASD. These included training for interested-parties to enable maximizing their use of technological tools, grouping of children based on their performance and needs into virtual classrooms, and incorporating outdoor learning areas allowing movement as children with ASD benefit from sensory-based physical activities.

Chapter five will provide an interpretation of the findings utilizing the conceptual framework, along with its translational implications, limitations of this study, and suggestions for future research.

Chapter 5: Discussion

This chapter addresses the four research questions that guided this study, utilizing the collective data from this dissertation, and reflects on the findings in association with the scientific literature. Additionally, the chapter discusses significant points related to the experiences of interested-parties and highlights the discussion's contribution to advancing research. The chapter also explores the translational aspects of this research, methodological considerations, and policy implications related to translational research. Finally, it acknowledges the limitations of this dissertation and offers recommendations for future research, policy development and practical applications.

The purpose of this research was to gain a deeper understanding of the contextual experiences of interested-parties in implementing virtual education for children with ASD during the COVID-19 pandemic. Three key themes emerged from this study: 1). Transition to Virtual Education, 2). Team Collaboration, and 3). Implementation of Virtual Education. These three themes are explored in connection with the four research questions within the framework of our conceptual model.

Research Question 1: How does virtual education influence the development and implementation of educational interventions for children with ASD?

The development and implementation of virtual education was influenced by Theme 1 (Transition to Virtual Education) and Theme 3 (Implementation of Virtual Education) and discussed by participants in four areas: disruption to routines and structures, managing multiple roles, accommodating resource limitations and attentional challenges to the virtual learning environment represented by Table 5.1.

Table 5.1

Development and Implementation of Educational Interventions

Research Question #1	Themes	CFIR Domains	CFIR Constructs
How does virtual education influence the development & implementation of educational intervention for children with ASD?	• Transition to Virtual Education • Implementation of Virtual Education	• Innovation	• Adaptability • Complexity
		• Characteristics of Individuals	• Implementation Leads • Implementation Team Members • Innovation Deliverers • Innovation Recipients
		• Implementation Process	• Assessing Needs • Teaming

Disruption to Routines & Structures

The rapid transition to virtual education during the COVID-19 pandemic disrupted established routines and structures for participants, presenting challenges in the development of new routines for engaging in remote learning. Caregivers, in particular, encountered initial difficulties as their children struggled to comprehend why their daily routines had suddenly shifted from attending school in person to learning from a computer screen. Given the diverse cognitive and communication abilities among children with Autism Spectrum Disorder (ASD) (Johansson et al., 2020), many were unable to grasp the implications of an ongoing pandemic and the necessity of staying at home for learning. As a result, the findings of this study suggest that this lack of understanding led to feelings of frustration, which were expressed through aversive behaviors directed towards caregivers and their technological devices. Caregivers attributed these behavioral challenges to the abrupt alterations in their child's routines. These

sudden changes posed difficulties for caregivers in establishing new routines and in helping their child associate educational learning with the home environment rather than the school building. This finding aligns with research by Eshraghi et al. (2020), which also emphasized that disruptions to fixed routines could lead to emotional and behavioral instability in most children with ASD.

In addition to developing new routines, caregivers also had to transform specific areas within their homes to create a dedicated space for virtual education. Caregivers discussed the challenges they encountered when attempting to make their child associate virtual learning with a space that had previously served a different purpose, such as a play area. The findings indicated that children struggled to associate their homes with learning, resulting in maladaptive behaviors that hindered their engagement in virtual lessons. Furthermore, the study revealed difficulties in establishing a distraction-free environment, especially with multiple people at home due to strict COVID-19 lockdown measures. Averett et al. (2021) also observed similar challenges in their research, noting that children with ASD faced great difficulties with distractions and maintaining focus at home compared to their experiences at school.

Education providers also described their challenging experiences with developing virtual lesson plans for students with ASD. The abrupt transition to virtual education did not afford education providers the opportunity to undergo training for delivering virtual lessons. Consequently, the findings of this study revealed that many were unfamiliar with utilizing the educational tools available on the virtual platform and had to rely on self-learning. Schieltz & Wacker (2020) further substantiate these findings by explaining that very few providers received training to facilitate remote services during the pandemic, which consequently affected the quality of services provided.

Moreover, education providers acknowledged that, in contrast to in-person education, developing educational interventions to address socioemotional and behavioral skills, essential components of education for children with ASD, proved challenging in a virtual environment. This finding aligns with research by Hurwitz et al. (2022), which elucidated that replicating educational modalities within an online environment for children with ASD, who require specialized supports and services, presented significant challenges and was often nearly impossible.

Managing Multiple Roles

During virtual education, participants were tasked with managing multiple roles, which added complexity to the development and implementation of educational interventions. Caregivers described the challenges they faced when assuming multiple educational responsibilities for their children during virtual education. These responsibilities had originally been handled by professionals at their children's schools during in-person education. However, in the virtual education context, caregivers were now expected to assume these professional roles without specialized training. This presented a source of concern for caregivers, as they did not feel qualified to implement educational interventions in these specialized areas for their children with ASD. Furthermore, they were apprehensive about potentially causing regression in the skills that had been previously developed with the support of educational specialists. The findings also indicated that caregivers were not perceived as educators by their children, which sometimes led to maladaptive behaviors during the implementation of virtual learning activities.

The multitude of roles that caregivers juggled daily, including overseeing virtual education for their children with ASD, frequently resulted in feelings of burnout. Recent studies have reported similar challenges faced by parents who had to assume multiple roles as educators during the COVID-19 pandemic (Aman & Pearson, 2020; Averett et al., 2021; Jeste et al., 2020).

Furthermore, in addition to managing multiple roles, some caregivers also had to contend with the responsibilities of implementing virtual education for multiple children residing in their homes. With social distancing guidelines in effect, many of these caregivers lacked access to respite care, which contributed to declining mental health and heightened parent burnout. Recent studies support the findings of this research and have linked parental burnout to caring for one or more children with special needs during the pandemic (Degli Espinosa et al., 2020; Fatehi et al., 2021).

Accommodating Resource Limitations

A third area, accommodating resource limitations, was essential to the development and implementation of educational interventions for virtual education. Caregivers and education providers discussed strategies for facilitating the implementation of virtual education by leveraging provided resources alongside supplemental educational materials to support children's participation in virtual lessons. However, both caregivers and education providers highlighted that a lack of access to essential technology resources, such as high-speed internet connections, posed a significant barrier to developing and implementing virtual educational interventions. Furthermore, maintaining the functionality of the provided technology, including laptops, for efficient use during virtual education proved to be a challenge for many participants. In response to the abrupt disruptions in established routines, some children exhibited adverse physical behaviors that resulted in damage to the technological devices used for virtual educational activities. Recent research studies have noted similar struggles related to disruptions in routines, aversive behaviors towards technological devices, and various virtual teaching modalities, which deviated from the typical experiences of students with ASD (Averett et al., 2021; Schwartz, 2021).

Attentional Challenges to Virtual Learning

The final area that informs both development and implementation of virtual education are attentional challenges from children with ASD. Education providers discussed the difficulties they faced in maintaining their students' attention to the computer screen during virtual educational activities. The findings indicated that students with ASD frequently became distracted due to various factors, including disturbances within their home environment, disruptions from other children appearing on the screen, technical issues, sensory dysregulation, and visual fatigue resulting from increased screen time. Additionally, traditional accommodations for students with attention issues were often ineffective and not easily translated to the virtual environment. Research by Averett et al. (2021) support this study's findings and emphasized that a child's specific needs while learning at home differed from their needs at school. Consequently, the accommodations that worked for them in a school setting did not necessarily apply in the same manner at home.

Similarly, caregivers also encountered challenges, particularly related to their child's inattention to the screen during virtual lessons. Many caregivers noted that during in-person education, their child received support from a paraprofessional who assisted them with educational activities. However, during virtual education, this support had to be provided by the caregiver, who often struggled to maintain a consistent presence during their child's virtual lessons due to the demands of managing multiple responsibilities. Although paraprofessionals were available remotely during virtual lessons, their attempts to provide educational support to students with ASD were frequently unsuccessful. According to the findings, participants described that remote support from a paraprofessional was often inadequate for engaging students during virtual lessons, as the child could easily walk away from the screen or simply log off from their session. Research by Averett et al. (2021) further substantiated this dissertation's

findings by recognizing that remote assistance was not a direct substitute for one-on-one, in person assistance. Consequently, students with ASD encountered challenges in maintaining attention and participation during the implementation of virtual lessons.

Research Question 2: How does virtual education influence team collaboration for children with ASD?

According to the findings, virtual education forced team communication (Theme 2) between caregivers and education providers. Participants shared their experiences with team collaboration, resulting from their mutual dependence on each other and technology during the implementation of virtual education (Theme 3) for children with ASD shown in Table 5.2.

Table 5.2

Team Collaboration

Research Question #2	Themes	CFIR Domains	CFIR Constructs
How does virtual education influence team collaboration for children with ASD?	• Team Communication • Implementation of Virtual Education	• Inner Setting	• Communications • Culture • Relational Connections • Structural Characteristics
		• Characteristics of Individuals	• Implementation Leads • Implementation Team Members • Innovation Deliverers • Innovation Recipients
		• Implementation Process	• Assessing Needs • Teaming

Dependence on Interested-Parties

The findings from this study revealed that participants described an elevated dependence on one another to support children with ASD during the implementation of virtual education. Caregivers reported increased collaboration with education providers as they sought guidance on navigating the unfamiliar virtual education platform. Additionally, caregivers relied on communication with education providers to explain their child's absence and to obtain missed assignments due to maladaptive behaviors that hindered the participation of some children with ASD in virtual sessions. Nevertheless, some caregivers noted that the delivery of virtual lessons to their child with ASD was impeded by the absence of direct, hands-on support from education providers. They further expressed overwhelming feelings of frustration stemming from their lack of a professional knowledge base necessary to adequately support their child. Recent research aligns with the findings of the this study, emphasizing that the delivery of educational services for children with ASD necessitates professional expertise, consistency, and content knowledge; areas that caregivers may not be familiar with or have the appropriate training (Hurwitz et al., 2022; Tremmel et al., 2020).

Comparatively, the findings indicated that some education providers were unfamiliar with the virtual teaching platforms used for the implementation of virtual education. This unfamiliarity, coupled with the numerous distractions within their students' home environments, prompted education providers to express difficulties in engaging children with ASD effectively on the screen during virtual lessons. Consequently, this led to increased collaboration with caregivers, who were physically present and able to assist in engaging their students with the screen during virtual lessons. Recent research by Hurwitz et al. (2022) supported the findings of this study, highlighting the need for heightened collaboration between special education

providers and parents/ caregivers to facilitate the progress of students with ASD during virtual education.

Technology Dependence

Participants described challenges related to technology dependence that influenced team collaboration. Caregivers shared that relying primarily on technology to communicate with education providers created a barrier, as they no longer had the ease of face-to-face, in-person interactions. Conversely, some caregivers lacked access to internet services in their homes during the initial stages of virtual education. These caregivers had no choice but to rely on their smartphones, which often did not support the technology required for participation in virtual education. This study's findings align with research by Hurwitz et al. (2022), which also discussed the challenges faced by caregivers when using virtual platforms to support the educational needs of children with ASD. The absence of efficient technology posed significant challenge for caregivers, but it also presented difficulties to education providers. The findings indicated that education providers were unable to implement virtual lessons to students because some caregivers' homes lacked internet services.

The findings from this study also revealed that participants had a mixed preference for the format of IEP team meetings and described challenges and opportunities associated with team collaboration. Some participants expressed a preference for virtual IEP team meetings due to the convenience of remote accessibility, which allowed many team member to attend and collaborate. However, some participants noted a lack of personalized interactions during virtual IEP team meetings due to environmental distractions that compromised privacy and hindered active team collaboration. Caregivers discussed their inability to physically bring their child to the meeting table and facilitate their interaction with the team, preventing their active participation in the IEP process. According to caregivers, many children did not attend virtual

IEP meetings because they found them unengaging. The findings of this study suggested that in-person IEP team meetings were more favorable for participants compared to virtual meetings because they facilitated increased personalized interactions, resulting in enhanced team collaboration.

Research Question 3: How has the transition of implementing traditional educational intervention methods to a virtual environment influenced IEP goal achievement for children with ASD?

The findings from this study indicated that modifications to the students' IEP were deemed necessary and were associated with the achievement of IEP goals for children with ASD during the implementation of virtual education (Theme 3) represented in Table 5.3.

Table 5.3

IEP Goal Achievement

Research Question #3	Themes	CFIR Domains	CFIR Constructs
How has the transition of implementing traditional educational intervention methods to a virtual environment influenced IEP goal achievement for children with ASD?	• Implementation of Virtual Education	• Outer Setting	• Local Attitudes • Local Conditions • Policies & Laws
		• Characteristics of Individuals	• Implementation Leads • Implementation Team Members • Innovation Recipients
		• Implementation Process	• Assessing Needs • Teaming

Modifications to IEP

Many IEP goals for children with ASD were originally formulated before the onset of school closures resulting from the COVID-19 pandemic. Consequently, these goals were

designed with the intention of being addressed during in-person education, in compliance with IDEA (2004). However, the findings indicated that participants recognized the significant disparity between in-person and virtual educational services in addressing IEP goals. As virtual education continued, participants serving on IEP teams collaborated to modify students IEPs' and their respective goals to align with the virtual delivery of educational interventions. Research by Hurwitz et al. (2022) had similar findings, emphasizing the need to focus on reasonable IEP goals while simultaneously adapting and modifying educational interventions to suit the current virtual setting.

Moreover, in the process of modifying goals across all pertinent performance areas, participants identified socio-emotional skills and social interaction skills as particularly challenging to address during virtual education. The findings illuminated that numerous students with ASD encountered difficulties maintaining attention to the screen and actively engaging in virtual lessons, resulting in maladaptive behaviors driven by frustration. Consequently, the study underscored the participants' struggles in addressing socio-emotional and social interaction skills in a virtual setting, especially given the absence of hands-on support from an Individualized Education Program (IEP) team member.

Similar findings indicated that teachers faced challenges in meeting IEP requirements through remote instruction. They reported feeling less equipped to deliver the necessary services, supports, and individualized attention required by their students with ASD in a virtual environment. This emphasizes the broader difficulties experienced in providing comprehensive support for students with ASD during remote learning, as outlined in the study by Hurwitz et al. (2022).

Furthermore, the study revealed limited information about the outcomes of IEP goal achievement for students with ASD during school closures resulting from the pandemic. This

highlights a critical gap in understanding the specific impact of the pandemic on the achievement of IEP goals, particularly in addressing socio-emotional and social interaction skills, adding to the urgency for further research in this area.

Research Question 4: How have the roles and resources of caregivers and educational team providers changed during the COVID-19 pandemic?

According to the findings in this study, both caregivers and education providers acquired various resources and assumed diverse roles throughout their experience with virtual education. During the transition to virtual education (Theme 1), participants assumed roles as evaluators and developers, navigating the initial challenges posed by school closures. Subsequently, participants transitioned into the role of collaborators as team communication (Theme 2) became essential due to their reliance on technology and dependence on interested-parties to support children during virtual education. Finally, participants assumed the role of facilitators during the implementation of virtual education (Theme 3), as they encountered challenges in their experiences with virtual teaching and learning shown in Table 5.4.

Table 5.4

Changes in Roles and Resources

Research Question #4	Themes	CFIR Domains	CFIR Constructs
How have the roles and resources of caregivers and educational team providers changed during the COVID-19 pandemic?	• Transition to Virtual Education • Team Communication • Implementation of Virtual Education	• Characteristics of Individuals	• Implementation Leads • Implementation Team Members • Innovation Deliverers • Innovation Recipients
		• Implementation Process	• Assessing Needs • Teaming

Evaluators and Developers

The results of this study indicated that both caregivers and education providers assumed the roles of evaluators and developers to address the initial challenges associated with the transition to virtual education (Theme 1). As evaluators, both groups critically assessed available resources to best support the implementation of virtual education. This informal assessment aimed to eliminate barriers to educational access, facilitating the effective implementation of virtual education. The findings revealed that some caregivers and education providers initially lacked internet services in their homes, which were essential for accessing the virtual platform. While most caregivers acquired internet services to enable their children's participation in virtual education, the findings revealed that some caregivers relied on their smartphones, which already had internet access, to engage their children in virtual lessons. Similarly, some education providers disclosed that prior to the introduction of virtual education, they completed work-related tasks in their school buildings, where internet access was readily available. However, during virtual education, these same tasks had to be completed at home, necessitating the subscription to home internet services for the implementation of virtual lessons. These findings are consistent with additional research that has identified various barriers contributing to educational service disparities during the pandemic, including low socioeconomic status, regional differences in resources, accessibility to Wi-Fi, bandwidth limitations, and access to a technological devices (Ameis et al., 2020; Schwartz, 2021; Fatehi et al., 2021).

In their roles as developers, caregivers and education providers had to create a virtual teaching and learning environment that effectively supported the educational needs of children with ASD. Research based on Hurwitz et al. (2022) indicated that caregivers and educators were "making the best out of a bad situation" and "constantly using trial and error to find the best way for students to eLearn". While such adaptive approaches may have been observed across various aspects of virtual education, participants in this study were notably proactive in developing a

learning environment conducive for children with ASD. As evidenced by the findings, caregivers transformed spaces within their homes to create dedicated learning areas for their children to engage in virtual lessons. Additionally, some caregivers supported their child's transition to virtual education by creating visual schedules outlining new daily routines. In contrast, educational providers adapted lesson plans by modifying the educational curriculum for virtual delivery. According to educational providers in this study, interactive activities played a pivotal role in the process of developing virtual lesson plans, as they encouraged children with ASD to focus on the screen and actively engage with their virtual lessons.

Collaborators

The role of collaborator was observed among both caregivers and education providers throughout virtual education, as they were compelled to collaborate and function as a team using technological tools exclusively during the implementation of virtual education. This collaborative effort led to the development of interdependence between caregivers and education providers, as both groups relied on each other to effectively support children with ASD during various aspects of virtual teaching and learning. These findings align with other recent studies that have demonstrated frequent, if not daily, collaboration between caregivers and education providers to assist children with ASD in participating in virtual lessons. (Hurwitz et al., 2022; Tremmel et al., 2020).

Facilitators

Caregivers and education providers had to assumed the role of facilitators during virtual education. The findings highlighted that children with ASD encountered challenges with maintaining engagement with the screen during their virtual lessons. Consequently, participants implemented strategies to enhance flexibility and adaptability, which were identified as essential characteristics to overcome the unpredictable difficulties seen throughout their implementation

experiences. Moreover, the incorporation of manipulative and sensory based activities proved beneficial in facilitating movement breaks and enhance interaction with the screen during virtual learning. Research conducted by Hurwitz et al., 2022 also supported the inclusion of short breaks that allowed for movement in virtual lesson plans, which were deemed necessary for children with ASD.

The findings also described how caregivers facilitated the use of incentives or rewards to promote their child's attention and engagement with virtual learning. The choice of incentives and rewards was influenced by the child's preferences and the severity of their ASD. As discussed in the findings, a nonverbal child with level two ASD might be rewarded with ten additional minutes of playing games on their tablet, while a child with level one ASD might prefer to go out for ice cream after completing their math assignment. These findings align with several studies that have detailed the changing roles of caregivers and educators during the COVID-19 pandemic to support virtual education for children with ASD (Averett et al., 2021; Fatehi et al., 2021; Hurwitz et al., 2022; Pecor et al., 2021; & Stadheim et al., 2022).

Translational Implications

This research provides evidence-informed knowledge regarding the implementation of virtual education to children with ASD during the COVID-19 pandemic. It draws upon the lived experiences of caregivers and education providers, with implications that can extend to diverse virtual education settings. Three significant areas for implementation improvements have been identified, necessitating a robust call to action: 1) Development of Guidelines, 2) Development of Needs Assessment, and 3) Development of Training.

Development of Guidelines

The implementation of virtual education for children with ASD emerged as a rapid response to mitigate the spread of the novel COVID-19 virus during a global public health crisis. The abrupt shift from in-person education to virtual education had a substantial impact on the overall effectiveness of educational programming and implementation. This impact was particularly pronounced for children with ASD, who thrive on established routines and structures in their daily schedules. Moreover, the primary focus on public health safety during the pandemic made it unfeasible for educational authorities to establish comprehensive implementation guidelines specifically targeted for education providers.

The findings from this study shed light on the contexts in which aspects of this emergency implementation of virtual education for children with ASD were successful and where challenges arose. These findings offer valuable support for the development of implementation guidelines for virtual education, thereby enhancing the effectiveness of remote education for children with ASD. Developing comprehensive implementation guidelines is essential for providing education providers with crucial guidance, enabling them to recreate the classroom-based learning experience within a virtual context while accommodating the diverse characteristics presented by children with ASD.

The development of comprehensive guidelines for virtual education implementation recognizes that the impact of the pandemic extends beyond immediate responses. It signifies the commencement of a paradigm shift in how education is delivered and reiterates the importance of flexibility in educational systems. By developing implementation guidelines, educational institutions can proactively prepare for future disruptions, ensuring that children with ASD and other unique learning needs are not left behind. These guidelines should consider the unique

requirements of children with ASD, such as individualized learning plans, sensory accommodations, and strategies for maintaining engagement in virtual learning environments.

First and foremost, these guidelines should address the individualized nature of education for children with ASD. Each child with ASD is unique, characterized with varying strengths, challenges, and learning styles. Effective implementation of virtual education necessitates a personalized approach. The development of implementation guidelines should emphasize the importance of individualized learning plans (ILPs) tailored to the specific needs of each child. These plans should be flexible, continuously adaptable, and incorporate input from caregivers, educators, and specialists.

Sensory accommodations hold paramount importance. Children with ASD often experience sensory sensitivities, necessitating the design of virtual learning environments that minimize sensory overstimulation. Implementation guidelines should provide specific recommendations for creating sensory-friendly digital classrooms, taking into account factors such as lighting, background noise, and visual stimuli.

In addition, maintaining engagement in virtual learning environments represents a critical challenge, especially for children with ASD who may encounter difficulties with attention and focus. The implementation guidelines should outline evidence-based strategies for promoting engagement, including the incorporation of interactive elements, regular breaks, and clear communication techniques. Furthermore, the guidelines should encourage education providers to establish a supportive and empathetic virtual classroom atmosphere, building connections with their students.

By considering these essential components, the development of implementation guidelines for virtual education not only addresses the immediate needs of children with ASD during the pandemic but also serves as a blueprint for a more inclusive, adaptable, and

personalized educational system. This effort signifies a commitment to the long-term well-being and success of children with ASD, irrespective of the public health challenges that the future may hold.

Development of Needs Assessment

The rapid shift to virtual education demanded a proactive and comprehensive effort to identify the barriers and facilitators related to available resources for the successful implementation of virtual education for children with ASD. In this transformative phase, caregivers and education providers were at the forefront, tasked with addressing unique challenges to enhance the learning experience for children with ASD within a virtual environment.

Caregiver Needs Assessment. Caregivers assumed a dual role, transitioning from parents to primary facilitators of their children's education within their homes. This transition required them to swiftly convert their living spaces into dynamic virtual learning environments conducive to effective education. Such adaptations encompassed the creation of designated study areas, lighting adjustments, and the integration of sensory accommodations. Simultaneously, caregivers encountered the challenge of procuring essential educational resources, including specialized materials and technology tailored to the unique needs of children with ASD. The urgency of the transition and budgetary constraints compounded the challenges they faced.

The findings of this research revealed that caregivers engaged in an informal and iterative process to identify specific needs within their home environments that significantly influenced the virtual learning challenges encountered by children with ASD. While caregivers played an instrumental role in facilitating remote education, they confronted numerous generalized challenges. These challenges included transforming their home spaces into conducive virtual

learning environments, procuring necessary educational resources, ensuring technology accessibility, and safeguarding technological resources from potential damages resulting from the behavioral challenges often experienced by children with ASD.

Developing a tailored self-assessment tool for caregivers is imperative. This self-assessment empowers caregivers to pinpoint unmet environmental, educational and technological needs, thereby enabling them to better support children with ASD during the implementation of virtual education within their home environments. It offers a structured approach to assess their unique requirements and challenges, guiding them towards acquiring essential resources and adopting effective strategies to enhance the virtual education experience for their children.

Education Provider Needs Assessment. Education providers faced a steep learning curve as they restructured their teaching methodologies to align with the virtual landscape. This transformation entailed mastering the utilization of digital platforms and technology to deliver quality education. Notably, for children with ASD, who rely on structured routines, education providers had to re-envision their approaches to maintain a consistent learning experience while capitalizing on the flexibility offered by the virtual environment.

Concurrently, the research findings indicated that education providers actively sought specific educational materials to ensure the effective delivery of virtual education to children with ASD. The development of a dedicated needs assessment tailored to the requirements of education providers is essential. This assessment is designed to identify the unmet needs they encounter when delivering virtual education, thus facilitating the acquisition of appropriate educational resources. This targeted needs assessment empowers education providers to bridge resource gaps and acquire the instructional materials necessary for delivering an effective virtual education program tailored to the unique needs of children with ASD.

Practical Insights and Knowledge Dissemination. The practical insights derived from implementing needs assessments for both caregivers and education providers offer a valuable resource for broader knowledge dissemination. This knowledge spans various aspects, encompassing the identification of virtual education resources, the allocation of educational resources, the mitigation of disparities in educational equity, and securing funding for the technological resources required for effective virtual education.

The needs assessments conducted with caregivers and education providers shed light on the specific resources required for successful virtual education. These resources encompass a wide range of elements, including educational materials, technology, software, and accessibility tools tailored to meet the unique needs of children with ASD. By understanding these requirements, the educational community can compile a comprehensive list of necessary resources, thereby facilitating efficient procurement and allocation. The translation of knowledge also contributes to the development of resource directories that can be made available to caregivers, education providers, and policymakers, enabling them to identify and access essential materials with ease.

The knowledge gathered from needs assessments inform the allocation of educational resources, which is critical for optimizing the virtual education experience for children with ASD. This knowledge guides educators, schools, and educational authorities in the equitable distribution of resources to ensure that every child, regardless of their circumstances, has access to the materials and tools they need. Moreover, it enables the development of resource allocation strategies that account for the individualized nature of education for children with ASD, including the provision of materials to address unique learning profiles and sensory sensitivities.

One of the significant challenges in virtual education is ensuring that all children, regardless of their background or abilities, have equal opportunities to access quality education.

Insights gained from the needs assessments reveal disparities in educational equity that may exist. Such disparities could be related to access to technology, the availability of specialized materials, or the ability of caregivers to support their children effectively. Armed with this information, educational policymakers can develop targeted interventions aimed at bridging these gaps. This may involve providing financial support to underprivileged families for acquiring necessary technology or materials or implementing programs to train caregivers and education providers in resource-strapped areas. In essence, these insights serve as a foundation for informed decision-making in the pursuit of equitable virtual education.

Ensuring that children with ASD have access to the technological resources required for virtual education is of paramount importance. The data collected through needs assessments can play a pivotal role in advocating for funding at various levels, be it within educational institutions, local school districts, or at the governmental level. The specific resource requirements identified through these assessments enable policymakers and advocacy groups to build compelling cases for allocating financial resources to acquire technology and tools that are essential for virtual education. This, in turn, facilitates the procurement of devices, assistive technologies, and software licenses that can enhance the virtual learning experience for children with ASD.

The knowledge gained from the needs assessments conducted with caregivers and education providers represent a treasure trove of information that can be leveraged for the comprehensive enhancement of virtual education. The dissemination of knowledge will inform resource identification and allocation, support equity-driven interventions, and aid in securing funding, ultimately fostering a more inclusive, effective, and equitable virtual education environment for children with ASD. The systematic and data-driven approach made possible by the dissemination of knowledge ensures that decisions made at the policy and institutional levels

are grounded in the real needs and challenges faced by children with ASD and those who support their educational journeys.

Development of Training

The findings underscore the critical need for comprehensive technology training among three key interested-parties involved in the implementation of virtual education for children with ASD. The challenges encountered by caregivers, education providers, and children with ASD necessitate a proactive approach to bridge the digital divide and ensure that technology becomes a facilitator rather than a barrier in their educational journey. The transition to virtual education, particularly during unprecedented times like the COVID-19 pandemic, has unveiled the pressing necessity for a concerted effort in technology training. Without adequate training, caregivers may find themselves grappling with unfamiliar virtual platforms, while education providers may encounter barriers in delivering effective virtual instruction. Children with ASD, on the other hand, require guidance to navigate the virtual landscape and harness technology as a tool for their education, all of which can transform their educational experience from one fraught with challenges to one filled with opportunities.

This transformative approach recognizes the evolving landscape of education, where technology has become an integral and permanent facet of the learning process. In today's rapidly changing educational environment, the effective use of technology is no longer a choice but a necessity to provide a well-rounded and inclusive education for all. By equipping caregivers, education providers, and children with ASD with the essential technological skills and knowledge, we take a significant stride towards ensuring that virtual education serves as an inclusive, empowering, and effective platform for children with ASD, fostering their growth and success.

Technology Training for Caregivers. Caregivers, who assumed a significant role in supporting the virtual education of children with ASD, often lacked familiarity with accessing the virtual platforms required for their children's engagement in virtual lessons. This gap in technological knowledge was exacerbated by the abrupt changes to their children's established routines and schedules, which often led to dysregulated behaviors. As a result, caregivers found themselves navigating a challenging landscape, with the need to not only become proficient with technology but also to provide guidance and structure to their children during virtual learning.

Caregivers would benefit from comprehensive technology training that includes participation in Virtual Learning Support Workshops. These workshops would guide caregivers through the intricacies of using virtual platforms, such as Zoom or Google Classroom. They would also provide practical tips for creating a conducive learning environment at home, addressing lighting, sensory considerations, and other environmental factors. Furthermore, these workshops can equip caregivers with strategies for managing their child's behavior during virtual lessons. For instance, they might learn to create visual schedules, use sensory tools, or employ behavior management techniques that support their child's engagement in virtual learning.

Technology Training for Education Providers. Education providers, on the other hand, encountered their set of challenges. Their professional training primarily focused on in-person teaching skills, leaving them ill-equipped to effectively utilize the various tools provided for virtual teaching. The transition to remote instruction demanded a shift in teaching methods and the mastery of digital platforms to ensure effective education for children with ASD. Education providers required specific training to adapt their teaching techniques for virtual settings and to harness technology to its full potential.

To address the needs of education providers, Virtual Teaching Certification Programs can be established. These programs would offer a deep dive into virtual teaching methods and tools,

equipping educators with the skills and knowledge they need to excel in the virtual environment. They would cover pedagogical techniques specific to remote learning, the adaptation of curriculum for online use, and the proficiency in using educational technology tools. Additionally, educators would gain hands-on experience in virtual classrooms, allowing them to master interactive features and assess student progress in virtual environments. Moreover, these programs can include specialized training modules that address the unique requirements of children with ASD in the virtual setting.

Technology Training for Children with ASD. Children with ASD faced unique challenges in adapting to virtual education. They often struggled to maintain screen engagement due to their unfamiliarity with the daily virtual learning activities. Moreover, they primarily associated technology with gaming and hands-on, in-person educational activities, leading to confusion and frustration. These challenges manifested as maladaptive behaviors that hindered their engagement in virtual lessons.

To empower children with ASD to effectively use technology for educational purposes, Virtual Learning Empowerment Camps can be developed. These camps would be led by trained facilitators who guide children through various virtual learning activities. Children would learn to navigate educational apps, understand the expectations of virtual classrooms, and build the skills required to stay engaged. Furthermore, these camps can incorporate social interaction and peer learning, helping children develop the ability to communicate and collaborate virtually, which is particularly vital in the current educational landscape.

The development of technology training opportunities for caregivers, education providers, and children with ASD is essential. These training initiatives should be tailored to the specific needs of each group, ensuring that they are equipped with the skills and knowledge required for successful virtual education. By offering these training programs, we can bridge the

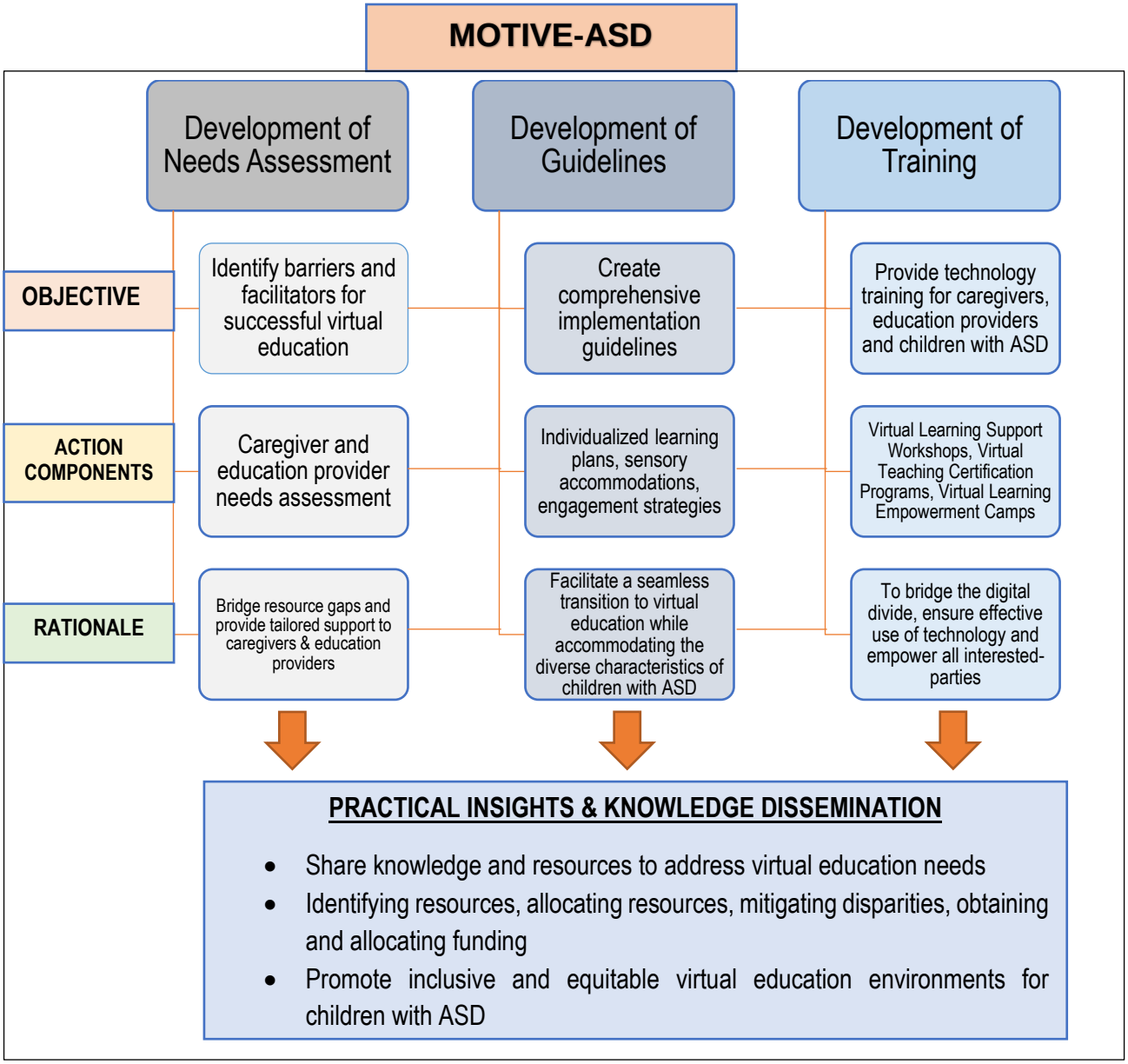
digital divide, overcome technological barriers, and create a more inclusive, engaging, and effective learning experience for children with ASD. These initiatives translate research findings into practical solutions that can be disseminated to benefit all interested-parties involved in the virtual education of children with ASD and ultimately supporting their educational success.

MOTIVE-ASD

The abrupt shift to virtual education, driven by the imperative to mitigate the spread of the COVID-19 virus, left interested-parties with insufficient time to develop comprehensive implementation practices for virtual education for children with ASD. This research offers evidence-informed knowledge drawn from the lived experiences of interested-parties engaged in implementing virtual education for children with ASD during a pandemic. To illustrate the translational implications of this research, the Model of Translation and Implementation in Virtual Education for children with ASD (MOTIVE-ASD) was developed and represented in Figure 5.1. MOTIVE-ASD serves as a robust call to action for the development of implementation practices in three critical areas: 1) development of guidelines, 2) the establishment of needs assessments, and 3) the implementation of training for interested-parties. Furthermore, MOTIVE-ASD offers practical insights towards the dissemination of knowledge to interested-parties so they may: 1) share knowledge and resources to address virtual education needs, 2) identify resources, allocate resources, mitigate disparities, obtain and allocate funding, and 3) promote an inclusive and equitable virtual education environment for children with ASD.

Figure 5.1

Model Of Translation and Implementation in Virtual Education (MOTIVE-ASD)



The implementation of virtual education in response to school closures can be triggered by various factors, including adverse weather conditions, local disasters, or public health crises. The results of this research contribute to the body of knowledge supporting the education of children with ASD during environmental circumstances that necessitate school closures, as

previously observed during events like Hurricane Katrina and 9/11 acts of terrorism (Elsevier, 2019; DeVaney et al., 2009; Stough et al., 2017 & Boon et al., 2011). Furthermore, the translational implications from this study, as presented in MOTIVE-ASD, have the potential to generalize to other locations, including rural communities, to inform the development of implementation practices in virtual education for children with ASD. Given that this study identified challenges related to access to technology, educational policy planning should incorporate measures to provide equitable access to technology or develop resourceful devices that include the necessary technology to support virtual learning. In the future, it is essential to explore options for supporting various virtual delivery platforms that are easily accessible to individuals, such as cell phones, to further enhance implementation practices.

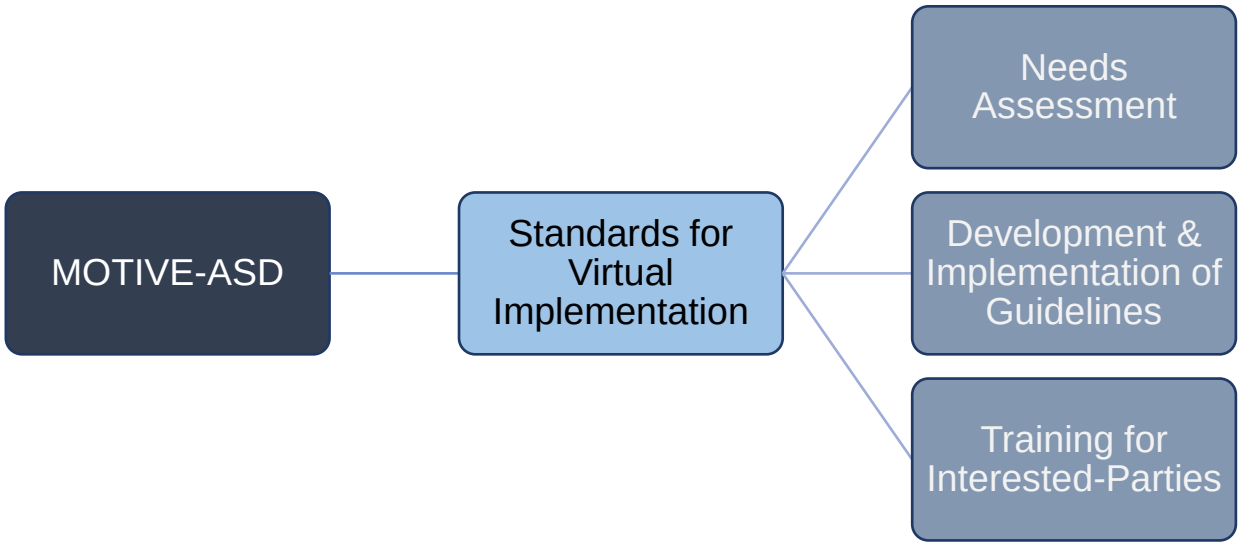
This research represents a vital contribution to the field of virtual education for children with Autism Spectrum Disorder (ASD), emphasizing the urgency of developing guidelines, needs assessments, and training programs to ensure a more inclusive and effective educational environment. The findings underscore the challenges posed by the abrupt transition to virtual education, not only during the COVID-19 pandemic but also in the context of other unforeseen circumstances that may necessitate similar shifts. The implications extend beyond the Washington DC region and can serve as a guide for improving virtual education practices in diverse settings, including rural communities. The research highlights the critical need for equitable access to technology and the development of resourceful devices that support virtual learning. Moreover, the future focus should be on ensuring accessibility through various virtual platforms, such as cell phones, to enhance implementation practices and foster the growth and success of children with ASD in an ever-evolving educational landscape.

Standards for Virtual Implementation

In response to the evolving landscape of virtual education, particularly in the context of children with Autism Spectrum Disorder (ASD), standards for virtual implementation have been developed from the findings of this research and comprise three pivotal areas highlighted by MOTIVE-ASD. These standards collectively address the unique challenges faced by children with ASD in virtual learning environments. They include three key areas; 1) Needs Assessment, 2) Development and Implementation of Guidelines, and 3) Training shown in Figure 5.2. The following sections expound upon each set of standards.

Figure 5.2

Standards for Virtual Implementation



Standards for Needs Assessment

The sub-standards developed for Needs Assessment represented in Appendix J adopts a proactive and comprehensive approach to identifying the unique needs of children with ASD in virtual education. The focus is on the development of assessment checklists and strategic

utilization of assessment data to inform an evidence based, data-driven, decision-making process. Continuous collaboration between interested-parties ensures diverse perspectives are considered, fostering a holistic understanding of the challenges faced by children with ASD. The user-centric design of assessment tools reflects a commitment to inclusivity and recognizing the diverse needs within the ASD community. The sub-standards within the area of Needs Assessment focus on the adaptability of the needs assessment process and considers the unique organizational structure

Standards for Development and Implementation of Guidelines

This set of sub-standards found in Appendix K are designed to guide the development and implementation of guidelines in virtual education for children with ASD in the respective organization. Similar to the Needs Assessment, there is emphasis on collaboration, bringing together diverse expertise, including educators, caregivers, special education experts, and technology specialists throughout the guideline development and implementation process. The focus on adaptability ensures that guidelines can withstand and navigate future disruptions in the educational landscape. Accessibility is prioritized to ensure that the guidelines are easily available and user-friendly for all interested-parties involved. Continuous improvement is embedded in the standards, with regular reviews and updates to guidelines, aligning them with emerging best practices and technological advancements. The standards highlight that effective implementation strategies are crucial to realizing the intended impact of guidelines, fostering an inclusive and supportive virtual education environment for children with ASD.

Standards for Training

These sub-standards shown in Appendix L underscore the critical role of comprehensive, inclusive, and continuous training for caregivers, education providers, and children with ASD engaged in virtual education. Addressing different proficiency levels ensures training is

accessible and beneficial for all participants. The provision of ongoing support, including help desks, hotlines, and community forums, fosters a collaborative and supportive virtual learning community. The emphasis on continuous evaluation of training programs promotes a culture of adaptability, where content and methods evolve based on the changing needs and technological advancements. Overall, these standards are designed to empower all interested-parties involved in virtual education, recognizing that effective training is key to navigating and excelling in virtual learning environments for children with ASD.

The three sets of standards and their respective sub-standards, encompass Needs Assessment, Development and Implementation of Guidelines, and Training. They can be used to facilitate both translation and future implementation as education systems work to enhance virtual education for children with ASD. The systemic and adaptable nature of these implementation guidelines ensures that educational strategies are informed by real needs and challenges, offering a blueprint for inclusive and effective virtual education. These translational implications underscore the potential for positive and lasting transformations in the realm of virtual education for children with ASD.

Study Limitations

This multi-case research study, while offering valuable insights into the lived contextual experiences of interested-parties implementing virtual education for children with ASD during the COVID-19 pandemic, is subject to certain limitations that should be considered when interpreting the findings.

Generalizability

The findings of this study primarily draw upon the experiences of caregivers and educational providers within a specific geographic region during a unique period characterized by the COVID-19 pandemic. Consequently, the generalizability of the findings to different

geographical locations, cultural contexts, or periods outside of a global health crisis may be limited. Variations in healthcare systems, education policies, and technological infrastructure may affect the applicability of these findings to other settings.

Case Selection

The study sample consisted of only twenty-five participants who were purposefully selected from the metropolitan Washington DC area, characterized as a moderate-sized city. The selection of cases in this study was purposeful, focusing on specific geographic regions and participants who were willing and available to participate. However, it is important to recognize that this purposive sampling approach may introduce selection bias and limit the representation of diverse perspectives within the population of caregivers and education providers.

While the participants represented a diverse group of interested-parties from the District of Columbia, Maryland, and Virginia, it is essential to acknowledge that the uneven distribution of participants across these regions may limit the generalizability of the findings. The majority of participants were from Maryland, followed by the District of Columbia and Virginia. This uneven distribution could potentially affect the transferability of findings to regions with different demographic and geographic characteristics.

Furthermore, because participants were not exclusively from a single state within the tri-state area, the study might be susceptible to confounding environmental variables related to state-specific mandates and regulations, particularly regarding COVID-19 infection rates. Therefore, caution should be exercised when extrapolating these findings to a broader population. It is important to note these state-level differences were not systematically measured in the study but could have influenced participants' individual experiences. Consequently, the findings may not readily apply to other regions with similar populations. This consideration underscores the need for future research to employ a more diverse and representative sample across various

geographic regions to enhance the applicability and generalizability of findings in the context of implementing virtual education for children with ASD during public health crises.

Data Collection

Data were primarily collected through semi-structured interviews, which are subject to the limitations of self-reporting. Participants' responses may be influenced by recall bias or social desirability, potentially impacting the accuracy and depth of the information gathered. Additionally, reliance on interviews as the primary data source may have limited the exploration of non-verbal cues and interactions that could provide additional insights.

Temporal Context

The COVID-19 pandemic necessitated an abrupt shift to virtual education, preventing the establishment of a formalized program to guide virtual education. The data for this research was collected during the hybrid learning period characterized by the COVID-19 pandemic. Consequently, the study could not assess the barriers and facilitators of a structured virtual education program because no such curriculum or program was available to guide implementation.

As highlighted by research by Hurwitz et al. (2022), special educators often had to adapt interventions on an ad hoc basis, employing a "trial and error" approach to address the immediate needs of students during the pandemic. To further contextualize this limitation, it is essential to note that the study's participant interviews were conducted with caregivers and education providers, rather than the students with ASD themselves. Existing research suggests that during times of crisis, adults may not fully grasp the extent of children's distress (Peek & Fothergill, 2009).

Therefore, the challenges reported by some interested-parties in implementing educational interventions for nonverbal children with ASD may not entirely represent the

children's actual experiences and struggles. Furthermore, the experiences and challenges faced by interested-parties during this crisis may differ from those in normal circumstances. Therefore, the findings may not fully capture the complexities of implementing virtual education during non-pandemic periods. This acknowledgment of temporal context limitations highlights the need for further research to investigate the long-term implications and differences in implementing virtual education for children with ASD in both crisis and non-crisis situations.

Potential Biases

Despite rigorous efforts to mitigate biases, the research may still be susceptible to certain biases. The researcher leading this study is a healthcare professional with extensive experience in pediatric autism. This background could introduce research bias, as preexisting knowledge and perspectives may influence data collection, analysis, and interpretation. Additionally, the purposeful recruitment of participants may introduce selection bias, as individuals willing to participate may have distinct perspectives or experiences compared to non-participants (Creswell & Creswell, 2017). Moreover, the collection of retrospective data through participant interviews, along with member checking of provided data regarding a complex and challenging period like the COVID-19 pandemic, may be susceptible to recall bias, potentially affecting the accuracy and completeness of participants' recollections (Johnson & Christensen, 2019).

Despite these potential sources of bias, steps were taken to mitigate these biases in accordance with established research practices, such as using a systematic coding process and involving multiple researchers in data analysis (Creswell & Creswell, 2017)

Resource Limitations

The scope of this study was constrained by available resources, including time and funding. As a result, certain aspects of the research, such as an in-depth exploration of specific cultural or regional differences, were not fully examined. The limitations imposed by resource

constraints are common in research endeavors (Creswell & Creswell, 2017). Future studies with greater resources could address these gaps and provide a more comprehensive analysis of the subject matter.

Long-Term Impact

This study primarily focused on the immediate challenges and experiences of interested-parties during the early stages of the pandemic. It may not capture the long-term effects and evolving dynamics of virtual education for children with ASD, which could be explored in future longitudinal research (Creswell & Creswell, 2017). Understanding the long term impact of virtual education on children with ASD is essential for developing effective interventions and support systems.

Acknowledging the limitations of this dissertation research is essential for a comprehensive understanding of the study's scope and potential constraints on the applicability of its findings. Future research endeavors can build upon these insights to further explore the nuances of implementing virtual education in diverse contexts and during different phases of public health crises.

Recommendations for Future Research

Prior to the COVID-19 pandemic, research on the educational experiences of children with ASD and their families during public health disasters was virtually non-existent (Stadheim et al., 2022). This gap in research left caregivers and education providers without the necessary implementation guidance to support children with ASD in their engagement with virtual education. In response to the findings from this study, several crucial areas warrant further investigation and research efforts within the realm of virtual education for children with ASD.

Development of Implementation Guidelines

A paramount area for future research involves the development, validation, and implementation of comprehensive guidelines tailored specifically for virtual education initiatives catering to the unique needs of children with ASD. These guidelines should encompass evidence-based practices, strategies, and resources to facilitate virtual learning during public health crises (Stadheim et al., 2022).

Development of Needs Assessment

The creation of robust needs assessment protocols is essential to identify and address the individualized requirements of children with ASD during virtual education. Research endeavors should focus on refining assessment methodologies capable of pinpointing personalized support and intervention strategies. These assessments should encompass factors such as communication styles, sensory sensitivities, and behavioral challenges (Stadheim et al., 2022).

Development of Training

To enhance the success of virtual education for children with ASD, future research should delve into the development and evaluation of comprehensive training programs. These programs should target caregivers, educational providers, and children themselves, equipping them with the knowledge and skills essential for navigating virtual learning environments effectively. Ensuring interested-parties possess the necessary competencies is crucial for optimizing the virtual education experience for children with ASD (Stadheim et al., 2022).

Moreover, this research illuminated the attentional challenges interested-parties encountered while attempting to engage children with ASD in virtual learning. Therefore, progressive research should actively explore the barriers and facilitators associated with strategies for delivering virtual education lessons while effectively maintaining children's screen

engagement. Innovative approaches, technologies, and pedagogical methods warrant thorough investigation to address this challenge comprehensively.

Expanding the Scope

Furthermore, this study primarily focused on the implementation experiences of interested-parties within the Washington DC metropolitan region, characterized as a moderate-sized city. Future research should broaden its scope to encompass various regions, both urban and rural, with varying population sizes. Exploring the educational resources, needs, and challenges specific to different geographic contexts will contribute to a more comprehensive understanding of virtual education implementation practices.

Comparative Analyses

To gain deeper insights into the nuances of virtual education implementation, future research should employ comparative analyses between different geographic areas. This approach allows for a more profound exploration of the impact of geographic diversity, including rural communities, on the support needs and best practices for implementing virtual education for children with ASD.

Technological Accessibility

In the era of virtual education, equitable access to technology is paramount. Therefore, future studies should focus on examining various virtual delivery platforms and technologies to ensure accessibility and usability for individuals with ASD. Research efforts should guide the development of implementation practices that consider the diversity of available technology and promote inclusivity.

Longitudinal Studies

Given the dynamic nature of virtual education, future research should consider longitudinal studies to capture the long-term effects and evolving dynamics of virtual education

for children with ASD. Understanding the enduring impacts of virtual education initiatives will inform ongoing improvements and adaptations.

IEP Team Collaboration

In the wake of the COVID-19 pandemic, it is imperative to direct further research attention towards the intricate dynamics of working within teams, specifically Individualized Education Program (IEP) teams, during public health disasters. The rapid implementation of virtual education during the pandemic exposed several challenges, including the palpable sense of isolation experienced by interested-parties operating within their home environments. This sense of isolation, coupled with the added complexities of juggling multiple educational service roles for children with ASD while attempting to maintain work-life balance, has resulted in heightened levels of burnout.

The challenges faced by IEP team members during public health crises extend beyond logistical issues. Feelings of burnout among caregivers and educators can be attributed to a multitude of factors, including the absence of respite care and the limitations on social interactions with peers and the wider community. These challenges manifest as significant barriers to effective teamwork, impacting the overall support provided to children with ASD during remote learning initiatives.

To address these challenges, future research endeavors should delve into the barriers and facilitators that influence collaborative dynamics within IEP teams during public health disasters. By systematically examining the factors contributing to effective collaboration and identifying the obstacles that hinder it, researchers can contribute to the development of targeted resources and interventions designed to support this vital community of interested-parties. These resources should encompass strategies for enhancing teamwork, managing burnout, and fostering a sense of inclusion and belonging within IEP teams.

A key aspect of supporting interested-parties within IEP teams involves the implementation of collaborative team training programs. These programs should equip team members with the necessary skills, knowledge, and strategies for effective communication, problem-solving, and decision-making within the context of virtual education during public health crises. Research should inform the design and evaluation of such training initiatives to ensure their relevance and impact.

Mental health awareness should be a central component of any support network designed for interested-parties of children with ASD during public health disasters. Understanding the emotional and psychological toll of the challenges they face is paramount. Future research should explore strategies to promote mental health awareness, resilience, and well-being among IEP team members, caregivers, and educators.

The ultimate goal is to build an inclusive support network that acknowledges the unique experiences and challenges faced by IEP team members during public health crises. This network should be designed to provide not only practical assistance but also emotional and psychological support. Through interdisciplinary collaboration between researchers, educators, mental health professionals, and caregivers, this network can offer a comprehensive range of resources and services.

Further research into the dynamics of IEP team collaboration during public health disasters is vital to address the challenges faced by interested-parties supporting children with ASD in virtual education. By understanding the barriers, facilitators, and complexities of teamwork in this context, researchers can inform the development of tailored resources, collaborative team training programs, and mental health support initiatives. These efforts are essential to create an inclusive and resilient network that empowers IEP team members to provide the best possible support to children with ASD during challenging times.

The findings of this study underscore the urgency of future research initiatives aimed at optimizing virtual education for children with ASD during public health crises. By focusing on implementation guideline development, needs assessment, training for interested-parties, attentional challenges, IEP team collaboration and comprehensive geographical and technological explorations, researchers can lay the groundwork for a more inclusive and effective virtual education environment. These research endeavors are not only essential but also a moral imperative to ensure that children with ASD receive the education and support they deserve, even in the face of unprecedented challenges.

Conclusion

The emergence of the novel COVID-19 virus in early 2020 triggered a global pandemic, leading to the abrupt closure of schools and businesses worldwide. The World Health Organization swiftly declared it a pandemic, ushering in a new era of stringent social distancing measures aimed at curbing the virus's spread. However, the rapid transition from in-person to virtual education left interested-parties of children with (ASD) facing unprecedented challenges and devoid of guidance for implementation. This profound knowledge gap in the context of a global public health crisis served as the impetus for this qualitative multi-case study.

This research has provided an insightful and comprehensive exploration of the experiences of twenty-five participants, including caregivers and education providers, as they navigated the complex terrain of virtual education for children with ASD during the COVID-19 pandemic. The candid interviews with these interested-parties illuminated a myriad of challenges encountered during the transition to, communication within, and implementation of virtual education to support children with ASD. The findings of this study have effectively addressed four crucial research questions, unraveling the intricacies of interested-parties' experiences.

The study's findings have uncovered valuable insights into the development and implementation of virtual education, the dynamics of team collaboration, the achievement of Individualized Education Program (IEP) goals, and the transformative changes in roles and resources experienced by interested-parties during the pandemic. Moreover, the translational implications distilled from the findings underscore three critical implementation domains that demand attention and development to enhance the virtual education experience for children with ASD: the implementation of guidelines, the establishment of a formalized needs assessment process, and the provision of targeted training for interested-parties.

The synthesis of the study's results and its translational implications have been artfully illustrated through the conceptual framework of the Consolidated Framework for Implementation Research (CFIR), as depicted in MOTIVE-ASD (Figure 5.7). Notably, the domains of Individuals and the Implementation Process have emerged as central themes interwoven throughout the study's findings, playing a pivotal role in addressing all four research questions.

The evidence-informed knowledge embodied by MOTIVE-ASD serves as a clarion call to action, urging the development and refinement of the identified implementation areas. It underscores the pressing need to establish comprehensive implementation guidelines, implement a systematic needs assessment framework, and institute targeted interested-parties' training programs. These endeavors are paramount to effectively supporting virtual education for children with ASD, aligning with existing literature emphasizing the significance of well-structured interventions and support mechanisms for children with special needs. Furthermore, the knowledge gleaned from the development of these implementation areas should be translated and disseminated, guiding the development of virtual education programs tailored to meet the unique needs of children with ASD.

In the broader context, this study stands as a valuable addition to the ever-expanding body of research that sheds light on the experiences of interested-parties as they grapple with the challenges and opportunities of implementing virtual education for children with ASD during the COVID-19 pandemic. Employing a qualitative approach, this research has adeptly fulfilled its mission of describing the intricate and context-rich experiences of interested-parties. As the landscape of virtual education continues to evolve, interested-parties will be well-equipped with the knowledge, insights, and resources needed to navigate educational implementation remotely for children with ASD in the face of future natural or public health disasters.

In summary, this study represents a significant contribution to the understanding of virtual education for children with ASD during a global health crisis. It underscores the importance of research and the critical role it plays in shaping the future of education for children with special needs, particularly in challenging and rapidly changing circumstances.

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Appendices

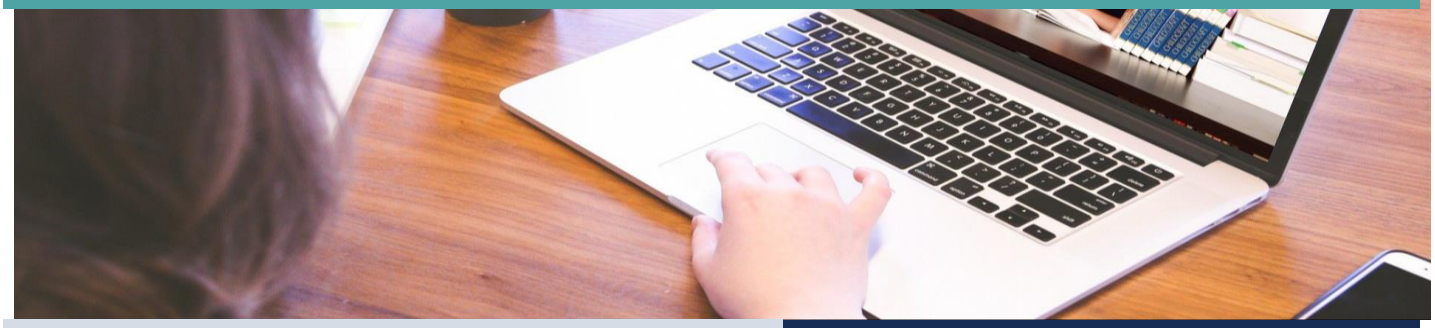
Appendix A

Recruitment Flyer for Caregivers

THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC

HELP US LEARN MORE ABOUT VIRTUAL EDUCATION!
You are Invited to Participate in an Innovative Study
Describing your Experience with Supporting Virtual Education to a Child with an Autism Spectrum Disorder



VIRTUAL EDUCATION FOR CHILDREN WITH AN AUTISM SPECTRUM DISORDER

Have you supported virtual education for a child with an Autism Spectrum Disorders (ASD) during the COVID-19 pandemic?

If yes, we need to hear from YOU!!

Researchers from the Department of Clinical Research and Leadership at the George Washington University (GW) School of Medicine and Health Sciences are seeking volunteers to take part in their study.

PURPOSE: This study aims to understand the experiences of parents/ caregivers who have supported virtual education to a child with an ASD during the COVID-19 pandemic.

TO REGISTER OR FOR MORE INFORMATION, PLEASE CONTACT:
XXXXXXXX
Study Coordinator at
XXXXXXXXXX

WHO DO WE NEED?

- Participants aged 21 years or older
- Parents/ Caregivers who have supported virtual education for a child with an ASD during the COVID-19 pandemic
- The child's assigned school is located in the Washington DC metro region (DC, MD & VA)

REQUIREMENT

- Attend (1) virtual meeting by appointment for a maximum of one hour per meeting
- Share the child's progress report/ report card (name blacked out) provided by their school during virtual education

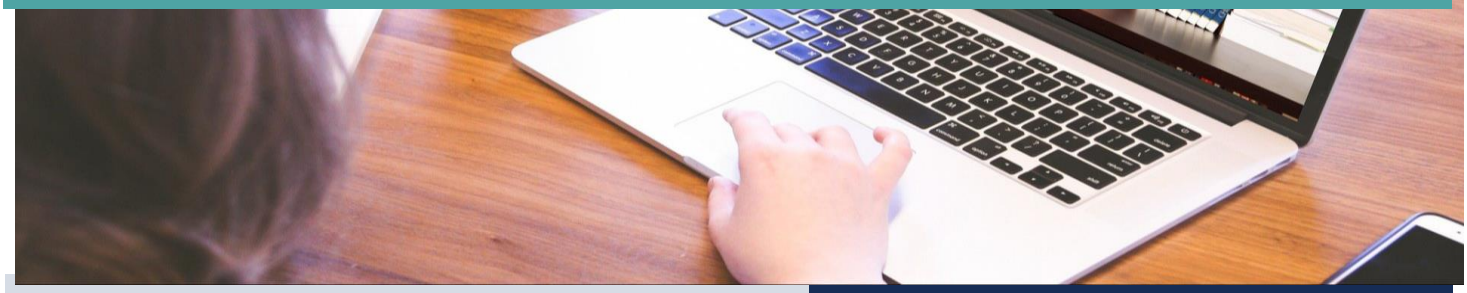
Appendix B

Recruitment Flyer for Education Providers

THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC

HELP US LEARN MORE ABOUT VIRTUAL EDUCATION!
You are Invited to Participate in an Innovative Study
Describing your Experience with Providing Virtual Education to Children with an Autism Spectrum Disorder



VIRTUAL EDUCATION FOR CHILDREN WITH AN AUTISM SPECTRUM DISORDER

Have you provided virtual education to children with an Autism Spectrum Disorders (ASD) during the COVID-19 pandemic?
If yes, we need to hear from YOU!!

Researchers from the Department of Clinical Research and Leadership at The George Washington University (GWU) School of Medicine and Health Sciences are seeking volunteers to take part in their study.

PURPOSE: This study aims to understand the experiences of educational professionals who have provided virtual education to children with ASD during the COVID-19 pandemic.

TO REGISTER OR FOR MORE INFORMATION, PLEASE CONTACT:
XXXXXXXX
Study Coordinator at
XXXXXXXXXXX

WHO DO WE NEED?

- Participants aged 21 years or older
- Educational professionals who have provided virtual education to children with ASD during the COVID-19 pandemic
- Fluent in reading and speaking English
- Assigned school is located in the Washington DC metro region (DC, MD & VA)

REQUIREMENT

- Attend (2) virtual meetings by appointment for a maximum of one hour per meeting
- Share (1) activity used during virtual education with children having an ASD

Appendix C

Interview Protocol for Caregivers

INTERVIEW PROTOCOL #1: CAREGIVER	
PRIOR TO INTERVIEW (Script) "I'd like to thank you once again for being willing to participate in this interview. As mentioned before, my study seeks to understand the experiences of caregivers supporting virtual education to their child with ASD during the COVID-19 pandemic. For the purpose of our interview, virtual education will be defined as an academic environment where the educators and students are separated by space and learning materials are delivered using an online multimedia platform. This interview is confidential and the data provided will be utilized to develop a deeper understanding into your experiences as a parent/ caregiver surrounding virtual education". "Our interview today will last approximately one hour during which I will be asking you questions regarding your experience during virtual education. As a participant for this study, you have completed a consent form indicating that I have your permission to audio and video record our conversation. I will let you know when I begin the recording and when I stop recording. Please let me know if at any time during our interview, you want me to turn off the recorder. As a reminder, you have the right to withdraw from this study at any time." "Before we begin the interview, do you have any questions? (Discuss any questions) If there are no questions at this point, do I have your permission to turn on the recorder and start our interview? Thank You, I will turn on the recording button now."	
CFIR DOMAIN	**INTERVIEW QUESTIONS**
• **Individuals** • **Implementation Process**	**Interviewee Background** 1. As a parent/ caregiver, describe the interactions with your child? a. Probe: How old is the child? How old at receiving diagnosis for ASD? When did your child receive an IEP?

	2. Describe some of the behaviors demonstrated by your child during virtual education? Were these behaviors different before virtual education? If so, how were they different? a. Probe: How do these behaviors impact your child's performance with virtual education? b. Probe: What level of severity in ASD would you say your child demonstrates? (Briefly describe the levels to participants if needed)
	3. Tell me about any *additional* school age children at home that were also receiving virtual education? a. Probe: If so, how many? i. What are their ages? ii. Do any of them receive specialized services based on an IEP?
	4. Besides you, tell me about any additional members in your home who assisted with virtual education for your child? a. Probe: If so, how many other members ? i. Describe their interactions to child/ children?
• **Innovation** • **Individuals** • **Implementation Process**	**Objective 1: Development and implementation of educational interventions** *(RQ1: How does virtual education influence the development and implementation of educational intervention for children with ASD?)*
	1. Describe your experience with supporting virtual education for your child/ children during the COVID-19 pandemic. a. Probe: Describe the strategies used to engage your child during their virtual sessions i. Do you believe these strategies worked? 1. If yes, why do you feel they worked? 2. If no, what could have been done differently?

	b. Probe: Tell me about any changes or adaptations to strategies made by you for engaging your child with virtual sessions. i. If none, describe how maintaining the same strategies engaged your child with virtual sessions. 2. Describe your experience with obtaining educational materials (ie. books, websites, worksheets, audio tapes, tv programs..etc) to support virtual education for your child? a. Probe: Were materials provided by your educational center? i. If yes, were they sufficient to support virtual education for your child? ii. If no, did you supplement with additional materials? 1. If yes, describe those materials and how you found them b. Probe: Were the virtual sessions for your child modified based on availability of materials? i. If yes, please describe how the sessions were modified ii. If no, please describe how the provided materials supported virtual learning
• **Inner Setting** • **Individuals** • **Implementation Process**	**Objective 2: Team collaboration among IEP team members** *(RQ2: How does virtual education influence team collaboration for children with ASD?)*
	1. Describe your role as a member on your child's IEP team? a. Probe: Describe any changes with team engagement due to being virtual vs. in person? i. If none: Describe why there may not have been any changes.

	2. Describe your experiences in communicating with other team members? a. Probe: Describe any differences in communicating with other team members due to being virtual vs. in person? i. If yes: Describe those differences. ii. If no: Tell me why there may not have been any changes. b. Probe: What suggestions would you make to help improve communication between IEP Team members in a virtual setting? i. Describe why that/ those suggestion(s) may be helpful.
• **Outer Setting (*Participant will screen share IEP progress report or report card)** • **Individuals** • **Implementation Process**	**Objective 3: Educational interventions influencing IEP goal achievements** *(RQ3: How has educational interventions influenced IEP goal achievement for children with ASD during virtual education?)*
	1. Describe how the virtual education process was different (compared to in person) in association with your child achieving their IEP goals? a. Probe: Describe your child's IEP progress report prior to virtual education? (Participant may screen share) b. Probe: What goals were met? Describe the strategies used to support goal achievement? c. Probe: What goals were not met? Describe what could have been done differently to support goal achievement?
	2. Describe how you were able to monitor your child's progress towards achieving IEP goals during virtual education. a. Probe: Describe your child's IEP progress report during virtual education? (Participant may screen share)

	b. Probe: Tell me about any modifications to your child's goals. i. If yes, why were these modification necessary? ii. If no, why were modifications not required?
• **Individuals** • **Implementation Process**	**Objective 4: Changes to Roles & Resources** *(RQ4: How have the roles and resources of education providers and caregivers changed during the COVID-19 pandemic?)*
	1. How has your comfort level changed in regard to supporting your child with virtual education? a. Probe: Tell me about how comfortable you were when virtual education first began? i. Describe what factors made you comfortable and uncomfortable at the start of virtual education b. Probe: What changes occurred with virtual education that influenced your level of comfortability to where it is currently? i. Describe how those changes influenced your behavior 2. Describe your comfort level if virtual education remained as part of your child's educational curriculum. i. Based on your experiences, what suggestions would you make to improve virtual education for children with ASD? and why?

AFTER THE INTERVIEW (Script)

"I will now turn off the recorder. Do you have any questions regarding our interview? (Discuss questions here, if none move forward). Please know that if any questions arise at any point in this study, you can feel free to ask them. I would be more than happy to answer your questions. This concludes our interview. Do I have your permission to contact you if I need additional information? (Note participant's answer). Thank you once again for your time and participating in this interview. Have a great day."

Appendix D

Interview Protocol for Education Providers

INTERVIEW PROTOCOL # 2: EDUCATION PROVIDER	
PRIOR TO INTERVIEW (Script) "I'd like to thank you once again for being willing to participate in this interview. As mentioned before, my study seeks to understand the experiences of IEP team members providing virtual education to students with ASD during the COVID-19 pandemic. For the purpose of our interview, virtual education will be defined as an academic environment where the educators and students are separated by space and learning materials are delivered using an online multimedia platform. This interview is confidential and the data provided will be utilized to develop a deeper understanding into your experiences as an educational team member surrounding virtual education. "Our interview today will last approximately one hour during which I will be asking you questions regarding your experience during virtual education. As a participant for this study, you have completed a consent form indicating that I have your permission to audio and video record our conversation. I will let you know when I begin the recording and when I stop recording. Please let me know if at any time during our interview, you want me to turn off the recorder. As a reminder, you have the right to withdraw from this study at any time". "Before we begin the interview, do you have any questions? (Discuss any questions) If there are no questions at this point, do I have your permission to turn on the recorder and start our interview? Thank You, I will turn on the recording button now."	
CFIR DOMAIN	**INTERVIEW QUESTIONS**
• **Individuals** • **Implementation Process**	**Interviewee Background** 1. Tell me about your role and responsibilities as an educational team provider for the school: a. Probe: Describe any changes to those responsibilities during virtual education.

	i. Any challenges with performing your responsibilities, what were they?
	2. Tell me about how long you have worked in your current position? a. Probe: At this school? If not where else? b. Probe: Did you work with children having ASD during this entire time? 3. Describe some of the behaviors demonstrated by your students with ASD during virtual education? Were these behaviors different before virtual education? If so, how were they different? a. Probe: How do these behaviors impact your students' performance with virtual education? b. Probe: What level of severity in ASD would you say most of your students demonstrate? (Briefly describe the levels to participants if needed)
• **Individuals** • **Innovation (*Participant will screen share educational activity)** • **Implementation Process**	**Objective 1: Development and implementation of educational interventions** *(RQ1: How does virtual education influence the development and implementation of educational intervention for children with ASD?)*
	2. Describe your experience with providing virtual education during the COVID-19 pandemic. a. Probe: Describe the strategies used to engage your students with ASD during your virtual sessions? i. Do you believe these strategies worked? 1. If yes, why do you feel they worked? 2. If no, what could have been done differently? b. Probe: Did you have to change or adapt strategies during your virtual sessions to engage your students? 1. If yes, describe those changes

	2. If no, describe how maintaining the same strategies allowed your students to engage in sessions?
	2. Describe your experience with obtaining educational materials (ie. books, websites, worksheets, audio tapes, tv programs..etc.) to support virtual education for your children with ASD? a. Probe: Ask participant to screen share educational intervention and describe their experience with usage for children with ASD. i. How did the students respond to this intervention? ii. How did the response change over time? b. Probe: Were materials provided by your educational center? i. If yes, were they sufficient to support virtual education for your students with ASD? ii. If no, did you supplement with additional materials? 1. If yes, describe those materials and how you found them c. Probe: Were the virtual sessions modified based on availability of resources? i. If yes, describe how the sessions were modified? ii. If no, describe how the provided materials supported virtual learning?
• **Inner Setting** • **Individuals**	**Objective 2: Team collaboration among IEP team members** *(RQ2: How does virtual education influence team collaboration for children with ASD?)*
	1. Describe your role as a member of an IEP team?

• **Implementation Process**	a. Probe: Describe any changes with team engagement due to being virtual vs. in person? i. If none: Describe why there may not have been any changes.
	2. Describe your experiences in communicating with other team members? a. Probe: Describe any differences in communication with other team members due to being virtual vs. in person? i. If yes: Describe those differences. ii. If no: Tell me why there may not have been any changes. b. Probe: What suggestions would you make to help improve communication between IEP Team members in a virtual setting? i. Describe why that suggestion(s) may be helpful.
• **Outer Setting** • **Individuals** • **Implementation Process**	**Objective 3: Educational interventions influencing IEP goal achievements** *(RQ3: How does the virtual provision of educational interventions influence IEP goal achievement for children with ASD?)*
	1. Describe how the virtual education process was different (compared to in person) for your students with ASD to achieve their IEP goals? a. Probe: Tell me about some goals that your students achieved? Describe the strategies used to support goal achievement? b. Probe: What goals were not met? Describe what could have been done differently to achieve those goals.
	2. Describe how you were able to monitor your student's progress towards achieving IEP goals during virtual education.

	a. Probe: Tell me about any modifications to your student's goals i. If yes, why were these modifications necessary? ii. If no, why were modifications not required?
• **Individuals** • **Implementation Process**	**Objective 4: Changes in Roles & Resources** *(RQ4: How have the roles and resources of education providers and caregivers changed during the COVID-19 pandemic?)*
	1. How has your comfort level changed with providing virtual educations to your students with ASD? a. Probe: Tell me about how comfortable you were when virtual education first began? i. Describe what factors made you comfortable and uncomfortable at the start of virtual education
	2. Describe your comfort level if virtual education remained as part of the educational curriculum for your students with ASD. a. Probe: Based on your experiences, what suggestions would you make to improve virtual education for students with ASD? and why?

AFTER THE INTERVIEW (Script)

"I will now turn off the recorder. Do you have any questions regarding our interview? (Discuss questions here, if none move forward). "Please know that if any questions arise at any point in this study, you can feel free to ask them. I would be more than happy to answer your questions. This concludes our interview. Do I have your permission to contact you if I need additional information? (Note participant's answer). Thank you once again for your time and participating in this interview. Have a great day."

Appendix E

Initial Codes of Caregivers

INITIAL CODES OF CAREGIVERS			
#	**CAREGIVER CODES (listed alphabetically)**	***n* of Participants Contributing *(N=16)***	***n* of transcript excerpts included**
1	Allowing child to join meetings	7	20
2	Avoiding laptop for learning	12	38
3	Child's perception of parent as educator	9	22
4	Child's understanding of school closures	12	23
5	Creating learning spaces	8	19
6	Difficulty with having child sit in front of screen	8	19
7	Easier to participate virtually due to less stress	8	17
8	Face to face interactions with teachers	9	24
9	Inability to engage in virtual evaluations	6	15
10	Inability to use technology features	11	26
11	Inattention to virtual lessons due to disruptions	12	32
12	Incorporating outside providers in meetings	8	18
13	Joining meetings from any location	10	24
14	Learning new technology	12	26
15	Managing home and work remotely	16	43
16	Managing initial behavior challenges	11	38
17	Outside areas for physical and social interaction	8	17
18	Outside distractions	11	24
19	Parents as dedicated aides	11	26
20	Personalized interaction for IEP meetings	10	22
21	Preparing for virtual lessons	13	29
22	Receiving modified progress reports & report cards	9	18
23	Rewards for participation	11	34
24	Safe space for discussing private information	10	20
25	Supplementing educational resources	12	26

26	Supplementing educational services at home	11	41
27	Support for multiple roles	13	32
28	Technology device care and protection	8	17
29	Technology issues	11	29
30	Technology training	11	24
31	Turning in classwork & homework	10	22
32	Utilizing paraprofessional support virtually	8	28
33	Virtual classroom assignments based on skills	10	23
34	Working on modified IEP goals at home	11	25

Appendix F

Initial Codes of Education Providers

INITIAL CODES OF EDUCATION PROVIDERS			
#	**EDUCATION PROVIDER CODES (listed alphabetically)**	***n* of Participants Contributing *(N=9)***	***n* of transcript excerpts included**
1	Access from remote locations	9	22
2	Accessing technology tools	6	15
3	Adapting goals for virtual education	8	22
4	Adapting progress report to reflect performance	6	18
5	Associating technology to learning	9	33
6	Child's understanding for teacher being on screen	6	17
7	Creating space for virtual teaching	9	28
8	Communication using technology	6	18
9	Disruptive behaviors	9	35
10	Engaging students in re-evaluations	5	13
11	Engaging students to screen	9	36
12	Environmental distractions	5	14
13	Face to face interactions with families	6	17
14	Family and work responsibilities	9	35
15	Feelings of burn out	6	18
16	Finding resources to support virtual lessons	7	18
17	Grouping children virtually based on similar skills	6	14
18	Managing multiple new roles	7	22
19	Methods used for obtaining child's work	5	25
20	Obtaining input from various providers	7	29
21	Outdoor sensory based physical activities	7	26
22	Preparing lessons for virtual teaching	9	38
23	Rewards for virtual participation	5	15
24	Sharing confidential information virtually	5	16

25	Sharing IEP data at virtual meetings	5	15
26	Students attending IEP meetings	5	13
27	Supporting caregivers in new roles	5	18
28	Sustaining educational materials for virtual lessons	6	16
29	Using technology features during IEP meetings	8	25
30	Using technology tools	6	18
31	Utilizing strategies for behavior challenges	8	28
32	Utilizing dedicated aides for virtual lessons	7	25
33	Virtual education training	6	20
34	Virtual lesson support from caregivers	6	21

Appendix G

Initial Codes of Interested-Parties

INITIAL CODES OF INTERESTED-PARTIES					
CODE NUMBER			**INTERESTED-PARTIES CODES (listed alphabetically)**	***n* of Participants Contributing *(N=25)***	***n* of transcript excerpts included**
C	**E**	**S**			
11	1	1	Accessibility from remote locations	19	46
28	7	2	Adopting new roles	18	63
7	8	3	Anxiety from being in person	13	32
15	14	4	Balancing work and home life	25	78
19	34	5	Caregivers as paraprofessionals	17	47
3	27	6	Child's behaviors towards new caregiver roles	13	40
6	11	7	Child's interaction with screen	25	84
2	5	8	Child's perception of technology device	21	71
1	26	9	Child's presence at meetings	12	33
11	12	10	Environmental distractions	16	38
4	6	11	Explaining reasons for school closure to child	18	40
23	23	12	Incentives/ Rewards	16	49
26	13	25	Interested-Parties' interactions	15	42
30	33	26	Interested-Parties' training	18	46
16	31	13	Managing initial behavior challenges	19	66
18	9	14	Managing interfering behaviors	21	67
34	3	15	Modification of IEP goals	19	47
22	4	16	Modification of progress reports & report cards	15	39
12	20	17	Multiple provider input	14	47
17	21	18	Outside learning areas	15	43
20	25	19	Personalized interaction without technology	16	39
9	10	20	Postponing evaluations	11	28
21	22	21	Preparing virtual lessons	22	67
24	24	22	Privacy	15	36

27	15	23	Respite care	20	50
32	32	24	Remote paraprofessional support	15	53
31	19	27	Submission of assignments	15	47
25	16	28	Supplementing educational materials	18	42
28	28	29	Sustaining educational resources	14	33
29	2	30	Technology accessibility	17	44
14	30	31	Technology usage	17	42
5	7	32	Transforming space for virtual education	17	47
10	29	33	Virtual chat features	19	57
33	17	34	Virtual classroom student grouping	16	37

Appendix H

Grouping of Initial Codes to Form Sub-Themes

SUB-THEMES	*n* of Participants Contributing *(N= 25)*	*n* of transcript excerpts included
Accommodating Resource Limitations • Supplementing educational items • Sustaining educational resources • Technology accessibility	**18**	**119**
Attentional Challenges to Virtual Learning • Caregivers as paraprofessionals • Child's interaction with screen • Incentives and rewards • Managing interfering behaviors • Remote paraprofessional support • Submission of assignments	**25**	**347**
Disruptions to Routines & Structures • Child's perceptions of technology device • Explaining reasons for school closures to child • Managing behavior challenges • Preparing for virtual lessons • Transforming space for virtual education	**22**	**291**
IEP Meeting Format • Accessibility from remote locations • Anxiety from being in person • Child's presence at meetings • Environmental distractions • Multiple provider input • Personalized interactions without technology • Privacy • Virtual chat features	**19**	**328**
Managing Multiple Roles • Adopting new roles • Balancing work and home life • Child's behaviors towards new roles of caregivers • Respite care	**25**	**231**
Modifications to IEP	**19**	**114**

• Modification of IEP goals • Modification of progress reports & report cards • Postponing assessments		
Opportunities for Development • Interested-Parties' training • Outside learning environments • Virtual classroom student grouping	**18**	**126**
Dependence on Interested-Parties & Technology • Interested-Parties' interactions • Technology training	**17**	**84**

Appendix I

Grouping of Sub-Themes to Form Emerging Themes

EMERGING THEMES	*n* of Participants Contributing *(N= 25)*	*n* of transcript excerpts included
Theme One: Transition to Virtual Education *Disruptions to Routines & Structures* • Child's perceptions of technology device • Explaining reasons for school closure to child • Managing behavior challenges • Preparing for virtual lessons • Transforming space for virtual education *Managing Multiple Roles* • Adopting new roles • Balancing work and home life • Child's behaviors towards new roles of caregivers • Respite care *Accommodating Resource Limitations* • Supplementing educational items • Sustaining educational resources • Technology accessibility	**25**	**641**
Theme Two: Team Communication *Dependence on Interested-Parties & Technology* • Interested-Parties' interactions • Technology training *IEP Meeting Format* • Accessibility from remote locations • Anxiety of being in person • Child's presence at meetings • Environmental distractions • Multiple provider input • Personalized interactions without technology • Privacy • Virtual chat features	**19**	**412**
Theme Three: Implementation of Virtual Education *Attentional Challenges to Virtual Learning* • Caregivers as paraprofessionals	**25**	**587**

• Child's interaction with screen • Incentives and Rewards • Managing interfering behaviors • Remote paraprofessional support • Submission of assignments *Modifications to IEP* • Modification of IEP goals • Modification of progress cards & report cards • Postponing assessments *Opportunities for Development* • Interested-Parties' training • Outside learning environments • Virtual classroom student grouping		

Appendix J

Standards for Needs Assessment

STANDARDS FOR NEEDS ASSESSMENT Standards focus on the proactive identification of needs, development of assessment checklists, and strategic utilization of assessment data to enhance virtual education for children with ASD. Continuous collaboration, user-centric design, and data-driven decision-making are emphasized to ensure the effectiveness and adaptability of the needs assessment process			
N.1.01- NEEDS ASSESSMENT			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Proactively identify barriers and facilitators for successful virtual education	○ ***Tailored Needs Assessments:*** Caregivers and education providers need tailored assessment tools to identify unique needs and challenges, empowering them to enhance the virtual learning experience ○ ***Inclusive Approach:*** Utilize standardized assessment tools that consider the diverse needs of children with ASD, recognizing the spectrum of abilities and challenges ○ ***Holistic Evaluation:*** Assessment must include the following needs; 1) technological 2) socio-emotional	***Resources:*** Supports equitable resource allocation, development of resource directories, targeted interventions, and advocacy for funding for resources (ie. Technological, staffing, assessments)	○ ***Equitable Resource Allocation:*** Ensure that resources are distributed based on the identified needs, fostering fairness and inclusivity ○ ***Development of Resource Directories:*** Create and maintain resource directories based on the assessed needs to facilitate easy access for caregivers and education providers ○ ***Targeted Interventions:*** Use assessment data to design targeted interventions, addressing specific challenges faced

	3) environmental 4) sensory 5) IEP compliance		by children with ASD in virtual education ○ ***Advocacy for Funding:*** Advocate for funding by presenting data-driven assessments that highlight the necessity of financial support for technological resources
N.102 NEEDS ASSESSMENT CHECKLIST DEVELOPMENT			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Developing comprehensive checklists for caregivers & education providers	○ ***Empowering Interested-Parties:*** Needs Assessment Checklists should provide actionable insights to caregivers and education providers for enhancing the virtual learning experience ○ ***User-Friendly Design:*** Design needs assessment checklist in a user-friendly manner, considering the varied technological proficiency of caregivers and	***Enhanced Virtual Learning Experience:*** The effective use of needs assessment checklists informs a tailored and effective virtual learning experience	○ ***Personalized Strategies:*** Utilize needs assessment checklist results to tailor strategies for individual children with ASD, recognizing their unique learning styles and needs ○ ***Continuous Improvement:*** Establish a feedback loop to allow for continuous improvement of assessment tools based on user experiences and

	education providers. ○ ***Collaborative Development:*** Involve interested-parties in the development process to ensure the needs assessment checklist addresses their specific concerns and challenges.		evolving educational requirements
N.103 UTILIZING CHECKLIST DATA			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Utilizing checklist data for informed-decision making and reporting	○ ***Informed Decision-Making:*** Checklist data should guide decision-making processes, ensuring resources are allocated effectively and interventions are targeted ○ ***Data Privacy*****:** Implement robust data privacy measures to protect sensitive information collected during assessments ○ ***Transparent Reporting:*** Provide transparent and easily understandable	***Advocacy and Resource Allocation:*** Well-utilized assessment data supports effective advocacy for funding and resource allocation	○ ***Evidence-Based Advocacy*****:** Present evidence-based reports to advocate for funding and policy changes at local, regional, and national levels ○ ***Responsive Decision-Making:*** Enable education providers to make real-time adjustments to virtual education strategies based on current and evolving assessment data

	reports to interested-parties, including caregivers, education providers, and policymakers		

Appendix K

Standards for Development and Implementation of Guidelines

STANDARDS FOR DEVELOPMENT AND IMPLEMENTATION OF GUIDELINES Standards focus on the development and implementation of guidelines, emphasizing collaboration, adaptability, accessibility, and continuous improvement. Effective implementation strategies are crucial to realizing the intended impact of guidelines in creating an inclusive and supportive virtual education environment for children with ASD.			
G.1.01 GUIDELINES			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Developing comprehensive guidelines for virtual education for children with ASD	○ ***Addressing Unique Challenges:*** Guidelines must be designed to address the unique challenges of virtual education, emphasizing individualized learning plans, sensory accommodations, and strategies for engagement ○ ***Inclusive Collaboration:*** Collaborate with caregivers, education providers, special education experts, and technology specialists to ensure a holistic approach ○ ***Responsive Design:*** Design guidelines to be responsive to the dynamic nature	***Content Inclusion:*** Guidelines must encompass individualized learning plans, sensory accommodations, and strategies for maintaining engagement	○ ***Individualized Learning Plans:*** Address diverse learning styles and needs, promoting a personalized approach to education ○ ***Sensory Accommodations:*** Provide recommendations and resources for creating a sensory-friendly virtual learning environment ○ ***Engagement Strategies:*** Include practical strategies to maintain the attention and participation of children with ASD in virtual classrooms
		***Adaptability*:** Guidelines should be	○ ***Scenario Planning:***

	of virtual education, considering the evolving technological landscape	adaptable to future disruptions, providing an inclusive educational system	Anticipate potential disruptions and include contingency plans in the guidelines to ensure continuity in virtual education during school closures ○ ***Regular Review:*** Conduct periodic reviews to assess the relevance of guidelines in evolving educational landscapes, updating them as needed
		Collaborative Development: Input from caregivers, education providers, and experts in ASD education is integral during the development phase	○ ***Workshops and Feedback Sessions:*** Conduct workshops and feedback sessions to gather insights from interested-parties, ensuring the guidelines are practical and effective ○ **Diverse Perspectives:** Consider the diverse experiences and perspectives of interested-parties to create guidelines that meet the

			varying needs of the community
		Accessibility: Guidelines should be easily accessible, understandable and available to all interested-parties involved in the education of children with ASD	○ ***Multilingual Resources:*** Provide guidelines in multiple languages to enhance accessibility for caregivers with diverse linguistic backgrounds ○ ***User-Friendly Formats:*** Present guidelines in user-friendly formats such as interactive websites, videos, and downloadable documents
		Continuous Improvement: Regular reviews and updates to guidelines to align with emerging virtual implementation best practices and technological advancements	○ ***Monitoring Feedback:*** Establish mechanisms for ongoing feedback collection to identify areas for improvement ○ ***Incorporating Innovations:*** Integrate innovative practices and technological advancements to enhance the effectiveness of the guidelines

G.1.01 IMPLEMENTATION STRATEGIES			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Implementing guidelines effectively in virtual education settings	○ ***Guiding Implementation:*** Guidelines should serve as practical tools to guide the implementation of effective virtual education practices ○ ***Implementation Support:*** Provide support resources to help education providers and caregivers translate guidelines into actionable practices ○ ***Adaptability in Implementation:*** Recognize the varying contexts of virtual education and provide flexible implementation strategies	***Monitoring & Evaluation:*** Establish mechanisms to monitor and evaluate the impact of guideline implementation	○ ***Metrics for Success:*** Define key performance indicators (KPIs) to measure the success of guideline implementation ○ ***Feedback Loops:*** Encourage feedback from educators, caregivers, and learners to continuously refine and adapt the implementation strategies
		Communication: Ensure clear and effective communication of guidelines to all interested-parties.	○ ***Training and Communication Plans:*** Develop plans for training and communicating guidelines to education providers, caregivers, and learners ○ ***Feedback Mechanisms:*** Establish channels for ongoing communication to address questions and provide clarifications

		Resource Allocation: Ensure that resources are allocated in alignment with the guidelines to support effective implementation	○ ***Equitable Distribution:*** Implement strategies to ensure equitable distribution of resources, considering diverse needs and geographical locations ○ ***Monitoring Resource Usage:*** Monitor the usage of allocated resources and adjust allocations based on evolving needs
		Promoting Adherence to Guidelines: Develop strategies to promote adherence and compliance with the established guidelines	○ ***Training Programs:*** Implement training programs to ensure that education providers, caregivers, and learners are familiar with and understand the guidelines ○ ***Recognition and Incentives:*** Recognize and incentivize adherence to guidelines through awards, certifications, or other forms of acknowledgment

Appendix L

Standards for Training

STANDARDS FOR TRAINING Standards emphasize the importance of comprehensive, inclusive, and continuous training for all interested-parties involved in the virtual education of children with ASD. By addressing different proficiency levels, offering ongoing support, and continuously evaluating the effectiveness of training programs, these standards aim to empower caregivers, education providers, and children with ASD to navigate and excel in virtual learning environments.			
T.1.01 TRAINING			
OBJECTIVE	**RATIONALE**	**AREA**	**IMPACT**
Provide comprehensive technology training for caregivers, education providers, and children with ASD	Bridging the digital divide is essential for technology to facilitate the educational journey of children with ASD. Training is critical for caregivers, education providers, and children with ASD to navigate the virtual landscape	***Curriculum Inclusion:*** Training programs should cover virtual platforms, online teaching methodologies, and navigation skills for children with ASD	○ ***Inclusive Curriculum:*** Address varying levels of technological proficiency, ensuring that training is accessible and beneficial for all participants ○ ***Child-Centric Approach:*** Develop age-appropriate training modules for children with ASD, focusing on their unique learning styles
		Tailored Resources: Training materials should be accessible and tailored to the diverse needs of caregivers, education providers, and children with ASD	○ ***Multiple Formats:*** Provide training resources in various formats, such as written guides, video tutorials, and interactive workshops

			○ ***Personalized Learning Paths:*** Offer options for personalized learning paths to accommodate different learning preferences and paces
		Continuous Learning: Establish mechanisms for continuous support and refresher courses to address evolving technology and educational requirements	○ ***Help Desks and Hotlines:*** Provide accessible help desks and hotlines for immediate support and troubleshooting ○ ***Community Forums:*** Foster a sense of community through online forums where interested-parties can share experiences and solutions
		Inclusivity: Training programs must be inclusive, considering the varying levels of technological proficiency among caregivers, education providers and children with ASD	○ ***Assessment and Adaptation:*** Implement pre-training assessments to gauge participants' proficiency levels and tailor training accordingly ○ ***Progress Tracking:*** Monitor participants' progress throughout the training

			program, adapting content based on individual needs
		Evaluation: Implement periodic assessments to gauge the effectiveness of the training programs and make necessary adjustments	○ ***Feedback Loops:*** Establish feedback loops to collect insights from participants on the relevance and impact of the training ○ ***Data-Driven Improvements:*** Use data analytics to identify trends, gaps, and areas for improvement in the training programs