A QUALITATIVE DESCRIPTIVE CASE STUDY OF SPECIAL EDUCATION TEACHERS' EXPERIENCES UTILIZING INTERACTIVE WHITEBOARDS FOR STUDENTS WITH AUTISM SPECTRUM DISORDER IN ELEMENTARY SELF-CONTAINED CLASSROOMS

by

John Terrell

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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APPROVED BY:

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Abstract

The purpose of this qualitative descriptive case study was to describe the experiences of special education teachers who use Interactive Whiteboards (IWBs) to instruct students diagnosed with autism spectrum disorder (ASD) in elementary self-contained special education classrooms. The theoretical framework for this study includes the persuasive technology theory and the social learning theory. Ten special education teachers from two elementary schools in a suburb of north Georgia will be asked to participate in this study. Data collection included an individual interview, and participant letters, followed by a focus group. Data analysis consisted of categorical aggregation, development of naturalistic generalizations, and development of themes. The methodology for this qualitative study followed the recommendation of Yin (2014) and has four stages: design the case study, conduct the case study, analyze the evidence, and develop the conclusion, recommendations, and implications.

Keywords: autism spectrum disorder, special education, assistive technology, interactive whiteboards.

Copyright Page

Dedication

I dedicate this dissertation to God Almighty, my creator, my rock, my source of inspiration, wisdom, and grace. He has given me strength and encouragement throughout the challenging moments completing this dissertation. This dissertation is also dedicated to my beloved family. My wife Julie, who has been extraordinarily supportive and has made countless sacrifices throughout this entire process. My two children, Noah and June, who have encouraged me to not give up. I hope I have made you both proud. Without such a supportive team behind me, I know I could never be where I am today.

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I would like to thank Dr. Gail Collins (Dissertation Chair and Qualitative Methodologist). Your patience, feedback and encouragement are why I am able to finish this program. I would also like to thank Dr. Kathy Keafer, committee member and second reader.

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List of Abbreviations

Assistive Technology (AT)

Autism and Developmental Disabilities Monitoring Network (ADDM)

Autism Spectrum Disorder (ASD)

Center for Disease Control and Prevention (CDC)

Diagnostic and Statistical Manual of Mental Disorders (DSM)

Education of All Handicapped Children Act (EAHCA)

Free Appropriate Public Education (FAPE)

Individuals with Disabilities Education Act (IDEA)

Individual Education Plan (IEP)

Institutional Review Board (IRB)

Interactive White Boards (IWBs)

Interpretive Phenomenological Analysis (IPA)

Learning Disabilities Association of America (LDAA)

Least Restrictive Environment (LRE)

Picture Exchange Communication Systems (PECS)

Students with Disabilities (SWD)

CHAPTER ONE: INTRODUCTION

Overview

The prevalence of autism spectrum disorder (ASD) has increased steadily over the last decade (Baio et al., 2018). According to the Autism and Developmental Disabilities Monitoring Network (ADDM), as many as one in 36 children are diagnosed with ASD (CDC, 2023). This represents a drastic increase in the prevalence of ASD, compared to the initial figures from 2002 that indicated the incidence to be 1 in 150 children/youth (CDC, 2008). As this population continues to increase, researchers continue to conduct research to better understand how this population can be best served in our schools. As it relates to ASD and Assistive Technology (AT), researchers have conducted quantitative studies and found that people with ASD had an affinity toward and preference for technology usage (Finkenauer et al., 2012).

In another study, Ennis-Cole (2012) found that the use of technology in the form of Interactive Whiteboards (IWBs) can help students with ASD observe more appropriate behavior and social interaction. Despite the growing literature on the use of ATs as interventions for students with ASD, the literature currently lacks a qualitative perspective as to how IWBs are perceived by special education teachers while teaching grade-level students diagnosed with ASD (Lopez & Krockover, 2014).

This study sought to understand the experiences of special education teachers who use IWBs to teach elementary students diagnosed with ASD enrolled in a self-contained classroom setting. I employed a descriptive qualitative case study design that enabled participants to narrate their personal stories through interviews and their interactions with other participants during a focus group, followed by a letter-writing assignment. In this chapter, I will discuss the evolution of ASD, how AT has helped support this ever-increasing student population and address the

importance of the study in adding to the fund of knowledge intended to help teachers, parents, administrators, and policy makers understand the value of IWBs for ASD students. This chapter will provide a framework for the research. The following subsections are discussed in this chapter: the background, situation to self, problem statement, purpose statement, the significance of the study, and the research questions.

Background

This section provides insight into the historical, social, and theoretical underpinnings of the proposed research. Historically, the United States' (U.S.) disability laws have consistently grown bolder and more specific as they related to the requirements educators and administrators must uphold for students with disabilities (SWDs) at the federal, state, and local levels. As more resources are allocated to SWDs in our educational systems, a greater understanding of the evolution of AT is discussed.

Historical Context

Individual Education Plans (IEPs) were not provided until 1975 for children with disabilities (Burke et al., 2016). Before this, services, if offered at all, were left to the discretion of local school systems (Martin, et al., 1996). This was the *status quo* before the 1970s; children with disabilities were either denied enrollment or offered minimal support by the public-school systems. Before the mid-1970s, laws in most states allowed school districts to decline enrollment of any student they considered "uneducable" (Martin, et al., 1996, p.26). This led to many SWDs being moved into state institutions for individuals with mental retardation or mental illness (Novella, 2010).

The Congressional hearings in 1975, as part of the *Brown v. Board of Education* case, played a pivotal role in highlighting the significant challenges and disparities faced by children

with disabilities in accessing appropriate education in the United States. It was estimated that 3.5 million children with disabilities in the U.S. were not receiving an education appropriate to their needs, while almost one million more were receiving no education at all (U.S. Congress 93rd Cong., 1st sess., 1973). These investigations helped change public opinion, governmental support, and support for special education rights, an orientation strongly influenced by the civil rights movement (U.S. Congress 89th Cong., 2d sess., 1966). This prompted the enactment of Public Law 94-142, which has dramatically changed the landscape for public school teachers and administrators. Thereafter, the Education for All Handicapped Children Act (EAHCA) of 1975 was passed by Congress for the following purposes:

> To assure that all children with disabilities have available to them…a free appropriate public education which emphasizes special education and related services designed to meet their unique needs, to assure that the rights of children with disabilities and their parents…are protected, to assist States and localities to provide for the education of all children with disabilities, to assess and assure the effectiveness of efforts to educate all children with disabilities (PL 94-142).

This resulted in the establishment of The Learning Disabilities Association of America (LDAA) in 1964, a lobbying group that would exert pressure on state and federal governments. In 1975, congress passed a new federal law mandating that all children, regardless of disability, are entitled to free and appropriate public education (FAPE), known as the Individuals with Disabilities Education Act (IDEA). IDEA mandates that all schools must provide SWDs free services, diagnosis, an individualized education plan, and special education specifically designed for their disability.

In 1990, Congress passed the Tech Act (P.L.101-476). The Tech Act defined the term *AT service* as any service that directly assists a student with a disability in the selection, acquisition, or use of AT devices [20 U.S.C. 1400(2)(E) & (F)]. This new act illustrated the importance the federal government placed on AT. The Tech Act of 1990 provided the following outline for faculty and administrators to utilize when adopting AT:

1. Evaluating the needs of an individual in the individual's customary environment
2. Purchasing, leasing, or otherwise providing for the acquisition of AT devices by individuals with disabilities
3. Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing AT devices
4. Coordinating and using other therapies, interventions, or services with AT devices, such as those associated with existing education and rehabilitation plans and programs
5. Training or technical assistance for an individual with disabilities or, where appropriate, the family
6. Training or technical assistance for professionals, employers, or other individuals who provide employment services or are involved in the major life functions of individuals with disabilities [Tech Act (P.L.101-476), Sec. 300.6].

The Tech Act of 1990 further defined types of AT based on the severity of an individual's disability. The Tech Act of 1990 originally defined AT as: Note-taking cassette recorders, pencil grips, NCR paper/copy machine, simple switches, head pointers, picture boards, taped instructions, and workbook (Sec. 300.6 – Assistive Technology Service). Today, the Tech Act defines AT as - optical character recognition, calculator, word processors with spelling and

grammar checking, word prediction, voice recognition, speech synthesizers, augmentative communication devices (e.g., Liberator), alternative keyboards (e.g., PowerPad, Intellikeys), devices that convert text to speech, speech-recognition software that converts speech to text, text manipulation that increases font sizes to accommodate vision impairments, transcribing tools that allow students to control the speed of audio transmissions, portable keyboards, and computing devices that are customizable and mobile, allowing students to become or remain engaged as they move from one classroom to the next (Sec. 300.6 – Assistive Technology Service). More recently, the potential of AT as an effective learning device in early intervention for children with disabilities has informed policies that reinforce early intervention (Parette et al., 2008).

AT has been recognized by the Federal government through the reauthorization of IDEA, which requires that it be considered for each child with a disability (NAEYC, 2009). Recent empirical studies investigating AT for early intervention provided reliable verification that effective use of AT (including IWBs) that enables young children to circumvent their weaknesses and use their strengths to reach their potential, thus compensating for their perceived deficits (Parette et al., 2009).

Today, at the federal level, the IDEA places the responsibility on the school system to provide AT devices and services to SWDs. At the state level, FAPE sets the rules and regulations for special education. FAPE provisions of AT devices and services must be appropriate and beneficial to the student (Etscheitd, 2016). At the local level, Least Restrictive Environment (LRE) was created to promote more inclusive placements to school districts under IDEA. All primary, and secondary institutions (public or private) that receive governmental assistance must adhere to all laws and provisions set forth by the previously mentioned entities.

Social Context

Throughout the United States, special education programs are facing decreasing budgets, teacher shortages, and increased enrollment (Etscheitd, 2016). These decreases resulted in fewer special education teachers available, who had to handle a larger number of students. Given the federal requirements for qualifying SWD to be provided AT, many schools are buckling under the weight of compliance (Burke et al., 2016). Leaders in federal, state, and local governments must continue to redefine rules and regulations to incorporate AT into the classroom. Furthermore, policymakers must award school administrators greater authority to make decisions regarding curriculum, materials, instructional practice, and the hiring of teachers.

K-12 schools continue to struggle with the financial and faculty resource mandates of FAPE and ADA, to include, if determined by a student's IEP, AT for all SWDs (Bunch, 2016). As a result, this will postulate further evidence that the lack of adequate training for teachers/faculty to incorporate AT into the curriculum to meet the needs of SWD students may violate the provisions set forth by FAPE, IDEA, and ADA (Novak, 2015). As the number and diversity of students with special needs continue to rise, new curricula and delivery methods must evolve to serve this unique student population .

This transformation poses tremendous challenges for educators in reevaluating their basic tenets, deploying the media in creative and constructive ways, and restructuring schooling to respond practically and progressively to the technological and social changes that we are now experiencing. One such AT, identified as IWBs, allows the teacher to tailor curricula for SWDs using a variety of learning styles, including visual, auditory, and kinesthetic, all at once (Kellner, 2002).

Laubscher et al., (2012) conducted a study that illustrated how AT can visually support language and communication in individuals with ASD. The literature supports that through the

application of AT (specifically IWBs), students experience differentiating learning (visual, listing, and kinesthetic examples) that reinforces key learning objectives (Claes et al., 2012). This, in turn, empowers SWDs to absorb new skills that are critical to academic success (Gillette & Depompei, 2008). Given the ongoing increase in students diagnosed with ASD and new federal mandates required to serve SWDs with AT, a greater understanding of how AT (specifically IWBs) is best utilized by our special education instructors is essential (Etscheitd, 2016).

Theoretical Context

The theoretical context for this study is based on theories centered around the social learning theory (Bandura, 1977) and persuasive technology theory (Fogg, 2003). Bandura's social learning theory posited that people learn from one another, through observation, imitation, and modeling. This theory has often been called a bridge between behaviorist and cognitive learning theories because it encompasses attention, memory, and motivation (Bandura, 1977). The persuasive technology theory describes persuasive technology as a technology that is designed to change users' attitudes or behaviors through persuasion and social influence, not through coercion or deception (Fogg, 2003). The emerging sub-discipline of persuasive technology offers an opportunity to assess how a focus on persuasion, which is found to be highly effective in bringing about behavior change in educational settings, including personalizing curricula.

Problem Statement

In 2021–22, the number of students ages three–21 who received special education and/or related services under the Individuals with Disabilities Education Act (IDEA) was 7.3 million, or the equivalent of 15 percent of all public-school students (National Center for Education

Statistics, 2023). As of 2014, the Center for Disease Control and Prevention (CDC) estimated that approximately one out of 54 eight-year-old children were diagnosed with ASD across multiple areas of the United States (Baio et al., 2018).

Researchers have indicated the factors that result in high attrition rates for special educators. For example, Hagaman and Casey (2017) explored perspectives of special educators and found that the top reasons for high attrition rates were the stress regarding the number of responsibilities they had to undertake and the lack of support from other teachers and the administration. These results confirmed why 13% of the special educators leave the field each school year, which is double the rate of general education teachers (Hagaman & Casey, 2017).

Given the rise in the number of students with ASD, more ATs have been introduced into our special education classrooms, including the computers, IWBs, and iPads (Dietrich & Balli, 2014); yet there are different challenges that arise in implementing them during instruction. With IWBs being identified as a primary instructional tool to support teaching and learning for SWDs (Bouck et al., 2012), it is essential for educators, administrators, and policy makers to consider a special needs instructor's perspective in using the said technologies for this ever-increasing student population.

Vongkulluksn et al. (2018) stated that when teachers perceive technological tools as relevant to their instructional goals, they are more likely to integrate technology into their classroom practices. Despite the growing literature on the use of AT as an intervention for students with ASD, the literature is currently void of a qualitative perspective as to how IWBs are perceived from a special education teacher's perspective while teaching elementary students diagnosed with ASD (Lopez & Krockover, 2014).

Courduff et al. (2016) noted that a study is needed to explain the process by which special education teachers use technology in an exemplary way. Courduff et al. found that the key beliefs and dispositions of these teachers were an impetus for successful technology integration. These researchers stated that further research needs to be conducted with other special education teachers to increase their knowledge in this field.

The problem is that given the increase in students with ASD and AT, the attitudes and perceptions of special education teachers are unclear, regarding the benefits or hindrances of the requirement of using AT with their elementary students. This descriptive case study seeks to understand how special education teachers use technology (specifically IWBs) to instruct students diagnosed with ASD in elementary self-contained classrooms. The knowledge gained from this descriptive qualitative case study might yield new understandings of teachers' experiences in adapting this relatively new technology and potentially provide information that school administrators can use in their efforts to encourage the use of instructional technology by special education teachers.

Purpose Statement

The purpose of this qualitative descriptive case study was to describe the experiences of special education teachers who use IWBs to instruct students diagnosed with ASD in elementary self-contained special education classrooms. The main phenomenon is how IWBs are used to instruct students diagnosed with ASD (a complex neurodevelopmental disorder) (Veatch et al., 2014). IWBs are large electronic touch screens connected to a computer used in a classroom to project information and can be written on using a finger and special pens (Mariz et al., 2017).

Significance of the Study

This study contributes to the existing body of knowledge regarding the factors that impact special education teachers who use IWBs to instruct ASD elementary students. Potential beneficiaries of this research include teachers, administrators, and researchers who intend to improve on the said technologies for the ASD student population. This section will provide the theoretical, empirical, and practical significances by offering insights into the experiences of elementary special education teachers as they work with students with ASD using IWBs in a self-contained classroom setting.

Theoretical Significance

Luo and Yang (2016) revealed that the use of IWBs made students feel more involved in their learning and opportunities to engage in interactive activities increased. According to Nelson et al. (2019), teachers reported certain features of the IWBs, such as the ability to play video clips to deepen students' comprehension, creating digital charts and graphs, and saving notes to refer later, as factors for using IWBs. Momani et al. (2016) contended that teachers' attitudes toward IWB integration were the strongest indicators that determined whether they utilized technology-rich instructional practices in a classroom setting. The United States Department of Education reported that less than 35% of teachers had utilized technology as a tool for teaching and learning on a weekly basis (United States Department of Education [USDOE], 2016). Special education teachers are required to be highly qualified and are responsible for implementing the curriculum for SWDs (Göransson et al., 2017). What is less known is how special education teachers perceive the use of IWBs to instruct students with ASD.

The theories that will guide this study are the persuasive technology theory (Fogg, 2003) and the social learning theory (Bandura, 1977). The social learning theory of Bandura

emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. Bandura contended that learning occurs within and among social exchanges where interaction fosters hypothesis testing, resulting in concept development .

Bandura (1977) identified three basic models of observational learning: (a) a live model that involves an actual individual demonstrating or acting out a behavior; (b) a symbolic model that involves real or fictional characters displaying behaviors in books, films, television programs, or online media; and (c) a verbal instructional model that involves descriptions and explanations of a behavior. For purposes of this study, the IWB represents Bandura's symbolic model, as the IWBs use video-modeling and social activities to create new behaviors by observing and imitating others.

This study will add to the notion that not only can video modeling be used to create new behaviors, but interactive video modeling (a component of IWBs) can have an equal or more significant effect on ASD elementary students. Like Bandura's (1977) social learning theory, the persuasive technology theory (Fogg, 2003) uses visual representations to attract its audience. This theory has shown that consciously designed visual methods increase student interaction. This study will add to Fogg's persuasive technology theory by gauging the effectiveness that interactive computing has by using IWBs through the lens of the special education elementary teacher.

Empirical Significance

Since 1975, a series of court cases have established the "right of every child with a disability to be educated, laying the foundation for the much-needed reform in special education" (McGovern, 2015, p. 119). Policymakers have relied heavily on equitable access to inclusive education as a social justice and civil rights issue (McGovern, 2015). The perceptions of teachers

toward inclusion are important because it is the classroom teacher's beliefs that become self-fulfilling prophesies of success or failure when implementing inclusive educational policies (Monsen et al., 2014). Erbas et al. (2015) found that IWBs support instructors by helping to enhance the students' motivation, concentration, and overall participation.

Additionally, Erbas et al. (2015) discovered that students with access to IWBs experienced an increase in the interaction between teachers and students, thus facilitating a collective meaning-making process in group settings. That said, research regarding the use and oversight of IWB integration in self-contained classrooms is limited and could significantly impact how IWB integration will be used by school district students with ASD, as they prepare for a technologically driven world (Bolkan, 2017; Delaney, 2011; Ruggiero & Mong, 2015).

Practical Significance

As IWBs are used in many classrooms throughout the U.S., the available academic literature is limited, particularly from the perspective of teaching and learning (Fekonja-Peklaj & Marjanovic-Umek, 2015). To this end, this study is designed to shed light on how ASD special education teachers describe their experiences using IWBs to facilitate learning. This study will add to the fabric of knowledge in an effort to help teachers, parents, administrators, and policy makers understand the value IWBs have in special needs self-contained classrooms for ASD students.

Research Questions

With AT being identified as the primary instructional tool to support teaching and learning for SWDs (Bouck et al., 2012), it is essential for educators, administrators, and policy makers to consider the perspective of special education teachers who are using these technologies for an ever-increasing student population. The purpose of this descriptive

qualitative case study was to describe the experiences of special education teachers who use IWBs to instruct students diagnosed with ASD in elementary self-contained special education classrooms.

Creswell (2013) argued that research should be funneled through one central question; likewise, sub-questions should clarify and define the central question. Qualitative case study questions must address the *how* or *what* regarding the study (Creswell, 2013; Yin, 2014). Moreover, Yin (2014) stated that defining the research questions is the most important aspect of the study. The following research questions address the focus of the research and align with the theoretical framework. The central question and sub-questions for this study are as follows:

Central Research Question

How do elementary special education teachers describe their experiences using IWBs to teach students with ASD in a self-contained classroom setting?

Sub Question One

How do special education teachers describe the integration process and continued support when IWBs are used as an instructional tool with students who are diagnosed with ASD in their self-contained classroom setting?

Sub Question Two

What are the primary advantages and disadvantages IWBs offer special education teachers in instructing ASD elementary students in a self-contained classroom setting?

Sub Question Three

How do special education teachers describe their experiences using IWBs for video modeling to demonstrate a new behavior or concept to students who are diagnosed with ASD?

Definitions

1. *Accessibility* – Access to computer systems, software, or other related items to all people regardless of disability or severity of impairment (Sobczak, 2013).
2. *Accommodations* - Altering the education environment to allow SWDs equal access to (Oertle & Bragg, 2014).
3. *Americans with Disabilities Act (ADA)* – The ADA is a federal legislation that prohibits discrimination based on disabilities (Guyer & Uzeta, 2009).
4. *Assistive Technology (AT)* – AT refers to equipment, software, and any other technology-related device that can assist people with disabilities in their daily activities (Coleman & Berge, 2018).
5. *Assistive Technology Act (ATA)* – The ATA is a law crucial to the increase in and availability of AT devices and services (Alkahtani, 2013).
6. *Autism Spectrum Disorder (ASD)* – A complex neurodevelopmental disorder (Veatch et al., 2014)
7. *Cognitive Disability* – A disability that will cause individuals to struggle with problem-solving, memory, attention, and comprehension (Sobczak, 2013).
8. *Disability* – A physical or mental impairment that substantially limits one or more major life activities of an individual (Coleman & Berge, 2018).
9. *Disability Service Office (DSO)* – The Disability Service Office is a centralized office with professionals who are knowledgeable about accessibility laws and serves as the primary point of contact for SWDs (Oertle & Bragg, 2014).
10. *Disability Support Staff (DSS)* – Disability Support Staff are personnel who are responsible for supporting SWDs (Cory, 2011).

11. *Individuals with Disabilities Education Act- (IDEA)* – The IDEA is a law that mandates that SWDs between the ages of 3 and 21 will receive a free and appropriate education (Floyd, 2012).
12. *Physical Disability* – Any impairment that limits the physical function of one or more limbs (Sobczak, 2013).
13. *Rehabilitation Act of 1973 (Section 508)* – A law that requires all government-funded technology to be accessible (Coleman & Berge, 2018).
14. *Sensory Disability* – Impairment relating to seeing, listening, and communicating (Asselin, 2014).
15. *Special Education Teacher* – A teacher who works with students diagnosed with special needs requiring an IEP (Yildiz, 2015).
16. *Students with Disabilities (SWDs)* – Students with a physical or mental impairment that substantially limits one or more major life activities (Cawthon & Cole, 2010).

Summary

Given the rise of students diagnosed with ASD, more IWBs have been introduced into our special education classrooms as a primary instructional tool and are essential for educators, administrators, and policymakers to consider the special needs teachers' perspective using IWB technology for this ever-increasing student population. The purpose of this descriptive qualitative case study was to describe the experiences of special education teachers who use IWBs to instruct students diagnosed with ASD in elementary self-contained special education classrooms.

The problem is that given the increase in students diagnosed with ASD and the widespread adoption of IWBs, the attitudes and perceptions of special education teachers are unclear regarding the benefits or hindrances of using IWBs to instruct elementary students

diagnosed with ASD. This descriptive case study seeks to understand how special education teachers use technology (specifically IWBs) to instruct students diagnosed with ASD in elementary self-contained classrooms. The knowledge gained from this descriptive qualitative case study might yield new understandings of teachers' experiences in adopting this relatively new technology and potentially provide information that school administrators can use in their efforts to encourage the use of instructional technology by special education teachers.

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter includes a discussion of the persuasive technology theory (Fogg, 2003) and the social learning theory (Bandura, 1977) that will be used as the theoretical framework for this study, as they are related to the experiences of special education teachers using Interactive White Boards (IWBs) to instruct elementary students with autism spectrum disorder (ASD). A clear description of ASD is provided in this literature review, along with a detailed explanation of ASD symptoms, diagnosis, the prevalence in the United States (U.S.), and the history of special education (Wainer, et al. 2011).

This review will cover how the IEP can provide insights into the process of diagnosis of individuals diagnosed with ASD and the detailed plan for teaching individual students with ASD. The related literature contains discussions about the evolution of AT, including the economic challenges in implementing AT in the modern special education classroom, including the challenges many special education departments face from a funding and resource perspective. The benefits and evolution of video modeling and universal instructional design to instruct ASD students will also be discussed, also how IWBs are being used today to teach children with ASD.

Theoretical Framework

The theoretical framework for this descriptive case study includes the persuasive technology theory (Fogg, 2003) and social learning theory (Bandura, 1977). Persuasive technology is the general class of technology that has the explicit purpose of changing human attitudes and behaviors. As this study focuses on how IWBs are used for instructing ASD elementary students, persuasive technology provides an appropriate theoretical lens for this study. The social learning theory proposed that individuals learn by observing the behaviors of

others (models). As IWBs are designed to provide visual aids (models), the social learning theory applies to this study.

Persuasive Technology Theory

Odom et al. (2014) described persuasive technology as "any type of computing system, device, or application that was designed to change a person's attitudes or behavior in a predetermined way" (p. 3806). Yet another description is of persuasive technology as a computerized software that provides users with an information system that uses cognitive-behavioral approaches that are designed to reinforce, change, or shape attitudes or behaviors or both, without using coercion or deception (Lehto, et al. 2012). Grynszpan et al. (2014) found that the use of technology, particularly in virtual environments, positively impacted ASD students' social ability, attention spans, collaboration, and social eye-gaze in a clinical setting.

Didehbani et al. (2016) led researchers to explore the use of AT through the lens of persuasive technology, to shed a light on why students with ASD using IWBs have shown increased social engagement and altered predetermined behavior (such as emotionally shutting down) resulting in a higher rate of success in their educational endeavors. The virtual environment was deemed idyllic, as the electronic format caused individuals to experience a reduction in anxiety and overall stress . Students diagnosed with ASD were able to model appropriate social skills in a safe place without fear of rejection or other repercussions (Krieger, et al. 2018). Today, many curricula designers, including Yufang et al. (2015), design their 3-D modules to include real-life social interactions that students will encounter daily, such as interactions with the teacher in a classroom and boarding a school bus.

Social Learning Theory

Bandura's (1997) social learning theory (SLT) claimed that behavior stems from one's environment, through the process of observational learning that can occur in any classroom setting. The social learning theory suggested that learning occurs through individuals inactively performing, or occurs vicariously through observing behaviors (Bandura, 1977). This learning is a process in which behavioral, structural, and environmental events can be used to transform and guide future actions (Bandura, 1986). Children with autism may lack these imitation skills, so when they are in an environment filled with peers from whom to learn, often very little learning takes place. Opportunities for observational learning occur throughout the day and may contribute to a considerable amount of what we learn.

Bandura's theory suggested that cognition and behavior are functions of human agency and context (Bandura, 1986). Learning takes place through social modeling by observing patterns of behavior of another in the environment (Oppong, 2014). People transform circumstances in an environment to fit their needs (Creswell, 2013). This transformation of circumstances in an individual's environment can influence the events that shape one's life (Bandura, 2000).

Related Literature

The purpose of the literature review is to "develop sharper and more insightful questions about the topic" (Yin, 2014, p. 15). Although previous research has been conducted using IWBs to instruct ASD students from the students' perspective, few have attempted to understand the special education teachers' perspective when using IWBs to instruct ASD students. Furthermore, research conducted specifically on students with ASD who use IWBs in a self-contained setting, as compared to an inclusive elementary setting, is scarce. This literature review includes the

evolution of ASD, the evolution of the U.S. special education policy, the history of ASD, symptoms, diagnosis, AT, the evolution of U.S. special education policy, IEP for special education of students with ASD, and IWBs.

Autism Spectrum Disorder (ASD)

ASD is a neurodevelopmental disorder that involves deficits in the areas of socialization, communication, and repetitive and stereotyped behaviors (Machado et al., 2016). According to Magana et al. (2020), approximately one in 59 children are diagnosed with ASD. There are three varying levels to the severity of ASD. A person who is diagnosed with ASD Level 1 requires *minimal support* from caregivers. According to the Diagnostic and Statistical Manual, Fifth Edition (Guha, 2014), those diagnosed with Level 1 have noticeable impairments, including the ability to communicate in a social situation if they do not have sufficient support in place. They may also have difficulty adjusting to changes in their routine, along with difficulties with organization and planning (American Psychiatric Association, 2013).

Those who are diagnosed with ASD Level 2 require more *substantial* levels of support. They will have more noticeable deficits, with both verbal and nonverbal communication, even when supports are available to them. They may also have a limited social circle and respond to others in a way that seems abnormal. They will also have difficulty adjusting to new routines. Additionally, they will often become stuck on a topic of their interest with a moderate inability to move on (American Psychiatric Association, 2013).

Those who are diagnosed with ASD Level 3 require the most support from their caregivers, otherwise known as *very substantial support*. They will have very limited verbal and nonverbal communication in social situations. They will also have difficulty responding to social overtures, as well as a minimal number of social friendships. Further, they will have marked

deficits in their ability to cope with change, as well as more repetitive and stereotyped behaviors than those diagnosed with Level 1 or Level 2 (American Psychiatric Association, 2013).

Therefore, a parent's experience with the disorder will be different on a case-by-case basis. Falk et al. (2014) reported that parents may perceive their children with ASD as unable to be reached emotionally. This is due to the lack of emotional reciprocity that is present among people who are diagnosed with ASD. Therefore, the bond between parent and child may not be as strong as that of a typically developing (TD) child and his or her parent. This could lead to internal struggles within parents and cause them to question the efficacy of their parenting skills .

Additionally, parents who have children with ASD report higher levels of stress and a poorer quality of life, compared to parents who have TD children or children with other developmental disabilities (Bohadana et al., 2019). This stress was also found to remain stable across the lifespan; children diagnosed with ASD require support throughout their lifetime. Further, Hsiao (2018) reported that families will consistently be confronted with the challenges of having a child with ASD, as there is no cure currently available. This type of prolonged stress can significantly impact parents over time (Shepherd et al., 2018).

The Evolution of Autism Diagnostic and Screening Instruments

The symptoms of ASD are so diverse that diagnosis is not assessed by a single individual, but by a multi-functional team which could be a team consisting of several members or a panel of professionals assessing multiple areas of functioning (Park et al., 2016). The starting point in ASD diagnosis includes behavioral observation and taking of developmental history from primary caregivers of the person being assessed. These form the most reliable basis for an autism diagnosis. The following represents the evolution of the diagnostic measures and screening instruments used for ASD children.

The first Diagnostic and Statistical Manual of Mental Disorders (DSM) (American Psychiatric Association, 1952), was published in 1952, which did not include an official diagnosis for autism. However, it did note that psychotic disorders in childhood "manifesting primarily as autism" (p. 28) should be classified as a variant of schizophrenia. At that time, autism was thought to be caused by a cold. The idea that autism was caused by environmental, rather than genetic factors was popularized by Austrian-born, self-proclaimed psychologist Bruno Bettelheim, who started an institution for children labeled as autistic, where they received what was referred to as a *parentectomy* (Nolan, 2020). Bettelheim believed that autistic children would benefit from being detached from their parents.

In 1968, the DSM-II was published and continued to have the term *autism* falling under the description of *schizophrenia*. In 1980, DSM-III was published and presented six major symptoms for infantile autism. They included onset within the first 30 months of life, a lack of responsiveness to others, gross deficits in language, peculiar speech patterns, bizarre responses to the environment (e.g., resistance to minor changes in the environment), and an absence of delusions or hallucinations (DSM-III, 1980).

With the publication of DSM-III-R (1987), the diagnosis of infantile autism was changed to autistic disorder. To receive a diagnosis of infantile autism, a child must have met eight of the 16 symptoms listed, including two items from criteria A, one from criteria B, and one from criteria C. Criteria A include symptoms consistent with impairment in social interactions, such as (1) lack of awareness of the feeling and emotions of others, (2) abnormally seeking, or not seeking, comfort during times of distress, (3) lack of or impaired imitation, (4) lack of or abnormal social play, (5) impairment in the ability to make friends. Criteria B includes symptoms of impaired verbal and non-verbal communication and imaginative activity.

Criteria B symptoms include (1) lack of communication, (2) abnormal non-verbal communication (e.g., abnormal eye gaze, gestures, lack of smile), (3) absence of imaginative activity (e.g., playing house), and lack of interest in made-up stories, (4) abnormalities in speech production (e.g., volume, pace) (5) abnormalities in content and form of speech, such as repetition and stereotyped speech, (6) inability to initiate and sustain a conversation. Criteria C includes symptoms of restricted interests and activities manifested through at least one of the following: (1) stereotyped body movements, (2) preoccupation with specific parts of an object, (3) distress over trivial changes in the environment, (4) insistence on following routines, beyond what is reasonable, (5) restricted ranges of interest and preoccupation with one specific interest. The onset of these symptoms must begin during childhood or infancy.

The DSM-IV (1994) retained much of the same diagnostic criteria for an autistic disorder that the DSM-III used for infantile autism and the DSM-III-R used for autistic disorder. To be diagnosed with autistic disorder, an individual must have met at least six of the 15 listed symptoms from criteria (1), (2), and (3), with one symptom from each criterion and at least two from criteria (1). Criteria (1) consist of impairment of social interaction, with symptoms of (a) impairment in multiple non-verbal behaviors, (b) inability to develop peer relationships, (c) lack of seeking spontaneously shared enjoyment achievements, or interests with others, (d) lack of emotional or social reciprocity. Criteria (2) consist of impairments in communication with the symptoms: (a) delayed or no verbal language, (b) for those who can speak, difficulty initiating and maintaining conversation, (c) repetitive and stereotyped behavior, (d) lack of varied and spontaneous make-believe or social play.

Criteria (3) include symptoms consistent with restricted repetitive patterns of behavior, activities, or interests, including (a) preoccupation with at least one stereotype or restricted

interest pattern, with abnormalities in focus or intensity, (b) inflexibility in adherence to routines or rituals, (c) repetitive and stereotyped motor movements (e.g., finger flapping), and (d) preoccupation with parts of an object. Further, there must be abnormal functioning before the age of three years in language, social interaction, or imaginative play. The aforementioned symptoms are outside the diagnosis of Asperger's syndrome, Rett's disorder, or Childhood Disintegrative Disorder.

DSM-IV (1994), in the diagnosis of autistic disorder, added Rett syndrome, Childhood Disintegrative Disorder, and Asperger syndrome in an attempt to clarify and capture the unique differences and nuances found in the entire autistic spectrum (Blacher & Christensen, 2011). One of the rationales behind the multiple disorders in the DSM-IV was that researchers accepted the premise of a biological cause for autism, and they were seeking the gene or genes responsible. However, after the completion of the Human Genome Project in 2003, no specific gene was found to be responsible for autism (Johnson, 2019). In part, because no genetic cause had been found, psychiatrists and psychologists moved to classify autism as an inclusive spectrum; thus, in DSM-5, the three similar disorders were deleted, and the diagnosis changed yet again to ASD.

In 2013, the DSM-V publication defined ASD as persistent deficits in social communication and interactions, and restricted or repetitive patterns of interests, activities, and behaviors. The standard diagnostic and screening instruments used in the identification of autism diagnostic and statistical manual for mental disorders (DSM-V) are highlighted below. According to the DSM-V, to be diagnosed with autism, one must meet the set criteria for autistic disorder. Specific features outlined in the three core areas, i.e., A, B, and C, as delineated in the DSM 5, must be met. One must have a total of six or more items across all the sub-categories (A, B, and C) with at least two from sub-category A) qualitative impairment in social interaction,

and one under both B) qualitative impairments in communication and C) restricted repetitive and stereotyped patterns of behavior, interests, and activities (APA, 2000).

For qualitative impairment in social interaction (criteria A), one must have at least two or more features of the following: 1) marked impairment in the use of nonverbal behaviors like eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction; 2) failure to develop peer relationships that are appropriate to one's developmental level; 3) lack of spontaneous seeking to share interests or enjoyment, and 4) a lack of social or emotional reciprocity (DSM-V, 2000). For qualitative impairment in communication (criteria B), one must have at least one of the following: 1) a delay or a total lack of the development of spoken language (not accompanied by alternative modes of communication like gestures); 2) marked impairment in the ability to initiate and sustain a conversation with others (among those with adequate speech); 3) repetitive or stereotyped use of language (echolalia), and 4) lack of varied, spontaneous make-believe play that is appropriate to their developmental level .

A person must meet at least one criterion for the Restricted Repetitive and Stereotyped Behavior (criteria C): 1) intense or abnormal preoccupation with one or more interest(s), 2) inflexible adherence to routine or rituals, 3) stereotyped and repetitive motor mannerisms (hand or finger flapping or twisting, or complex whole-body movements, and 4) persistent preoccupation with parts of objects. It is important to note that to be diagnosed with autistic disorder, evidence of delay or abnormalities manifestation before three years of age is required. Also, the symptom presentation should not have been better explained by a diagnosis of Rett's Disorder or Childhood Disintegrative Disorder (DSM-V, 2000).

As ASD diagnoses continue to increase, additional research studies attempt to isolate the nature of the disorder (Whyatt & Torres, 2018). Existing research concurs that genetic and

environmental factors may contribute to ASD; however, researchers remain bewildered by the increase in ASD diagnoses (Posar & Visconti, 2017; Snow et al., 2016). Ramsey et al. (2016) suggested that the rise in ASD diagnoses may be due to the ever-changing definition of autism, better diagnostic tools, early diagnoses, and a heightened awareness brought about by research studies that attempt to contribute to the understanding of ASD.

ASD Prevalence in the U.S.

In the 1960s, the occurrence of ASD was estimated to be 1 in 10,000 people (Russell et al., 2012). In the U.S. the prevalence of autism was 1 in 166 in 2005 (Russell et al., 2012). Autism diagnoses have been on the rise in the last decade. For instance, Baio et al. (2018) estimated that from 2000 to 2014, there was approximately a 150% increase in ASD diagnoses among 8-year-old children in the United States.

Further evidence came from Xu et al. (2018), who reported an increase of 95% in ASD diagnoses among children and adolescents in the U.S. between 2014 and 2016. Prevalence of ASD continues to be four to five times more frequent in boys than in girls (Salari et al., 2022). In 2020, the CDC reported that one in 36 children are diagnosed with ASD (CDC, 2020). The members of the CDC identified autistics as one of the largest minority groups in the world .

ASD – A Historical Perspective

The word *autism* derives from the Greek *autos*, meaning *self*, used to describe the characteristics of schizophrenia and was used as early as 1912 (Frith, 1991). A professor at the University of Zurich, Eugen Bleuler, director of the Burgholzli Asylum in Zurich, Switzerland, introduced the term *autism*, to describe a symptom of schizophrenia (Bleuler, 1912). Dr. Leo Kanner (1943) was the first to describe autism as a separate and unique disease apart from schizophrenia.

In 1938, Dr. Kanner initiated a study of 11 children who displayed monotonous repetitions, deficiencies of language, insistence on consistency, and preoccupation with objects, the results represented the first diagnoses of infantile autism (Cohmer, 2014). One year later, Hans Asperger published an article in Germany, describing children with symptoms similar to those Kanner described, but with more advanced verbal and cognitive skills (Johnson & Myers, 2007; Rutter et al., 1999), the results of which came to be known as Asperger's Syndrome.

Hans Asperger found similar characteristics as Kanner but described the children with social interaction deficits and noted that the children had strong academic knowledge in math and generally a higher level of intelligence than adults; however, they had stereotyped behaviors (Frith, 1991; Wing, 2000). In the DSM-IV, Asperger's became its own diagnosis, despite meeting the requirements of ASD, because Asperger specified the absence of communication impairment (APA, 2000).

During the 1950s and 1960s, the criteria for autism were being developed, studies during this time increased society's overall understanding of autism (Rutter et al., 1999). Autism became a mental health disorder in 1980 (Rutter et al., 1999). Prior to this, the symptoms related to autism were categorized under schizoid personality and childhood schizophrenic disorders. Then the term *autistic thinking* was created, which depicted a cold, emotionally detached, and aloof personality (APA, 1952). Kanner (1943) found a disorder similar to childhood schizophrenia called *autism* while observing 11 children who had obsessive and repetitive behaviors and social deficits. Increasingly, ASD is considered a spectrum of strengths and weaknesses. It is seen by ASD scholars as a form of neurodiversity, not pathology (Pellicano & Stears, 2011).

U.S. Special Education Statistics

In 1976, one year after the enactment of IDEA of 1975, the U.S. Department of Education provided ample data for review about how many students are utilizing the special education system nationwide (IDEA, 1996). By the 2014-2015 school year, IDEA provided coverage for 6.6 million children and youth, accounting for 13 percent of the total enrollment in the public-school systems (National Center for Education Statistics, 2017).

The percentage of distribution for children and youth aged 3-21 served under IDEA for the 2014-2015 school year represented mostly those eligible under the category of specific learning disability (35%), followed by speech or language impairment (20%), other health impairment (13%), autism (9%), intellectual disability (6%), developmental delay (6%), emotional disturbance (5%), multiple disabilities (2%), hearing impairment (1%) and lastly, orthopedic impairment (1%) (National Center for Education Statistics, 2017). Those with speech and language impairments had the highest rates for the most time being spent in general education (87%), followed by specific learning disability (69%), visual impairments (66%), other health impairments (65%), intellectual disabilities (16%) and multiple disabilities (13%). Therefore, there is concern that students enrolled in special education may face an increased risk of removal from general education programs or having their time limited in general education classes, more so in cases where consideration might not have been given to AT, and more inclusive placement options have not been considered (Etscheidt, 2016).

Evolution of U.S.' Special Education Policy

Excluding SWDs from public school education can be traced back in legal history to 1893, when the Massachusetts Supreme Court supported the expulsion of a student exclusively on poor academic performance (Smith, 2004; Yell et al., 1998). Thirty years later, the Wisconsin Supreme Court denied education to a student suffering from cerebral palsy; the court stated he

"caused a depressing and nauseating effect upon both the teachers and school children" (Smith, 2004, p. 2). The first significant court case was to introduce special education as racial segregation. In *Brown v. Board of Education* (1955), it was determined that segregation based on race violated equal educational opportunity.

The *Brown* decision gave all people, regardless of race, gender, or disability, the right to public education. Although funding for special education programs and training improved following the *Brown* verdict, school districts maintained the right to choose whether to take part in special education incentive programs throughout the mid-1960s (Smith, 2004). In 1965, with the passage of the Elementary and Secondary Education Act, schools began receiving federal monies for public education (National Center for Education Statistics, 2017). According to the National Council on Disability, congress first addressed the education of SWDs in 1966 when it amended the ESEA of 1965 to establish a grant program to assist states in the initiation, expansion, and improvement of programs and projects for the education of children with handicaps (IDEA, 1996). In 1970, that program was replaced by the Education of the Handicapped Act (P.L. 91-230) which, like its predecessor, established a grant program aimed at stimulating the states to develop educational programs and resources for individuals with disabilities . Neither program included any specific mandates on the use of the funds provided by the grants; nor could either program be shown to have significantly improved the education of children with disabilities .

Although progress was being made in both awareness and funding for special education students, it was reported that in 1975, up to half of the estimated 8 million children with disabilities in the U.S. were either being inappropriately educated or fully excluded from the public-school setting (Pulliam & Van Patten, 2006). This prompted the enactment of Public Law

94–142, which has dramatically changed the landscape for public school teachers and administrators. The EAHCA of 1975 (PL 94–142) was passed by congress to:

- Assure that all children with disabilities have available to them free appropriate public education that emphasizes special education and related services designed to meet their unique needs
- Assure that the rights of children with disabilities and their parents…are protected
- Assist states and localities provide for the education of all children with disabilities
- Assess and assure the effectiveness of efforts to educate all children with disabilities

The LDAA is a lobbyist group that exerted pressure on State and Federal governments in 1975 that led to the signing of a federal law known as the Individuals with Disabilities Education Act (IDEA), mandating that all children, regardless of disability, are entitled to FAPE (IDEA, 1996). This act mandated that all schools must provide students diagnosed with disabilities, including those with LD, free services, diagnosis, an individualized education plan, and special education specifically designed for their disability .

In 1990, Congress passed the Tech Act (P.L.101-476). The Tech Act defines the term AT services as any service that directly assists a student with a disability in the selection, acquisition, or use of AT devices (20 U.S.C. 1400(2)(E) & (F)). This new act illustrated the importance that the federal government placed on AT. The Tech Act of 1990 provided the following outline for faculty and administrators to utilize when adopting AT:

1. Evaluating the needs of an individual in the individual's customary environment

2. Purchasing, leasing, or otherwise providing for the acquisition of AT devices by individuals with disabilities
3. Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing AT devices
4. Coordinating and using other therapies, interventions, or services with AT devices, such as those associated with existing education and rehabilitation plans and programs
5. Training or technical assistance for an individual with disabilities or, where appropriate, the family
6. Training or technical assistance for professionals, employers, or other individuals who provide employment services or are involved in the major life functions of individuals with disabilities (Tech Act (P.L.101-476), Sec. 300.6).

The Use of an Individual Educational Plan for Students with Autism

Over the last four decades, the U.S. public school systems have been and continue to be the only publicly funded provider mandated by federal law to ensure that every K-12 student with a disability has access to FAPE, regardless of family income, insurance status, and geographic location (Ruble et al., 2011). However, according to the Tech Act of 1990, before such services can be accessed, a team must determine if the impairment impedes the educational learning and functioning of the student (Johnson, 2015).

Testing must occur through psychological examination. Thereafter, the special education teacher and other team members can develop an Individual Education Plan (IEP) for the student. An IEP serves as the legal and binding contract for providing services for a specific disability, such as ASD (Patti, 2016). These IEPs run parallel to the school's general curriculum and

benchmarks for each grade level (Yell et al., 2016). There are four types of accommodations that are present in a student's IEP: (a) presentation of instruction, (b) type of responses expected, (c) timing or scheduling of instruction, and (d) the setting (Harrison et al., 2013).

IEP teams usually consist of teachers, parents, school professionals, and the student (Patti, 2016). During the IEP meeting, teachers, parents, administrators, and advocates may present various learning methods or AT that should be available to meet the IEP objectives. As AT has been recognized by the federal government through the reauthorization of the IDEA, the IEP requires that it be considered for each child with a disability, including ASD (NAEYC, 2009).

The Evolution of Assistive Technology (AT)

The Tech Act of 1990 further defined the types of AT based on the severity of an individual's disability. The Tech Act of 1990 originally defined AT as note-taking cassette recorders, pencil grips, NCR paper/copy machine, simple switches, head pointers, picture boards, taped instructions, and workbook (Sec. 300.6 - Assistive Technology Service). The Tech Act defined AT and an AT *device* as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized. This includes items such as instructional equipment and necessary furniture, printed, published, and audio-visual instructional materials, telecommunications, sensory and other technological aids and devices, books, periodicals, documents, and other related material" (n.p.).

More recently, the potential of AT as an effective learning device in early intervention for young children with ASD has primed policies that support early intervention (Parette et al., 2009). Not surprisingly, AT has been recognized by the federal government through the reauthorization of the IDEA, which requires that AT be considered for each child's IEP

(NAEYC, 2009). Empirical studies investigating AT for early intervention provided reliable evidence that the effective use of AT enables young children to circumvent their disadvantages, thus compensating for their perceived deficits (Parette et al., 2009).

Today, at the federal level, the Individuals with Disabilities Education Act (IDEA) places the responsibility on the school system to provide AT devices and services to SWDs. At the state level, FAPE sets the rules and regulations for special education. FAPE provisions relating to AT devices and services must be appropriate and beneficial to the student (Etscheitd, 2016). At the local level, LRE was created to promote more inclusive placements to school districts under IDEA (Kahn & Lewis, 2014). All primary, secondary, and post-secondary public institutions which receive governmental assistance must adhere to all laws and provisions set forth by the ADA, IDEA, and FAPE.

Technology in the Classroom

Students are using technology for personal communication, entertainment, and information; the same students desire technology to be incorporated into the curricula that they were accustomed to outside the classroom (Mitchell et al., 2015). It is well documented that by the integration of technology into the classroom, students are given more opportunities to engage in critical thinking and active learning, both of which have been shown to increase academic performance (Shyr & Ching, 2017). Likewise, Siu and Morash (2014) found that technology-based interventions are beneficial for individuals with ASD. Teachers have reported that when technology is used in the classroom, students have a surge in motivation, participation, and academic responsibility (Bryant, et al. 2015). As students with ASD continue to struggle both academically and socially, AT (e.g., IWBs) have the potential to enhance learning outcomes, increase group participation, motivation, and overall attentiveness (Ahmad, 2014).

Assistive Technology (AT) for Students with Disabilities (SWDs)

According to Akpan and Beard (2014), the offering of AT services for SWDs is designed to ensure they have equal opportunity access to technology and services similar to those available to their peers without disabilities. AT devices have been divided into three categories: low-tech, mid-tech, and hi-tech (Constantinescu, 2015; Ganschow et al., 2001). The following describes each of the three categories:

Low-tech. Nonelectronic tools which are accessible, inexpensive, and easy to adapt for SWDs are considered low-tech types of assistive devices (Alkahtani, 2013; Constantinescu, 2015; Cook & Hussey, 2002). Low-tech devices are manually operated. Low-tech devices are easy to customize based on students' specific abilities and needs (e.g., flashcards, adapted chairs and tables, pen or pencil grips, manual communication boards, canes, and highlighters).

Mid-tech. Mid-tech devices usually refer to electronic devices that are easy to use, requiring very little training (Alkahtani, 2013; Constantinescu, 2015). Most mid-tech devices are inexpensive and prevalent in most U.S. classrooms. Examples of some mid-tech devices include talking calculators, adapted keyboards, and electronic dictionaries.

Hi-tech. Hi-tech devices are generally expensive, with complex features requiring more training and advanced skills, including ongoing maintenance. Hi-tech devices are typically operated electronically or digitally. Examples of hi-tech tools are electronic tablets, such as iPads, IWBs, or other advanced devices. Liu (2016) found that the most common hi-tech technology used by teachers was a document camera to display visual information to enhance lesson objectives.

The second most common hi-tech classroom technology teachers used was IWBs or videos as part of their lessons (Liu, 2016). Silva et al. (2016) discovered in their study that

technology, specifically IWBs, has the potential to expand learners' higher-order thinking skills when teachers employ technology in their pedagogic strategies.

Barriers to the Use of Assistive Technology (AT)

Ozguc and Caykaytar (2015) reported that not all special education educators have the same views and attitudes toward implementing AT, which may be due to their limited training in various ATs. The lack of training in hi-tech AT is the main barrier that special education teachers cite for their negative attitudes toward implementing AT in their curricula (Ozguc & Caykaytar, 2015). In a study of special education teachers' perceptions of AT implementation, Ahmad (2014) cited four barriers to AT implementation, including (a) teachers' self-defeating thoughts, (b) lack of support from the school, (c) teachers' negative attitude toward AT implementation, and (d) negative beliefs toward technology. A lack of funding or resources has been reported by some researchers as a reason for the lack of AT implementation in the U.S. special education classrooms (Hsu, 2016) indicated that if special education teachers were offered more comprehensive training and technical assistance, the inclusion of AT in the classroom would improve.

Implementing Assistive Technology (AT) in Special Education

Despite the legal requirement and peer-reviewed literature that quantifies how AT has a direct impact on student success, AT support is often not available to SWDs (Etscheitd, 2016). While the availability of AT for most SWDs is ubiquitous, inadequate teacher training and lack of funding remain at the forefront of explanations why faculty and administrators continue to find it challenging to comply with federal, state, and local rules and regulations (Kahn & Lewis, 2014). Throughout most of the U.S., special education departments are facing an increase in

enrollment and decreasing budgets (Lersilp, 2016), resulting in fewer teacher assistants, increasing the workload of the special education teacher.

Budget cuts also affect resources-like equipment, such as AT, for delivering effective lessons (NETP, 2017) argued that teachers in the business and technology sectors lack proper training to cater to the special needs community in their courses. The authors highlighted the instructional methods and technology practices currently being utilized by business and technology educators to include students with a disability (NETP, 2017). The NETP (revealed that technology and business teachers had little coursework or professional development in special education and that most reported feeling unprepared to teach students with a disability.

Along with the lack of training and support for AT inclusion, Vittek (2015) presented the concurrent exodus of special education teachers in the U.S. K-12 education system is due to the lack of resources and funding. “The factors that contribute to the teacher shortage in special education are wide-reaching, ranging from preparation programs to the support a teacher receives in their first few years as an educator” (p. 6). Hsu (2016) noted that teachers’ lack of technology training, limited time available to implement technology integration, and poor technical support for teachers were major barriers to successful technology integration.

Given the legal requirements for qualifying special needs students to be provided AT, most institutions are collapsing under the weight of compliance (Burke et al., 2016). As the demand for AT rises, the K-12 system & post-secondary institutions must receive appropriate funds and resources to comply with federal and state requirements (Bunch, 2016). All public education institutions are required to provide adequate training for teachers/faculty to incorporate AT into the curriculum to meet the needs of special needs students set forth by FAPE, IDEA, and ADA (Novak, 2015).

Integrating Technology into the Curricula for Students with ASD

The focus of special education has been not only to familiarize students with skills of daily living but also to instruct students in all aspects of the Common Core curriculum using specialized techniques, as specified in each student's individualized education plan (IEP). This process of categorizing and implementing AT in the classroom rests with the educator's beliefs and conceptions about learning (Tondeur et al., 2017). Ultimately it is the educator's responsibility for technology integration into the classroom (Coklar & Ozbek, 2017).

Most recent technological devices and software can be customized to meet the specific needs of students in instruction (Hughes & Yakubova, 2016). Some digital tools even enable modification of content, such as changing the complexity level of a text and customization that enables personalization of the learning experience to meet the individual needs of students with IEP's. Today, technology giants, such as Apple, Microsoft, and Google, are spending enormous resources in designing their AT services specifically with built-in customization features that will continue to allow people with disabilities to individualize their experiences.

Research has also shown that technology usage tends to promote group learning through social interactions. For example, iPads have proven to be more collaborative and have encouraged a student-centered approach toward learning (Falloon, 2013). In a recent study, Knight et al. (2015) engaged four middle school students with a diagnosis of autism. All students had adequate hearing and vision for using a computer, all four possessed basic computer skills, verbal skills, and exhibited low comprehension scores.

The seven most common information technology interventions are "digital textbooks, digital course portals, video content, digital training resources, learning games, reading and writing technology, and digital summary or comprehension tools" (Anderson & Sorenson, 2017,

p.243.). These tools are utilized with those students identified as focus learners and consist of students identified with Developmental and Attention Deficits, including those students with ASD (Anderson et al., 2016). It is well documented that computer-based technologies, including virtual reality, iPads, Interactive Whiteboards, Google Classroom, and video, have all benefitted elementary-aged students with and without ASD (Anderson & Sorenson, 2017; Arhipova & Sergeeva, 2015; Chauhan, 2017; Tamakloe & Agbenyega, 2017).

In one such study, students were given a science e-text using computer software named BB. The BB software gives students visual and audio illustrations, explanatory resources, translations, hyperlinks to definitions, summarized sections, and provides embedded coaching. Students listened two times and then were asked vocabulary and comprehension questions. The results indicated that computer instruction encouraged student engagement, all students preferred computers over traditional text, and they also found hyperlinks and coaching to be beneficial (Knight et al., 2015). “Children with ASD appear to be more attentive and motivated when using a computer” (Sansosti et al., 2016, p. 67).

Technology and Reading Comprehension for Students with ASD

Technological devices have been found to benefit students with autism in reading through, decoding, sentence construction, and word identification (Knight et al., 2015). Features, such as text captioning, visual and audio capabilities, and play-back features, have also been found helpful to students with autism who tend to be more visual than auditory (Burgstahler & Russo-Gleicher, 2015; Stanley, 2016). Videos, for instance, can be edited and made shorter to accommodate students with comprehension and retention difficulties (Stanley, 2016).

In another study, students were exposed to a computer reading program called ABRACADABRA, which has a student, teacher, and parent module for supporting

comprehension activities for students (Abrami et al., 2016). Apart from an increase in comprehension skills, the results from the inquiry by Abrami et al. also revealed high gains for students with reading disabilities who used the computer reading program. Stanley (2016) studied the effect of IWBs on the achievement and engagement of elementary students diagnosed with ASD in the context of reading. In this mixed-method study, Stanley used three students diagnosed with ASD who were considered fluent readers with a measurable reading ability higher than a first grader.

The results indicated a measurable impact on student achievement and overall engagement. In terms of achievement, the first subject's achievements were greater during traditional book reading than on an IWB. There were also no notable differences in reading achievement between the two methods of intervention for students with ASD, and all three subjects had no achievement in growth from the beginning to the end. Observing student engagement, Stanley (2016) found no noticeable differences in engagement between the two intervention methods.

However, there was a considerable increase in verbalizations and total joint attention for the three participants. Furthermore, it was found that the IWB was the same as the book method on both achievement and engagement for all participants (Stanley, 2016). The achievement variables measured, that is, word count and comprehension did not improve while using the IWB . It appeared that the intervention had negative correlations on word count for one participant, and comprehension for another participant. The positive impact that came from using an IWB in this study was an increase in verbalizations and total joint attention for the duration of the study for all three students. Students demonstrated growth in expressive language throughout the study

Technological devices have been found to benefit students with autism and intellectual disabilities in reading through decoding, word identification, and sentence construction (Knightet al., 2015). Features, such as text captioning and visual and audio capabilities, have also been found helpful to SWDs in inclusion and those with autism who tend to be more visual than auditory (Burgstahler & Russo-Gleicher, 2015; Stanley, 2016). According to Kientz et al. (2014), most classroom computer programs allow teachers to select and match content to an individual's cognitive ability, make that content relevant to the students' current environment, and use photos to help generalize the content to the real world.

Benefits of Video Simulation for Students Diagnosed with ASD

Video Modeling (VM) is an observational approach that focuses on social skills based on a child's specific needs (Eck & Pierson, 2017). VM uses recordings of participants who model the appropriate target social behavior. This simulation may be in cartoon form, an actual recording of a peer modeling this behavior, or a VM game. The students view the video and practice imitating the specific social skill presented by the video recording (Eck & Pierson, 2017). Anderson et al. (2016) found that VM was an effective approach for groups and individuals to learn and generalize specific socially acceptable behaviors. VM is a format commonly used to teach social-communicative skills to children with ASD, which involves the child learning the target skills from watching a video of themselves or others.

The use of an iPad and its versatility for video modeling has earned its place in the classroom, as it can instruct children and adults on many topics. Applications that promote social skills using social stories, organization, problem-solving, and self-determination make the iPad a desired medium as a teaching aid for transition students. The use of video modeling in the study had significant results, and it showed that the individual was able to increase perspective by

taking in one trained skill in a specific setting and was then able to adapt the skill to a novel situation with varying degrees of success (Yakubova & Zeleke, 2016).

According to Erbas et al. (2015), the use of IWBs as a pedagogical practice can help teachers enhance the students' motivation, concentration, and overall participation. Moreover, Erbas et al. (2015) discovered that students with access to IWBs experienced an increase in the interaction between teachers and students, thus facilitating a collective meaning-making process in group work. Alshawareb et al. (2012) found that general education teachers prefer to use IWBs rather than static boards and believed that the IWBs provide the highest level of interactivity in the classroom, which in turn improves teaching performance, stimulating attractive pedagogical methods. However, the literature is currently void on the perceptions that special education teachers have when using IWBs to instruct elementary-age children with ASD.

Interactive Whiteboards

The IWB was developed in 1991 by David Martin and Nancy Knowlton and was implemented and used in classrooms in 1992 (Riaz, 2018). Currently, IWBs are considered to be the most popular instructional technological device in the classrooms in the U.S. (Luo & Yang, 2016). Due to the IWB widespread interactivity, it is fundamental to the enhancement of students' learning and is vaunted as elevating the *chalk and talk* way of teaching to a highly technological teaching type (Luo & Yang, 2016).

The IWB empowers students to learn and discover new ideas (Mun & Abdullah, 2016). Students are thrilled and eager to learn, causing educators all over to lobby for the integration of IWBs in the curriculum (Mun & Abdullah, 2016). Another notable feature of the interactive whiteboard is touchscreen navigation and object manipulation, which allows the users to move

objects using their fingers. The interactive nature of the IWB makes it easy for several students or groups of students to utilize the board simultaneously (Pourciau, 2014).

Pourciau (2014) stated that the reason for integrating IWBs in schools is to maximize the effectiveness of pedagogic approaches and the way students learn, setting the path for improving performance. The IWB is deemed more beneficial than computers; computers are made for single use, while the IWB is developed for collaborative and full class learning (Almajali et al., 2016). The IWB promotes interactivity in the classroom and keep students engaged during teaching (Pourciau, 2014). Most importantly, it makes it possible for teachers to reach learners of every style, including those with special needs (Riaz, 2018).

Research has shown that when IWBs are not present, teachers utilize a lecture-style approach that results in monotony and less student engagement (Tsayang, et al., 2020). Riaz (2018) confirmed that the use of IWBs in K-12 schools positively impacted the way students learn in every area of education and at all grade levels. Teachers affirm that the biggest benefit of the IWB is that it is stimulating, versatile, and contributes largely to the teaching and learning process, facilitates various kinds of visuals digitally as teaching materials, making the lesson easy, saving time, and being fun to use (Momani et al., 2016).

Advantages of Interactive Whiteboard Technology

The IWB allows quick, effective, well-organized, and interactive classroom experiences (Almajali et al., 2016; Davidivitch & Yavich, 2016; Dori & Kurtz, 2015; Riaz, 2018). Students are given the opportunity to learn in a technologically interactive setting, which provides enhanced engagement, particularly for more challenging subjects (Almajali et al., 2016). According to Almajali et al. , another major advantage of the IWB is the large work area it offers, supporting users to work in groups.

The IWB supports a student-driven atmosphere where students can work collaboratively in their efforts to learn (Almajali et al., 2016; Al-Rabaani, 2018). Teachers expressed that the quality of their teaching improved with the integration of the IWB in the classroom and being able to combine the IWB with the students' computers resulted in capturing the students' full attention and thoughts through a resourceful means (Davidivitch & Yavich, 2016).

According to Tertemiz et al. (2015), the IWB offers students highly stimulated lessons that lead to supporting a constructivist learning environment. Students at every level and all styles of learners (auditory, visual, tactile) benefited from the use of IWBs (Momani et al., 2016; Tertemiz et al., 2015). Using IWBs, special needs teachers can include a wide range of teaching tools, allowing more flexibility, and can modify learning to the individual needs of the student (Riaz, 2018).

Teachers can present a "media-rich" lesson due to the extraordinary features of the IWB (Pourciau, 2014, p. 11). According to Pourciau (2014), the main motive for integrating IWBs into K-12 schools is to maximize the effectiveness of pedagogic approaches and set the path for improving performance. The IWB, being so versatile, is referred to as the "outsmart technology" in education (Riaz, 2018, p. 71). The IWB is deemed more beneficial than computers; computers are made for single use, while the IWBs are developed for collaborative and full class learning experience (Almajali et al., 2016).

Disadvantages of Interactive Whiteboard Technology

The main barrier for schools utilizing IWBs is the cost and low funding, schools may be unable to afford them (Hebing & Wenzel, 2017). The IWBs cost anywhere from $1000 to $7000 each and this is dependent on the series and the desired software. Another disadvantage is that

the IWBs need regular maintenance, and the cost to them to maintain is challenging for lower-resourced schools (Momani et al., 2016).

Hebing, & Wenzel (2017) added that because of the huge cost involved in purchasing the IWBs, lower-income schools are at a disadvantage in procuring such modern electronic devices, thus causing these schools to be ill-prepared to provide students with strategies and means to compete in the 21st-century digital workforce. Students who lack experience with technology are at a great disadvantage in a digitally globalized industry, and they are left to struggle with the endless technological change in a fast-moving society (Hebing, & Wenzel, 2017).

Another obstacle facing teachers is the inadequate training and the lack of time to prepare lessons using the IWBs (Hsu, 2016; Momani et al., 2016). Likewise, Alfaki and Khamis (2018) identified that the IWB can be difficult for teachers to utilize without strong technical abilities and with little or no IWB training. Alfaki and Khamis (2018) said that for IWBs to be successfully integrated into the classroom, technical support at the school level is essential. Alfaki and Khamis explained that without technical support at the local level, when IWBs malfunction, for example (a) the stylus pen needing replacement, (b) connectivity issues between the IWB and teacher's or student's computer, (c) not understanding data projector software operation, (d) installing programs and files that are not incompatible with interactive software, (e) breakdown in the middle of a lesson, among others, teachers are at a loss as to where to turn. The challenges listed contribute to teachers' reluctance in using IWB technology in the classroom (Umugiraneza et al., 2018). Dehqan et al. (2017) said that the lack of technical support and financial resources to support the use of IWBs technology in the classroom are the probable barriers to teaching with the technology.

Teachers' Need for Professional Development

According to Joo et al. (2018), teachers reported that technological pedagogical content knowledge positively influenced their perceived usefulness of technology in the classroom. Technology-related change in teachers' practice is guided by confidence in engaging with and views about technology integration (Howard & Gigliotto, 2016). Karademir et al. (2017) examined the use of Web 2.0 tools, such as Facebook, Wikipedia, and blogs, by teachers in the classroom and reported that peer learning promotes computer skills and high-level learning skills.

The main barrier to classroom technology integration is the lack of training and resources for teachers (Hsu, 2016). Liu et al. (2017) reported that the availability of quality technology support was correlated to classroom technology integration. Mitchell et al. (2015) reported that teachers need adequate technology training. Ogirima et al. (2017) recommended that teachers should be trained and retrained in the use of AT. Mitchell et al. (2015) found that teachers with fewer years of teaching experience utilized technology more than seasoned teachers.

Summary

The problem is that given the increase in ASD students and AT, there is no clarity as to the attitudes and perceptions special education teachers have regarding the benefits or hindrances of using IWBs for their ASD elementary students. The purpose of this descriptive qualitative case study was to describe the experiences of special education teachers who use IWBs to instruct students diagnosed with ASD in elementary self-contained special education classrooms. The existing research discussed how the persuasive technology theory and social learning theory offer an appropriate theoretical lens for this descriptive case study. This extensive literature review provided a solid empirical basis for the research that follows, which aims to investigate

how IWBs are being used to instruct elementary students with ASD. The literature provided a clear need for further research, given the recent rise in ASD diagnoses.

The research discussed the evolution of the U.S. special education policy, which determines what resources (specifically AT) should be made available to special needs students. The literature covered the financial and resource challenges most special needs departments face when attempting to use AT to accommodate IEPs. Next, the literature described how IEPs are used for teachers, parents, school administrators, related services personnel, and students (when appropriate) to work together to provide an appropriate course of action (including AT resources), curricula, and support services.

The last section demonstrated how IWBs promoted positive social norms and learner-centered pedagogy, which has had a positive impact on student motivation, engagement, and attention. Given the growing body of research on various ATs' impact on ASD students, the literature unfolds a clear need to understand how IWBs are perceived from special education teachers' perspectives.

CHAPTER THREE: METHODS

Overview

The purpose of this descriptive qualitative case study was to describe the experiences of special education teachers who use Interactive White Boards (IWBs) to instruct students diagnosed with autism spectrum disorder (ASD) in elementary self-contained special education classrooms. Mardis et al. (2012) noted that teachers who had federal mandates to adopt AT into classroom settings for SWD have faced many obstacles when integrating assistive technology (AT) into classrooms. This chapter will identify the study's design, research questions, setting, participants, study procedures, my researcher role, the data collection methods, data analysis, trustworthiness, and ethical considerations for this study.

Research Design

At its core, qualitative researchers seek to understand how people make sense of the experiences they encounter in their lives (Merriam, 2009). A research method should be selected based on the most ideal way to examine an issue, given the research questions and phenomena (Nagata & Suzuki, 2017). Qualitative methods aim to provide information about the experiences and attitudes of a particular group using interviews, observation, and interpretation (McCusker & Gunaydin, 2015). The advantage of using qualitative methods when studying special education teachers' attitudes and perceptions toward the use and integration of IWBs is the openness of inquiry that can provide an unanticipated response to an inquiry (Patton, 2002). Diving deeper, qualitative case study research is chosen when researchers are "interested in insight, discovery, and interpretation rather than hypothesis" (Merriam, 2009, p. 42).

"A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon

and context may not be clearly evident" (Yin, 2014, p. 16). The case study allowed me to study the participants' experiences and perceptions, which were essential in understanding how elementary teachers perceive and use IWBs to instruct students with ASD. Since Creekside School district utilized IWBs in every K-12 classroom (including all special education classrooms), it offered me the ideal site to conduct this study. Case study research was appropriate for this study, as case study research is commonly used to examine practicing professions, including education, and used to "understand complex social phenomena" (p. 5). The case study design provided the tools that allowed me to study the phenomenon in detail, gaining a better understanding of the experiences that contributed to the participants' perceptions. I used a case study to offer multiple perspectives on this topic. The case study approach allowed the collection of multiple sources of data to recognize patterns and themes.

Given my desire to have teachers describe their experiences, I chose the descriptive case study. According to Yin (2014), a descriptive case study is used to describe a particular phenomenon within its context. Yin suggested using the descriptive case study with the qualitative research method to describe a trend in its real-world context. Using a descriptive case study method allowed the participants to tell their story as it relates to the research questions. This descriptive research is valuable in helping me to understand how elementary special education teachers described their experiences using IWBs to teach students with ASD in a self-contained classroom setting.

Research Questions

Central Research Question

How do elementary special education teachers describe their experiences using IWBs to teach students with ASD in a self-contained classroom setting?

Sub Question One

How do special education teachers describe the integration process and continued support when IWBs are used as an instructional tool with students who are diagnosed with ASD in their self-contained classroom setting?

Sub Question Two

What are the primary advantages and disadvantages IWBs offer special education teachers in instructing ASD elementary students in a self-contained classroom setting?

Sub Question Three

How do special education teachers describe their experiences in using IWBs for video modeling to demonstrate a new behavior or concept for students who are diagnosed with ASD?

Site and Participants

The setting was conducted in a public school system located in northeast GA. This site was chosen for this study, as each classroom in this public school system, including special education classrooms, all utilized IWBs. As I was seeking to understand how special education teachers described their experiences using IWBs to teach elementary students with ASD, having access to special education teachers who currently use IWBs to instruct elementary students is compulsory for this study. Each participant had experience using IWBs for instructing elementary students diagnosed with ASD. Having selected a school system and teachers who had experience using IWBs to instruct ASD elementary students aligns with my purpose statement.

Site

The Creekside County School District was, at the time, one of the top 10 largest school districts in Georgia, which served 51,000+ students. At the time of this study, Creekside County

School District was the only school district in GA to require all elementary school classrooms (including those with special needs) to utilize IWBs. Since I was seeking to understand how special education teachers describe their experiences using IWBs to teach students with ASD, having access to special education teachers who currently use IWBs to instruct elementary students is essential for this study. I had chosen three elementary schools within the district to take part in this study, as it is necessary to obtain the required number of participants.

Participants

According to Creswell (2013), purposeful sampling is an approach that is commonly used in qualitative research and involves identifying selected individuals or groups of people who are knowledgeable or have experience with a certain phenomenon of interest. The recommended sampling size for a qualitative case study can range from one participant to hundreds (Creswell, 2013). According to Yin (2014), a sample size of 15 is the smallest acceptable sample size for qualitative research, although, for a case study method, the sample could be as low as 10, depending on the saturation point.

Participants for this qualitative descriptive case study included 10 elementary special education teachers who were currently using IWBs in a self-contained classroom to teach elementary students diagnosed with ASD. This number of participants was considered sufficient and provides the opportunity to gather an appropriate amount of information to develop and identify themes (Creswell, 2013). Within this study, there were many variables of interest, as each participant had experience with IWBs as an instructional tool, which, in turn, provided multiple sources of data, as well as theoretical propositions that guided the collection and analysis of the data (Yin, 2014). Each participant met the following requirements: (a) must hold a state-issued teacher's license to teach students with intellectual disabilities, (b) must currently

be teaching elementary children diagnosed with ASD using IWBs as an instructional tool, (c) must be currently employed full-time by Creekside School District, (d) must have more than one year of experience in teaching children with ASD.

Researcher Positionality

Xu & Storr (2012) discussed the importance of researchers serving as human instruments. The researcher must use her/himself as an instrument in the interview dialogue. Xu, & Storr discussed how the dialogue is characterized by the ability of the researcher to achieve connectivity – a relationship characterized by insight, understanding, and attachment with self, understanding and compassion for the participants' intentions, statements, and experience of the situation, and reflection on the researcher's approach to the subject and the person. My role was to establish connectivity with my participants while recognizing my approach to research. During this qualitative descriptive case study, I was the primary means through which the data was collected (Lincoln & Guba, 1985). It is the role of the researcher to interact as a part of a qualitative study.

My goal was to interact with the participants to gain an understanding of how special education teachers describe their experiences using IWBs as an instructional tool to teach students with ASD in a self-contained classroom setting. My motivation for conducting this study stems from my desire to help the ASD community. When my son was diagnosed with ASD at the age of two, I began to research what resources related to ASD were available for parents and teachers. My findings were not only ambiguous but vary sparse. Advice on ASD therapies, treatments, and diagnoses would often vary from so called expert to expert Entering my doctorate program as a student with a cognitive learning disability (Dyslexia), I wanted to explore a subject that could benefit both the special education teachers and the ASD community.

I have seen first-hand how helpful and effective IWBs can be for students with ASD. With this in mind, I would like to see an IWB in every United States (U.S.) special education classroom.

Interpretive Framework

The interpretive framework for my research was found in social constructivism. Creswell (2013) stated, "In social constructivism, individuals seek understanding of the world in which they live and work" (p. 24). The social constructivist worldview holds to the expectation that seeking an understanding of the world in which one lives and works aids the individual to make meaning of their experiences (Liu & Lan, 2016). I approached the research with the understanding that there is no one true reality, but rather multiple realities that are constructed by the lived experiences of the participants (Creswell, 2013). For this study, the participants described their unique experiences in using IWBs to instruct elementary students with ASD.

Philosophical Assumptions

My philosophical assumptions were addressed in this section through an ontological, epistemological, and axiological lens, as I identified my personal value and bias within the study (Creswell, 2013). The philosophical assumptions that guided my research are methodological, as I analyzed the data detailing knowledge of the topic of this study .

Ontological Assumption

The nature of reality is critical in this study, and the nature of reality was the primary question posed by the ontological assumption (Creswell, 2013). I was cognizant that each special education teacher (my participants) held a unique perspective on learning technology, group instruction, and lesson development. Moreover, I was aware that each class of students (with ASD) had a unique variation in the severity of ASD, which allowed me to document and analyze data from multiple perspectives. Viewing the research through the ontological lens and utilizing

the tools of themes using the actual words of different individuals allowed me to report different perspectives as the themes developed .

Epistemological Assumption

This study was founded on the epistemological assumption that specific knowledge is required to participate in this study; more specifically, that all participants must have a special education background, worked with ASD elementary students, and were currently using IWBs to instruct their students diagnosed with ASD. Given those specific requirements was important for me to rely on statements as evidence from the participants. Spending ample time with the participants allowed me access as "an insider" (Creswell & Clark, 2007, p. 18) and help justify how "I know what I know" (p. 18). Consequently, conducting multiple interviews with the participants, and recording and analyzing their statements offered a more persuasive contribution to the knowledge of their experiences using IWBs to instruct ASD elementary students.

Axiological Assumption

The term *axiological* refers to the value-laden aspect of qualitative research, acknowledging that researcher prejudices are present (Creswell & Clark,2007). Thus, it was important to admit my value-laden approach by "positioning myself in the study" (Creswell & Clark,2007, p. 18) and acknowledging my voice, and my interpretation of the data collected, as much as the voice and interpretation of the participants. In other words, I acknowledged that if this study were to be conducted by another person but was otherwise identical, the results could be different.

Researcher's Role

Within qualitative research, there is a belief that rich data can be understood through the interaction of the researcher and participant, where the researcher portrays the meaning of the research through the voice of the participants (Bell, 2022). With this assumption, my role was that of a human instrument. I was the primary instrument for data collection and analysis of data. Thus, some biases may be present. For example, I have experience using IWBs for educational purposes. I have a child diagnosed with ASD. I also own a non-profit company entitled the National ASD Learning Center. I hold a master's in education leadership, and working on my Ed. D. in Curricula & Instruction. I had over twenty years of experience in the business of education and have designed 70+ courses in higher education (some related to children with ASD). This reveals a potential bias, of which I was aware.

That said, I did not have any relationships with the schools or teachers who participated in this study. Throughout this study, I maintained an awareness of my personal beliefs and kept a researcher's reflexive journal (Appendix J) to bracket out my thoughts to focus on the study. By doing so, according to Yin (2014), I was able to gain a greater insight into the participants' perceptions. Consequently, my role as a non-participant observer, having no previous relationship with the participants, helped me in avoiding *issues of positionality* (Bell, 2022).

Procedures

Before commencing this study, I sought approval from Liberty University Institutional Review Board (IRB). After IRB approval, I conducted a pilot study. Kvale (1996) suggested that piloting questions allows for possible revisions before the actual implementation in the study. A pilot study strengthened the research and yielded initial observations that assisted me in managing the research and understanding the interview process (Padilla-Díaz, (2015). To this

end, I emailed three special education teachers who currently used IWBs to instruct elementary students diagnosed with ASD to take part in a pilot study, although none of these individuals or the data that was collected was included in this study. This pilot study allowed me to practice all three of the data collection methods with actual teachers. Doing this allowed me to ascertain any potential issues with these data collection methods and make any necessary revisions before the actual study began. The results of this forced me to modify my interview questions before interviewing the remaining participants.

Permissions

I obtained signed permission to conduct my study from the Creekside County School District superintendent. This signed copy was submitted as part of my application to Liberty's IRB. Once the IRB had approved my study, I submitted the IRB approval letter in Appendix A. Then, I immediately completed a pilot study, and then began to contact potential participants.

Recruitment Plan

After receiving IRB approval and completing the pilot study, I requested contact information for all special needs elementary school teachers from the Creekside County school district. Once I received this list, I emailed each special education teacher a recruitment letter (Appendix B). This letter described the purpose of the study and what was required from an individual who was chosen as a participant in this study. Each interested individual was asked to complete the screening survey (appendix C). Access to this survey was through a hyperlink included in the teacher recruitment letter. Once the interested individuals had completed the screening survey, I reviewed the screening surveys and selected those teachers who seemed to be good candidates to participate in this study. I then emailed the selected participants an acceptance letter (Appendix D) and a denial letter (Appendix D) to those who were not selected

to participate. The email to the accepted participant included a link to the consent form (Appendix E) for signature. Each participant signed the form electronically and emailed the signed copy to me. I then reached out to each participant via email to schedule individual interviews and focus group interviews.

Data Collection Plan

Within this study, there were many variables of interest, as each participant had his/her experience with IWBs as an instructional tool for elementary students with ASD. This provided multiple sources of data, as well as theoretical propositions that guided the collection and analysis of the data (Yin, 2014). The three data collection methods were one-on-one interviews, focus group interviews, and participant letters.

Individual Interviews

Interviews were the primary collection method for this qualitative descriptive case study. According to Sad (2012), interviewing will provide detailed meaning from the experiences of the participants. In this case, individual interviews will encourage special education teachers to reconstruct their experience using IWBs to instruct elementary students diagnosed with ASD.

During this process, the data collection consisted of an in-person or video teleconference interview, with open-ended questions asked of each participant. When video teleconference interviews become necessary, I emailed each participant a link to the virtual meeting via Zoom at the agreed-upon time. Each participant then clicked the link for the meeting and joined online for his/her interview.

The semi-structured interviews in this study allowed participants to describe their experiences. For this descriptive case study, I developed 16 open-ended interview questions. Each participant consented to be audibly recorded during the interview. The results of the

interview were transcribed and sent to the participant to check for accuracy before data analysis begins. After the participants approved their transcripts, they were stored on my password-protected personal computer.

Grand Tour Question

Why do you want to work with children with ASD?

Individual Interview Questions (Appendix G)

1. How would you describe your experiences in using Interactive Whiteboards (IWBs) to teach your students with autism spectrum disorder (ASD)? (CRQ)
2. Describe your general introduction to Assistive Technology (AT) in the classroom. (SQ1)
3. Describe your general introduction to AT, specifically for ASD elementary students. (SQ1)
4. Describe your introduction to IWBs in the classroom, specifically for ASD elementary students. (SQ1)
5. What types of training or preparation did your school provide you before implementing the IWB as an instructional tool for your students? (SQ1)
6. How would you describe organizational support concerning IWBs in continuing education? (SQ1)
7. How would you describe your transition from chalk and talk to virtual tools to instruct your students with ASD? (SQ1)
8. What have been the barriers or challenges in using IWBs as an instructional tool for elementary ASD students? (SQ2)

9. Describe the top three features of the IWB when instructing your ASD students in a self-contained classroom. (SQ2)
10. What makes these features so valuable? (SQ2)
11. What do you consider to be the three least valuable features of the IWB when instructing your ASD students in a self-contained classroom? (SQ2)
12. What makes these features unfavorable? (SQ2)
13. How do you use IWBs to enhance your students' learning experience? (SQ3)
14. How do you use IWBs to model behavior? (SQ3)
15. How would you describe using IWBs to support social-emotional learning? (SQ3)
16. How would you describe using IWBs to support abstract concepts when compared to previous chalk & talk methods? (SQ3)
17. What is your perspective on how the IWBs have/have not increased group collaboration? (SQ3)

Questions one–five covered how the availability of AT for most SWDs is ubiquitous. AT resources, training, and ongoing support for faculty and administrators remain a continuous challenge in complying with federal, state, and local rules and regulations (Kahn & Lewis, 2014). These questions directly addressed how AT is introduced to special education teachers.

Questions five–10 recognized that IWBs are still a relatively new technology in classroom education. As such, the available academic literature related to IWBs is limited, particularly from the perspective of teaching and learning (Armstrong et al., 2005; Fekonja-Peklaj & Marjanovic-Umek, 2015). This absence of resources and best practices for school systems has the potential to create challenges for teachers, administrators, and policymakers. The aforementioned questions

directly speak to the benefits and frustrations special education teachers have when using IWBs as an instructional tool for elementary students with ASD.

Questions seven–11 addressed the transition from static classroom materials to IWBs. The questions allowed the teachers to describe which IWB features are the most and least valuable when instructing their students with ASD. Mechling et al. (2009) stated, "motivational and engaging features of AT may further support students' preference to use such an interactive medium over traditional formats for delivering instruction" (p. 45). Instructional strategies, which are more interactive and likely to integrate technology, help students take more responsibility for their learning (Cumming et al., 2014). Currently, no studies have examined the use of technology to increase participation or for activity completion during classroom tasks (Collette et al., 2019).

Questions 12–17 allowed the special education teachers to describe how their students react to IWBs when introducing a new concept, abstract concept, or emotional and behavioral modeling, both from individual and group perspectives. The literature supports that through the application of AT (specifically IWBs), students experience differentiating learning (visual, listing, and kinesthetic examples) that reinforce key learning objectives (Claes et al., 2012). Laubscher et al. (2012) conducted a study that illustrated how AT can visually support language and group communication in individuals with ASD. This, in turn, empowers SWDs to absorb new skills that are critical to academic success (Gillette & Depompei, 2008).

Questions 12–17 further addressed the social learning theory (Bandura, 1977, 1986), which is a video-modeling method used to create new behaviors by observing and imitating others. This study will add to the notion that not only can video modeling be used to create new behaviors, but interactive video modeling (a component of IWBs) can have an equal or more

significant effect on elementary students with ASD. The persuasive technology theory (Fogg, 2003) uses visual representations through computer applications to attract students. This theory has shown that consciously designed visual applications help increase students' interaction to meet learning objectives and modify behaviors of children diagnosed with ASD. The aforementioned questions will address both theories by gauging the effectiveness interactive computing has, through IWBs, through the lens of the special education elementary teacher.

Individual Interview Data Analysis Plan

Each interview session was audio recorded, then transcribed by a transcription application service. Once the interview was transcribed, I emailed a copy of the interview transcript to the participant to check for accuracy. This was referred to as *member checking*. Data analysis did not begin until the participants had returned their checked transcript. All transcriptions were labeled and saved with the participant's pseudonym. I used Creswell's (2013) six-step approach to data analyses. The first step was to organize the data. I manually sorted the data. From here, I began the coding process. After organizing the interview data sets , I reviewed and memoed what I found in each participant's interview transcription . Memoing allowed me to capture my outflow of ideas, insights, and observations. As I did this, I identified repeated phrases using manual coding for the participants that were identified in each of the individual interviews. Next, I searched for repeated phrases that I identified in the individual interviews to identify those repeated phrases that are found across all interviews. Then, I set these up as categories and labeled them as initial codes for use when I began data synthesis.

Focus Group

There were two focus groups. Each participant was able to select which of the two focus group times best fit his/her schedule. During this process, the main objective of the focus group was to elucidate and expand on the information discussed at the interview stage (Gill et al., 2008). Each member of the focus group described their shared experiences as to how the IWB is an instructional tool for students with ASD.

I provided the participants with open-ended questions, including probing questions, that allowed them to describe their perspectives related to the implementation of the IWBs as an instructional tool for elementary students with ASD. The use of probing questions allowed me to gain more details and clarity as related to the participants' responses (Jacob & Furgerson, 2012; Qu & Dumay, 2011). Each focus group met one time via Zoom, which both lasted approximately one hour. The session was tailored at a time convenient to all participants, using Zoom.

Focus Group Questions (Appendix G)

1. During your one-on-one interview with me, which issue, when using Interactive Whiteboards (IWBs) to instruct autism spectrum disorder (ASD) elementary students, stood out to you the most? (CRQ)
2. What advice would you share with a special education teacher who is using IWBs for the first time to teach students with ASD? (SQ1)
3. What would you say to other special education teachers who would like to use IWBs to instruct their students with ASD, yet are met with resistance from their respective administrations? (SQ1)

4. How would you describe your time preparing lessons using IWBs as compared to the chalk-and-talk methods? (SQ2)
5. What are the greatest benefits of IWBs that you have experienced in instructing ASD elementary students? (SQ2)
6. What are the greatest barriers to IWBs that you have experienced in instructing ASD elementary students? (SQ2)
7. What resources did you used when you first started using IWB services for your ASD students? And what additional resources have you found helpful to improve your IWB services for your ASD students? (SQ1)
8. How would you describe your student's reactions to IWBs when introducing a concept, abstract concepts, or emotional and behavioral modeling when working with just one student at a time? (SQ4)
9. How would you describe your students' reactions to the video modeling features of IWBs when introducing a concept, abstract concepts, or emotional and behavioral modeling when working with the class as a whole? (SQ3)
10. What other experiences would you like to discuss that have not been brought up in this focus group?

Questions one and two allowed the group to discuss the most significant issues they experienced when using IWBs to instruct ASD children. As IWBs are still a relatively new technology in classroom education, the available academic literature is limited, particularly from the perspective of teaching and learning (Fekonja-Peklaj & Marjanovic-Umek, 2015). The results of such a study led to a greater understanding from a teacher's perspective when using IWBs to instruct ASD elementary students, added to the literature, and provided both teachers

and administrators valuable insight into the benefits IWBs have when instructing ASD elementary students.

Question three allowed the teachers to describe how they would advise special education teachers, who are not using IWBs to instruct their students, as to how they approach using IWBs for the first time and how to react to administrative pushback to utilizing such AT. Despite the legal requirement and peer-reviewed literature that quantifies how AT has a direct impact on student success, AT support is often not available to SWDs (Etscheitd, 2016). While the availability of AT for most SWDs is ubiquitous, inadequate teacher training (Kahn & Lewis, 2014) and the lack of funding and unqualified support staff, remains at the forefront of explanations as to why faculty and administrators are unable to comply with federal, state, and local rules and regulations (Munyi, 2012).

Question four allowed the group to comment on the time needed for preparing lessons using IWBs, as compared to chalk-and-talk methods. Ulzii (2019) revealed in his study that iPad-assisted instruction took a shorter time to implement, compared to traditional flashcard instruction. Given that iPads and IWBs are both assistive technologies, I wanted to determine if the same applies to IWBs. Doing so can shed light on the benefits of IWBs for ASD students.

Questions five to seven addressed the potential lack of resources and best practices support that school systems face, which, in turn, may create challenges for teachers, administrators, and policymakers. The aforementioned questions will directly speak to the benefits, frustrations, and access challenges to IWBs that special education teachers face when instructing elementary students with ASD. Using qualitative methods in studying special education teachers' attitudes and perceptions toward the use and integration of technology is the openness of inquiry that can provide unanticipated knowledge (Patton, 2002). Such insight is

valuable to the study, as it provided special education teachers a platform to address such challenges for future administrators and policymakers to consider.

Questions eight and nine allowed the group to discuss how they describe their students' reactions to IWBs when introducing a new concept, abstract concepts, or emotional and behavioral modeling when working with an individual or group setting. Laubscher et al. (2012) conducted a study that illustrated how AT can visually support language and group communication in individuals with ASD. This study seeks to discover how teachers perceive students' reactions to AT, specifically IWBs when they are introduced to new concepts.

Focus Group Data Analysis Plan

The focus groups were audio recorded. Before beginning data analysis on the focus groups, I asked a transcription service to transcribe the data from the focus groups. After the transcription was completed, each participant was asked to check his/her part of the focus group conversation for accuracy. Before saving this on my password-protected computer, I replaced the participants' names with their assigned pseudonyms to preserve their confidentiality. All transcriptions were manually uploaded, organized, and coded for comparative purposes. Using Creswell's (2014) six-step approach to data analyses, I reviewed all collected data. From here, I began the coding process, setting up categories, and labeling them. Next, I described my findings, then addressed the said findings from my analysis. Lastly, I described what I learned from my analysis. Each focus group data set was analyzed separately for over-arching codes, and then the results from both the focus groups were compared to identify codes

Participant Letter-Writing

Each participant was asked to write a letter to a special education teacher who is not currently using interactive whiteboards (IWBs) to instruct elementary students diagnosed with

autism spectrum disorder (ASD). In this letter, each participant described their experience using IWBs, how their students responded to this technology, and whether their teaching methods had benefited from or been hindered by the said technology. The participants were required to write between 300–600 words and email me the letter when finished.

Participant Letter-Writing Instructions (Appendix H)

Write a letter to a special education teacher who is not currently using IWBs to instruct elementary students with ASD. In this letter, describe your experience using IWBs, specifically:

- How your students respond to this technology
- Discuss if you feel that your students with ASD have benefited from this technology and if so, how your students benefited.
- As a teacher, how have you benefited from using IWBs while instructing your students with ASD?
- Finally, discuss if you have experienced barriers while using this technology, what those barriers are, and how you work around them.

Please keep the word count to 300–600 words. Once you have completed the participant letter, please email me a copy at jterrell5@liberty.edu

Letter-Writing Data Analysis Plan

Using the participants' pseudonyms, each letter was uploaded to Excel for organization, coding, and comparative purposes. Using Creswell's (2014) six-step approach to data analyses, I reviewed all the data from the letters and looked for emerging themes. From here, I began the coding process, setting up categories and labeling them. Next, I described my findings, then addressed the said findings from my analysis. Lastly, I described what I had learned from my

analysis. Each participant's letter was analyzed individually for over-arching codes, and then all the results were compared to identify recurring codes.

Data Synthesis

To analyze and synthesize the data gained in this study, I organized the over-arching codes from the individual data collection methods to further classify the data across all data sets into the final codes and themes, interpret the data, and represent the data (Creswell, 2013). The next process was to further organize the data across all data sets into more manageable categories. Once the coding process was complete, I continued my analysis that ultimately led to data saturation, generating themes from the codes were then classified. Once themes were generated, I analyzed the data to interpret data with a more significant meaning beyond the codes and themes.

Next, I linked my interpretations based on insight (Creswell, 2013) to articulate my findings. Afterward, I represented my data in a table format for the readers of this study to easily access the data findings. This table connected the codes and themes generated from the many items of data gathered. The final step was the validation of my findings and processes.

Trustworthiness

Trustworthiness was established in this study to increase credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). Researchers have sought means for preserving rigor while conducting "real-world" research (Lincoln & Guba, 1985, p. 15). Lincoln and Guba set out to establish benchmarks for deeming real-world or qualitative research as rigorous. The researchers referred to this set of criteria as trustworthiness that is equivalent to rigor in quantitative studies. To this end, Lincoln and Guba identified the four means of

establishing trustworthiness as credibility, dependability, confirmability, and transferability . These criteria ensure that the qualitative study is of good quality and significant for the reader.

Credibility

Credibility assured that the participant's remarks and views were represented in the conclusions. Lincoln and Guba (1985) suggested member checks, triangulation, and prolonged engagement as three possible means to establish credibility. Member checks refer to the frequent (re)checking of the responses from the participants to verify the accuracy of the reconstruction of the evidence (Lincoln & Guba, 1986). To verify the data, I provided each participant the opportunity to review their transcribed interview and focus group data. This method helped to ensure that the results were credible and were an accurate narrative of the data represented. The use of multiple methods to gather data about a phenomenon can enrich the validity of a case study's findings; this process is called *triangulation* (Gall et al., 2003). Triangulation involves using multiple sources of data to make the study "believable" (Lincoln & Guba, 1985, p. 306). This is designed to ensure that the data is valid in the study .

In this study, I included three data-collection sources, via individual interviews, focus groups, and participant letters. This allowed for multiple methods of collecting data, as well as multiple perspectives regarding the phenomena being studied. The final means to establish creditability was prolonged engagement, which implies that the investigator performs the study for a considerable period (Lincoln & Guba, 1986). According to Lincoln and Guba (1985), prolonged engagement is crucial in helping to support the concept of credibility in qualitative research because it assists the researcher in testing for misinformation and building trust.

Transferability

Transferability is the ability of this study to be applied to other areas or contexts. Lincoln and Guba (1985) stressed the importance of the researcher providing an audit trail (Appendix K) for transferability. The audit trail included a list of tasks completed so that another researcher could replicate this study. Data analysis proceeded through the process of categorization, as outlined in Lincoln and Guba. The rich, thick descriptions provided me operational details of the data collection and analysis, enabling readers of this study to make decisions regarding transferability (Creswell, 2013). The experiences of special education teachers using IWBs to instruct elementary students with ASD were analyzed and could transfer for use in other special education classroom settings.

Dependability

Dependability is designed to ensure the findings of this qualitative inquiry are repeatable if the inquiry occurred within the same cohort of participants, coders, and context (Lincoln & Guba, 1985). To this end, I provided a rich description of my collection methods, including a detailed track record of the data collection process. I also completed a peer review audit of all data collected, my findings, interpretations, and recommendations. The peer-review will involve two individuals who have doctoral degrees and have performed similar qualitative studies, reviewing my data and findings. Thus, "a single audit [or peer review], if properly managed, can be used to determine dependability" (Lincoln & Guba, 1985, p. 318).

Confirmability

The findings of the study need to be shaped by the participants' data and not by the researcher's interest, motivation, or personal bias (Lincoln & Guba, 1985). According to Guba and Lincoln (1989), my job is to ensure that the findings of the research are the result of the ideas and experiences of the participants, rather than my characteristics and preferences. Yin (2014)

stated that “case study researchers are especially prone to [bias] because they must understand the issues beforehand, and this understanding may sway them toward supportive evidence and away from contrary evidence” (p. 76). Furthermore, Merriam (2009) pointed out that the researcher must set aside his common beliefs and thoughts regarding the experience, thus I began bracketing them before starting the data collection process. As such, I implemented reflexive journaling before beginning and throughout this study. To do this, I kept a Researcher’s Reflexive Journal (Appendix J) that was used as one aspect of confirmability to bracket myself as the researcher. After each interview and focus group meeting, I wrote my thoughts about the interview in my journal.

As an experienced academic administrator, educator, and parent of an ASD child, I have seen first-hand the benefits the said technology has bestowed on both my son and his peers. This has motivated me to complete this study because in hopes that the results of this study will help future educators and administrators justify the cost and training associated with implementing IWBs in every classroom with ASD students.

Ethical Considerations

Ethical considerations in a study provide for the protection of the participants involved in the study, as well as ensure the trustworthiness of the study (Merriam, 2009). IRB approval was my first step in confirming the ethical treatment of the participants. Full disclosure of the purpose of this study and respecting the privacy of the participants was taken into serious consideration to avoid any discoveries of information that may harm participants (Rockinson-Szapkiw et al., 2014). Confidentiality is the most important ethical consideration in a study. To this end, I safeguard the identity of each participant, as well as the site, through the use of pseudonyms.

At the beginning of each interview and focus group meeting, I reminded the participants that the information discussed was confidential. All participants were informed that they have the right to withdraw from the study at any time. Interview notes, focus group notes, audio recordings, and transcriptions were stored in my safe. Finally, additional security measures relating to the data was provided with password-protected computers. All records (both hard copies and digital) were preserved on site for three years in my safe and destroyed thereafter by shredding and deletion.

Summary

This study, located in suburban north Georgia, sought to describe the experiences of elementary special education teachers who currently use IWBs to instruct ASD students in a self-contained classroom setting. This chapter provided a clear description of the descriptive qualitative case study method, research design, data collection methods, data analysis procedures, trustworthiness, and ethical considerations. All information included in this chapter will be aligned with the research questions that will guide this proposed study. This chapter began with a description of the setting at a Creekside School District and continued to describe the setting of the school district chosen for the study. The procedures for conducting this study began with receiving district approval, followed by Liberty University's IRB approval. Purposeful sampling was used to identify special education teachers, who currently use IWBs as an instructional tool, for participating in the three data collection methods: interviews, focus groups, and participant's letters. The three identified methods of data collection resulted in the triangulation of the data, including data analysis procedures and trustworthiness. This chapter concluded with a discussion of ethical considerations, to ensure the rights of each participant will be protected throughout this descriptive case.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this qualitative descriptive case study was to describe the experiences of special education teachers who use IWBs to instruct students diagnosed with ASD in elementary self-contained special education classrooms. Participants included 10 special education elementary teachers. Data was collected from the participants using individual interviews, focus groups, and participant letters. Chapter Four begins with a description of each participant, followed by the results of the data analysis. The chapter provides explanations of the emerging major themes and subthemes that were identified from the participants' experiences. Lastly, this chapter answers the central and sub-research questions answers (from the participants perspective) followed by a chapter summary.

Participants

This section provides a profile of the participants. The description of the teachers includes the number of years they taught special education, their highest degree obtained, degree type, and the grade level they were teaching at the time of this study. All participants met the study's criteria for selection. All participants were passionate about special education and were eager to share their experiences. Demographics for the teacher participants are presented in Table 1.

Table 1 Teacher Participants

Participant	Years Taught	Highest Degree Earned	Content Area	Grade Level
Jana Austin	22	Masters	Reading ED	3rd
Dina MsCavitt	23	Bachelors	Special ED	4th

Allyson Trembley	23	Masters	Social Work	3rd -5th
Leslie Hoenburger	5	Bachelors	Special ED	3rd
Tina Propes	22	EdD Candidate	Curricula / Instruction	3rd-5th
Amanda Pruitt	9	Masters	Early Childhood	3rd -4th
Brenna Baker	11	Bachelors	Special ED	3rd -5th
Alexis Phillips	2	Bachelors	Special ED	3rd – 5th
Murray Beth	19	Bachelors	Special ED	3rd
Judy Stewart	2	Bachelors	Special ED	3rd

Jana Austin

Jana has a Bachelor of Science in Special Education from University of Georgia, with an ESOL endorsement. She is currently finishing up a master's in reading education from the University of Georgia. She is happily married and has five daughters. She is also the proud owner of Freya, the elementary school's therapy dog!

Dina MsCavitt

Dina has been teaching a total of 23 years, 17 of those teaching special education. She loves working with the special needs community both in the classroom and in her community. She has three teenage boys and loves running. She will be retiring this year and will miss her students.

Allison Trembly

This is Allison's 23rd year teaching special education. She earned a Bachelor of Arts in special education from Brenau University, and her master's in social work from University of Georgia. She also earned a specialist degree in teacher leadership from Piedmont College. She

holds certifications in leadership, general education, middle grades, and various forms of special education. She has been married 19 years and has two teenage boys. In her free time, she loves reading, traveling, and spending time making memories with my friends and family.

Leslie Hoenburger

Leslie was named teacher of the year in 2022 at her elementary school. She has been teaching special education for five years. She loves working with the special needs community both in the classroom and in her community. She cannot see herself doing anything else. Leslie also enjoys cooking, reading, and playing the piano.

Tina Propes

Tina was named the November 2022 teacher of the month at her school. She is an outstanding educator and valued member of the community. This is her 6th year teaching special education. Before teaching in special education, she taught in a general education classroom in a neighboring county. She graduated from the University of West Alabama with an Education Specialist degree in special education. She earned a master's degree from the University of Georgia and a bachelor's degree from Georgia State University. She is also certified in ESL, gifted, special education general curriculum, and special education adapted curriculum. She loves paleontology, so in her spare time you might find her exploring the beach, digging in a pit, or excavating a riverbed searching for fossils. When at home she enjoys reading and quilting.

Amanda Pruitt

This is Mrs. Pruitt's 9th year teaching special education. This is her first year as one of our autism teachers. She graduated from North Georgia College and State University with a dual degree in Early Childhood and Special Education, in addition to her Reading endorsement. She later graduated from the University of North Georgia with a master in early childhood education,

with Gifted and ESOL endorsements. She has experience teaching 3rd and 4th grade, providing special education support and early intervention support to 1st through 5th grade, and pre-K. She adores her family and spending time with them at home. When she is not teaching, Amanda enjoys reading, cooking, and shopping. Her favorite restaurants are Olive Garden and Chick Fil A. She also loves chocolate, Starbucks, and Dr. Pepper!

Brianna Baker

When she was in high school, Brianna Baker volunteered at her local vacation Bible school and realized that she loved working with children. She decided she wanted to go to school to become a teacher, poured herself into pursuing that dream, and never looked back. When she was in college studying to be a teacher, she realized that she was called to teach some of the most special children who may need a little extra help in their studies.

Beth Murry

Beth was born in Atlanta, GA and grew up in Fayette County. She attended high school in Athens, Ga. She then moved to the small quaint town of Dahlonega to attend North Georgia College in the fall of 1995. At the end of 4 years, she was fortunate to student teach at Robinson Elementary where her teaching career began in the fall of 1999. She has taught now for 19 years in elementary education. She began her career as a third-grade teacher. In the fall of 2015, she transitioned from the general education setting to an exceptional children's teacher.

She teaches in a self- contained classroom setting and is able to help all students reach their potential. She stays busy in life outside of school as well. She also stays busy volunteering with a local non-profit organization called *Connectability*. She believes that every person has abilities, and they deserve to be celebrated and loved. She has been working with this group for several years.

Her family attends a local church, and they enjoy spending time with friends. As a teacher, she has loved every student that has passed through her classroom door throughout the years. She said,

> These students have made so many impacts in my life. Students change daily and it is such an amazing process to be a part of, especially at Riverview. This school has been such a blessing to me. I feel so blessed to work for an amazing group of admins who love us and support us in all we do. Everyone around me helps to strengthen me and helps me to strive to be the best in all I do as a teacher and as a mother.

Ms. Murray cannot wait to see what the next years bring.

Judy Stewart

Judy went to Valdosta State University for her undergraduate degree in special education in general curriculum. She is currently working on her master's degree through Georgia Southern for Special Education. Fun fact, she attended the school where she now teaches. The same school had an amazing teacher, who later inspired her to become a special education teacher. She hopes to inspire her students in the same way in which she was inspired to enter this field.

Results

The results of the data analysis process are presented in this section. The data was collected using Teams for individual interviews, followed by Teams focus group meetings and participant letters collected by email. All of the participants' quotes given in this manuscript, including dialect and grammatical errors in speech and/or writing, are presented verbatim to accurately depict their voices. The central research question explored "how would you describe your experiences in using Interactive Whiteboards (IWBs) to teach your students with autism spectrum disorder?" I analyzed the collected data using codes that developed into themes.

Theme Development

The most prevalent theme that appeared from all the participants' responses to the central question: How would you describe your experiences in using Interactive Whiteboards (IWBs) to teach your students with autism spectrum disorder (ASD), was the many advantages IWB have for elementary age students diagnosed with ASD. This major theme was derived from the responses of all 10 of the participants. Alexis stated, "Extremely helpful. I think it's nice you can use visuals and manipulative and videos and things to help reinforce what you're trying to teach." The following section presents the theme development and research questions responses. The theme development is organized in Table 2.

Table 2 Theme Development Table

Key Words/Phrases	Subthemes
Major Theme 1: Initial Training and Support	
Tablets, IWBs, desktops	Introduction to AT
Self-taught, no IWB specific training for children with ASD, access to videos on how to use the IWB generically, basic features taught by vendor or county employee, no continuing education, mainly learned from other teachers	Initial Instruction and Continuing Education
Major Theme 2: IWB Advantages	
Attention grabber/engaging, keep students motivated	Engaging
Internet access, YouTube, google	Online Resources
The IWB uses video, audio, and kinesthetic exercise, reinforces key learning points, visual and audio to show that they're retaining the information, phonics through video, Increased our ability to do instruction meaningfully, more exciting	Behavior Modeling
Interactive graphs and charts, manipulative, touch screen, draw on top of images and text. Prefer technology over paper and pencil	Adaptive Learning
Calendar, visual timer, Disney picks	Popular IWB features
Major Theme 3: IWB Disadvantages	
System lag when mirroring IWB to student laptops, reliance	Technical issues

on internet connection, students smash the screen too hard, the screen needs a more protective layer, low functioning students have trouble using the IWB (i.e., using two hands to grab an object instead of a single finger; will not register with the IWB	
Difficult to work one-on-one, other students want to get Involved	Distracting
Most applications were not appropriate for my low functioning students, I had to create my own applications	Applications not Applicable
Major Theme 4: Community Learning	
Increase group collaboration, group gets to take turns where all students get to observe how the other student did with a particular problem or task, social stories increase group	Group engagement
collaboration, play the read aloud books for the group, background music and visuals are calming for the class	Collaboration
Linked directly to Chromebooks, working together in real time, builds team collaboration and communication skills, share student success to classmates	

Initial Training and Support

Special education teachers enter the classroom with various levels of experience using AT to instruct their students. After teachers are introduced to AT, it is important to share what training and support has been provided from my participants perspective. This section discusses how my participants were introduced to AT, followed by the introduction to IWBs, and what continuing education/support has been provided.

Initial Training. All participants reported having very little initial training in how to utilize the IWB. Dana said during her interview:

> I was given a very basic overview, you know, here's how you turn it on, here's your stylus, anything you want to do on it is sort of left to you to figure out, or else we have like little videos you can watch on YouTube to learn more.

Lessie said, during the focus group meeting, that:

> I think we're kind of kind of expected to know how to use it, without any training. I never received any training on how to use it. Sometimes I discover months later there's something, there's some really cute program or there's some little trick to the board that I didn't know till still learning process even. But that when you learn, that by you kind of fumbling into it or talking to another teacher or an administrator.

Support. As noted by the participants, the initial training and support received by teachers can significantly impact their confidence, competence, and overall success in incorporating IWBs into their teaching practices. All participants reported that they did not have any specific training on how to utilize the IWB or IWB applications for children with ASD. All participants described access via YouTube to training materials; the remaining resources came from other special education teachers within their school. Tina said during the focus group that:

> I did feel like we personally did not get a lot of training on those IWBs, and so I had to rely alone. Nothing was specific to our special needs students. I really think it would have been helpful had we had some sort of groups to rely on, or some other names or some sort of community. You know that that really focused on things, ways that we could use the IWB effectively.

The overall theme is that if special education teachers wanted material or resources for their students, they needed to ask other special education teachers or create it themselves.

IWB Advantages.

There were several advantages to utilizing an IWB to instruct children with ASD that emerged in the findings from my participants during the individual interviews, the focus group interviews, and the participant letters. These findings point to specific advantages of IWBs by

providing opportunities for enhanced engagement, online resources, adaptive learning, valuable applications, and behavior modification tools.

Engaging. The IWB is engaging. This was the first subtheme to emerge and was reported by all 10 of the participants how the IWB engages students. The visual nature of the IWB, combined with interactive elements and multimedia resources, helps to capture their attention, and support their understanding of concepts. The integration of videos, images, and interactive activities can facilitate engagement and reinforce learning outcomes. Interactive whiteboards allow children to interact directly with the learning material. The students become a part of the lesson and can even teach each other.

Tina mentioned during her interview that: "The engaging nature of IWBs can help maintain students' attention and motivation, which is particularly important for those with special needs who may struggle with focus and attention." The IWB reinforces a student's understanding of the subject, and is seen through the visual, audio, and kinesthetic exercises. Students engage with the IWB by touching, drawing, singing along, reading alone, or writing on the board. Educational games can be played by entire classrooms. They also provide immediate feedback, so students and teachers can easily assess student progress.

Alexis said, during the focus group interview, that: "The IWB uses our core curriculum and makes it more interactive and more engaging by adding videos and songs or teaching the kids how to draw off." The IWB can be used outside classroom experiences to share with the entire class. Dina described one such example during her interview:

> If I know that you went to Disney and your favorite thing was the rollercoaster, but you can't tell me that well, I'm going to pull it up on IWB. We're all going to ride it together. We're all going to do a point-of-view video and we're all going to hang out and we're

> going to ride, and so things like that engage the whole class and create the experience we can all share and learn from.

Online Resources. The second subtheme to emerge was online resources. Having online resources that can convey alternative explanations, visuals, or additional curricula gives teachers the ability to help a student(s) who are struggling to have an immediate alternative resource. Tina said in her interview that:

> I can stop if, if a student is not getting or if the class is really not picking up on the lesson that I'm teaching them, they're not getting the point that I can immediately really kind of adjust and find something. I can look up something on the internet, like if we're talking about. Like a specific science topic and they're not understanding exactly what I'm talking about, that we can pull that up picture or video. I can get to visuals very easily, I can supplement things really fast if you know if something goes really quickly or it's really over their head, and I need to start from the beginning. We can stop and we can try something different right on-the-fly right there.

Beth said, during the focus group, that: “Throughout the day, I can easily access games, videos, songs, stories, pictures, etc. that interest my students, support current topics we are focusing on, and add an extra engagement and participation component to lessons.” All participants found that having access to sites like YouTube and Google save students and teachers time from having to go to the library to check out books. Amanda stated in her participation letter that:

> Throughout the day, I can easily access games, videos, songs, stories, pictures, etc. that interest my students, support current topics we are focusing on, and add an extra engagement and participation component to lessons. While all of this could be

> accomplished without the interactive white board, the white board allows me to easily plan more engaging lessons in much less time. As I am teaching, I can easily make changes and add accommodations to lessons that would normally take additional planning and time. I also don't have to worry about materials being misplaced or damaged.

Using the IWB to access such sites allows teachers to instantly pull from a world of information right there at their fingertips. Having readily available online resources through the IWB is a must in this information age.

Behavior Modeling. IWBs have emerged as a valuable instructional tool for educators seeking to model behaviors and desired outcomes, particularly for students diagnosed with ASD. The video modeling strategy initiates the learning process by capturing students' attention and engaging them in a compelling visual narrative. Through the integration of IWBs, educators have harnessed the capacity of videos to vividly illustrate abstract concepts. Brianna wrote in her participant's letter:

> I can use IWBs to show videos or images depicting various facial expressions and emotions. My children can watch and identify different emotions, such as happiness, sadness, or frustration. Afterward, they can practice recognizing emotions by selecting corresponding facial expressions displayed on the IWB.

The implementation of Video Modeling within special education classrooms has yielded significant benefits, notably enhancing the comprehension of abstract concepts among students. Video Modeling, a technique that leverages IWBs to present visual narratives, has emerged as a powerful tool in bridging the gap between theoretical and practical understanding. The subsequent translation of the modeled behavior to the IWB platform provides a bridge between

the virtual and physical realms, enabling students to interact with visual and auditory cues. Dina said during her interview:

> Well, I would start with watching a video on how to play baseball, and then I would figure out a way to do a slide to where we can make that ball move or that bad move and then have that as reinforcement step one step, two steps, three, as we practice it physically in the room. So, you start with the teaching them about it through something more fun than just a book, then have them somehow play a baseball thing, even if it's just online somewhere, and then have the steps written with visuals as we physically practice how to do it, and then their visuals are right there.

The overall censuses were that the IWB offers dynamic visual support that can aid in comprehension and reduce frustration for students who may have difficulty expressing themselves verbally.

Adaptive Learning. The nature of special education requires teachers to employ a variety of teaching methods and adapt to each student's unique learning style. An interactive whiteboard offers the versatility and adaptability needed for a diverse classroom setting. The IWB uses video, audio, and kinesthetic exercises, which reinforces key learning points. Allison said, during her interview: “interactive whiteboards enable multisensory learning experiences by combining visual, auditory, and tactile elements. This not only caters to a range of learning preferences but also fosters better engagement and information retention for students with special needs.” Leslie said in her participation letter that:

> The IWB provides immediate feedback to students, enabling them to learn from their mistakes and develop a deeper understanding of the material. interactive whiteboards provide immediate feedback to students, enabling them to learn from their mistakes and

> develop a deeper understanding of the material. This is especially beneficial for special needs students, who may require additional reinforcement and support. The IWB allows teachers to easily make changes and add accommodations to lessons that would normally take additional planning and time.

Popular IWB Applications. The most popular IWB applications were virtual adapted books, calendar, and Disney picks. Adapted books provide repetition to maximize learning while also working on fine motor skills, matching, and building social skills. These beautifully crafted, high-quality books are perfect for those with tactile sensitivity or who might need a little guidance finding the matching illustrations. Amanda said, during the focus group, that: "Virtual adapted books allow all students to view the book as individual students manipulate and match vocabulary throughout the book, sequence events, and learn text directionality."

Calendar Application. This popular application allows teachers to display upcoming activities to the entire class. Unlike a standard calendar, the IWB calendar allows teachers and students to manipulate the schedule, add videos, songs, graphs, shapes, and pictures. Having this feature allows students to see what the day may hold for them. This is very important for children with ASD, as most children on the spectrum have difficulty transitioning from one activity to another. Tina said during her interview that:

> During my daily calendar segment, the white board allows my students to select songs and videos to learn more about the months of the year, days of the week, and seasons, check the weather forecast, and manipulate graphs, shapes, and sentence stims.

Disney Picks. Disney Picks is an application which can be launched through the IWB. This streaming service allows teachers to search short stories or movie scenes by topic. Leslie said, during the focus group interview, that:

> We use Disney Picks to address an issue that a student(s) may be struggling with. If we've got a kid that is getting a little bit physical with another kid, I can quickly find a Disney Picks topic using the IWB which may show something like, I don't like when you do that. That gets interactive and then we tie it in with talking about emotions and talking about things like that and then how we can sort of role play that with the rest of the group.

Alexis said, during the focus group, that: "Given that most children with ASD are more likely to engage with animations as compared with *chalk and talk*, having visuals lessons cataloged by topic is a valuable resource for our special education teachers." By utilizing the Disney Picks application on IWBs, teachers can provide children with ASD access to engaging and relevant content that aligns with their learning needs and preferences. The application's visual appeal, emotional connection, and interactive features create an effective tool for enhancing engagement, communication, and learning outcomes for children with ASD.

IWB Disadvantages.

While the IWB offers many wonderful features and resources for special education teachers, IWBs have technical issues. Participants point to technical issues, a lack of appropriate applications for children with ASD, and how IWBs can be distracting for the classroom when an individual student is using the board. This section will look at some of the challenges special education teachers have when using IWBs to instruct elementary students diagnosed with ASD.

Technical Issues. The main technical issue is related to lag times, when mirroring the IWB to student laptops. Teachers will mirror the IWB onto the classroom laptops. For example, a teacher might be giving a quiz, each student would be able to vote or give an answer that would be tabulated on the IWB for the classroom to see. Tina said during her interview that:

> I've found that it either lags really bad or the sound doesn't match the video or it's very grainy and my particular group of students, if it doesn't match-up very well or its grainy, it just it's not going to work for other lesson what we're trying to teach because that's all they'd pay attention to. The second most common technical issue is reliance on the internet. Often the internet is slow, down for maintenance or blocking websites not approved by the county. If you have lesson plans online, video presentations or research as a part of your daily activities, having access to the internet is crucial. Many participants create their lesson plans off their home computer and store them in the cloud. Then once in the classroom, teachers will access said lesson plans using the IWB internet access. If the internet is not working properly, teachers are forced to scramble, often teaching a lesson from their laptop until the internet is restored.

Beth said, during the interview, that:

> For children with ASD who rely on real-time interactions and visual cues, delays in response can disrupt their engagement and comprehension. Lag times may hinder their ability to follow instructions, respond to activities, or participate in interactive discussions effectively.

Inappropriate Applications. Most IWB applications are developed with a broader audience in mind, focusing on mainstream educational objectives. These applications might not provide the level of individualization, visual support, or engagement required for children with ASD. Most manufactures of IWBs and application developers focus on the general student populations, often leaving special education teachers to create custom material for their students. Allison said during her interview: "not only did we have to figure out how to use the IWB on our

own, but the materials also that were provided, are not geared towards our population, so we had to create that."

Distracting. The presence of an IWB, with its vibrant visuals and interactive features, can divert the attention of students from their primary tasks, leading to potential challenges. The participants described how the IWB can be distracting for students who are working on other projects in the same classroom. Tina said during her interview that: "They look up from their work and see a big, bright, and colorful screen with animation and immediately lose focus of what they are doing." The combination of visual, auditory, and interactive elements on IWBs can be overwhelming for some students, leading them to shift their attention to the board rather than their assigned work.

Community Learning.

The IWB adds value to community learning through accommodating different styles of learning, adding visuals, animation, and audio examples to reinforce lesson objectives. During this study, participants identified how IWBs are used to engage the group and how this ultimately increases collaboration. This section will discuss how the IWB is used to improve community learning though group engagement and collaboration.

Group Engagement. The shared screen becomes a focal point that encourages students to collaborate, discuss ideas, and contribute to a collective understanding of the subject matter. Allison, during the focus group interview, siad that:

> The IWBs promotes a collaborative learning environment where students can work together on projects and problem-solving tasks. This sense of inclusion is crucial for students with special needs, as it helps them build social skills and fosters a sense of belonging. IRBs Increase group collaboration, whereas the group gets to take turns going

up to the IWB, this allows all students to observe how the other students did with a particular problem or task.

Collaboration. IWBs facilitate collaborative learning by enabling students to work together on group activities, problem-solving tasks, and interactive exercises. Students take turns writing and sharing ideas on the IWB, thus engaging the entire class, which, in turn, increases collaboration. Dina said, in her participants letter, that:

> The IWBs promote a collaborative learning environment where students can work together on projects and problem-solving tasks. This sense of inclusion is crucial for students with special needs, as it helps them build social skills and fosters a sense of belonging.

Amanda said, during her interview:

> I feel that the IWB does increase collaboration, for example: We have story called Turkey Disguised. So, I used to have a student that really loves to flip through the pages of a book. You think like old school, flip as they read. Today if I'm reading the actual book to my students, he can't do that. So, I'm able to play (using the IWB) the read aloud feature, as it does that. Then I'm able to take the pictures of the book on there and have created 15 different ways my students can disguise him. So, my kids are still able to pick and disguise this turkey as a clown or as Santa Claus or whatever.

Every participant mentioned that playing the read aloud books (within the IWB) greatly increased group focus and collaboration.

Research Question Responses

This study was guided by a central research question and three sub-questions. The data collected provided answers to these questions through individual interviews, document analysis

(participants letters), and focus groups. The explanations reflect the major themes and subthemes that emerged from the data collected from all teacher participants.

Central Research Question

The central research question asked, "How do elementary special education teachers describe their experiences using IWBs to teach students with ASD in a self-contained classroom setting?" This central research question focuses on gaining insights from elementary special education teachers regarding their experiences and perspectives on using IWBs as instructional tools for teaching students with ASD in a self-contained classroom environment. By exploring their experiences, challenges, training, and the impact of IWBs on student learning and collaboration, the research aims to provide a comprehensive understanding of the use of IWBs in special education settings for students with ASD. The experiences of elementary special education teachers using IWBs to teach students with diagnosed ASD in a self-contained classroom setting can vary.

Teachers generally described IWBs as a helpful and valuable instructional tool. They highlighted the ability to engage students through interactive lessons, access a wide range of educational resources, and provide visual and auditory stimuli to enhance learning experiences. Teachers expressed that IWBs improved their instructional practices by allowing them to demonstrate concepts, model behavior, and provide real-time feedback. They noted that the interactive nature of the boards facilitated group collaboration, increased student participation, and supported differentiated instruction for students with diverse learning needs.

The flexibility of IWBs was appreciated by teachers, as it allowed them to adjust lessons on-the-fly and tailor instruction to individual student needs. Teachers could quickly supplement lessons with additional resources, such as videos or online materials, to address specific learning

goals. Having the ability to modify lesson plans in real-time allows special education teachers to adapt to IEPs more effectively.

Teachers described how IWBs fostered a positive and inclusive classroom environment. The interactive features of the boards helped promote social-emotional learning, encourage collaboration, and provide visual support for students with communication difficulties. They emphasized the ability to model behavior, reinforce routines, and provide immediate visual feedback, which aided in creating a structured and supportive learning environment.

Some teachers, who were interviewed, mentioned challenges they encountered while using IWBs in their classrooms. These challenges included a lack of initial training or continuing education on the specific use of IWBs for students diagnosed with ASD. Teachers described the occasional technical difficulties and difficulties in finding appropriate software or programs that are designed for the unique needs of their students.

Overall, elementary special education teachers viewed IWBs as a valuable tool in their self-contained classrooms for teaching students with ASD. The boards were seen as enhancing instruction, engaging students, supporting social-emotional development, and providing a platform for collaborative learning. While some challenges were identified, the benefits of using IWBs outweighed the difficulties, and teachers expressed a willingness to explore and adapt to new technologies to further support their students' learning.

Sub Question One

The first sub-question asked, “How do special education teachers describe the integration process and continued support when IWBs are used as an instructional tool with students who are diagnosed with ASD in their self-contained classroom setting?” Based on the information provided by the special education teachers interviewed, the integration process and continued

support when using IWBs as an instructional tool with students diagnosed with ASD in self-contained classroom settings can vary. Many teachers expressed that they received limited or minimal initial training on how to effectively integrate IWBs into their teaching practices, specifically for students with ASD. They often had to figure out how to use the technology on their own or through informal conversations with colleagues.

Teachers described a process of self-exploration and informal learning, where they had to experiment with the IWBs, explore available features and applications, and discover ways to adapt them to meet the needs of their students with ASD. Teachers relied on sharing tips and strategies with fellow educators who were also using IWBs in their classrooms. This informal exchange of knowledge and experiences among colleagues served as a valuable source of support and professional development.

Ongoing training and professional development specific to using IWBs with students with ASD in self-contained classrooms were generally limited. Teachers mentioned that the provided training often focused on basic functions and features of the IWBs, rather than addressing the specific needs of students with ASD. Teachers reported that they engaged in self-guided learning to further enhance their use of IWBs. They actively sought out resources, tutorials, and online communities to expand their knowledge and discover new ways to utilize the technology effectively in their classrooms. Collaborating with colleagues and participating in professional learning communities allowed teachers to share best practices, exchange ideas, and troubleshoot challenges related to integrating IWBs for students with ASD. Peer support played a crucial role in their continued growth and development as users of the technology.

In summary, the integration of IWBs for students diagnosed with ASD in self-contained classrooms involved navigating limited initial training through self-exploration, informal

learning, and the shared expertise of colleagues. The participants reported taking charge of their professional development by seeking tailored resources and collaborating within a community of peers. Participants stressed the importance of adapting instructional methods to cater to the distinct needs of students diagnosed with ASD.

Sub Question Two

The second sub-question asked, "What are the primary advantages and disadvantages IWBs offer special education teachers in instructing elementary students diagnosed with ASD in a self-contained classroom setting?" The use of Interactive Whiteboards (IWBs) in instructing elementary students diagnosed with ASD in a self-contained classroom setting can provide several advantages and disadvantages for special education teachers. The main advantage conveyed by the participants was that the IWB offers multi-sensory engagement through visual, auditory, and kinesthetic components. This can be beneficial for students diagnosed with ASD, as it allows for varied modes of learning and can help increase their attention and participation in lessons. Using a variety of visual supports, the IWBs allows special education teachers to incorporate images, videos, and interactive activities, which can enhance understanding and comprehension for students with ASD who often benefit from visual learning strategies.

The second most common advantage when using IWBs to instruct students diagnosed with ASD is that the IWB provides flexibility in lesson delivery, allowing teachers to adapt and modify content in real-time based on students' individual needs and preferences. Special education teachers can customize materials, adjust pacing, and incorporate interactive lessons to meet the diverse learning styles and abilities of students diagnosed with ASD. The third most common advantage reported was that the IWB increases collaboration and student interaction. IWBs facilitate collaborative learning experiences, allowing students to actively participate,

interact with content, and engage in group activities. This collaborative aspect can foster social skills development, peer interaction, and cooperation among students with ASD.

The disadvantages when using IWBs reported by the participants included technical challenges, lack of initial training and continuing education, and access to content specific to special education teachers who use IWBs to instruct students diagnosed with ASD. The main disadvantage reported with the technical issues included internet glitches, which disrupted lessons and created frustrations for both teachers and students. These challenges included connectivity issues, software glitches, or difficulties with calibration.

The second most common disadvantage reported was that the IWB can be distracting for students working on other projects not using the IWB. Allison said, during the focus group, that:

> I think that one of the hardest things is that the size of it and the fact that you can't move it. It is stationed there because it would be great if I could use it in small groups. But it is such a big thing that the kid's attention is there. So, if I have three groups going on they all end up engaging in it, it is very difficult to have the class not working on the IWB focus on their project.

It is important for special education teachers to consider these advantages and disadvantages when integrating IWBs into their instruction. By leveraging the strengths of IWBs while addressing potential challenges, teachers can create meaningful and engaging learning experiences for students diagnosed with ASD in self-contained classroom setting.

Sub Question Three

The third sub-question asked, "How do special education teachers describe their experiences using IWBs for video modeling to demonstrate a new behavior or concept to students who are diagnosed with ASD?" Special education teachers have generally described

positive experiences when using IWBs for video modeling to demonstrate new behaviors or concepts to students diagnosed with ASD. Video modeling on IWBs tends to captivate the attention of students with ASD, as it combines visual and auditory elements. The interactive nature of IWBs allows teachers to present videos that effectively demonstrate desired behaviors or concepts, making it more engaging and relatable for students. Like most participants interviewed, Tina said, during the focus group interview, that:

> You can do a lot of video modeling that way. Sometimes there are some really good books that have kids who are not making good choices with. That said, I have a graphic that I use all the time, that's green choices and red choice, and so it's an interactive. You know we give a behavior, and we slide it on the green or the red. So, it's not necessarily modelling behavior, but it is like showing, making a choice, and understanding what a good behavior is and what is not good behavior, but the biggest thing for them to see: videos and themselves sometimes making other students making good choices. I don't ever put them making wrong choices up there, but I'd like to like the good behavior up there of other students.

In summary, the integration of video modeling through IWBs for students diagnosed with ASD is met with positive responses from all participants. The combination of visual and auditory elements, interactive capabilities, and the opportunity for controlled learning pace contributes to an effective and engaging method for introducing new behaviors and concepts. The resulting skill generalization and improved contextual understanding enhance the overall learning experience for students diagnosed with ASD.

Summary

This chapter provided individual descriptions of the teacher participants involved in this study and a description of the results of the data analysis. Data were collected from the participants using individual interviews, focus groups, and participant letters. The major theme was derived from the responses of all 10 of the participants. These major themes were explained further through the following 12 subthemes: Initial Instruction and Support, (a) Engaging, (b) Online Resources, (c) Behavior Modeling, (d) Adaptive Learning, (e) Calendar Applications, (f) Disney Picks, (g) Technical Issues, (h) Inappropriate Applications, (i) Distracting, (j) Group Engagement, (k) Collaboration.

During this study, special education teachers described the IWB integration process as a learning curve. Some teachers reported receiving limited training, where most described having to learn through trial and error, or through informal discussions with colleagues. Special education teachers often rely on their own research or advice from other special education teachers to maximize the use of IWBs in the classroom. Continued support for IWB usage is generally lacking, and teachers found themselves seeking information and updates on their own.

The primary advantages of using IWBs for ASD instruction included enhanced engagement, clear visual presentation, repeated viewing, individualized and differentiated instruction, generalization of skills, self-paced learning, reinforcement of positive examples, and increased independence. Teachers found that video modeling on IWBs captures students' attention, allows for closer observation of behaviors or concepts, and enables repetition.

When using IWBs for video modeling, teachers described positive experiences. They found that video modeling on IWBs enhanced engagement, provided clear visual presentations, allowed for repeated viewing, supported individualized instruction, promoted skill

generalization, enabled self-paced learning, reinforced positive examples, and fostered independence. Teachers emphasized the benefits of video modeling in capturing students' attention, facilitating comprehension, and promoting the imitation and practice of desired behaviors or concepts.

However, there are also disadvantages to using IWBs. Teachers mentioned challenges, such as technical issues, limited training and support, complicated software or programs, and the potential for overstimulation in some students. Teachers highlighted the need for ongoing professional development and more user-friendly software to overcome these challenges effectively. In summary, special education teachers generally appreciate the benefits of using IWBs for ASD instruction, particularly in the context of video modeling. However, they also acknowledged the need for additional training, ongoing support, and user-friendly software to fully harness the potential of IWBs in self-contained classrooms.

CHAPTER FIVE: CONCLUSION

Overview

In this concluding chapter, this qualitative descriptive case study's findings and insights are brought together to offer a comprehensive understanding of the experiences of special education teachers utilizing IWBs to educate elementary students diagnosed with ASD in a self-contained classroom setting. This concluding chapter synthesizes the key findings, implications, and limitations of the study, offering a comprehensive overview of the research journey and its contributions to the field of special education and instructional technology. The chapter culminates in a reflection on the significance of the study's insights and their potential to shape the education of students diagnosed with ASD.

Discussion

This qualitative case study examined the experiences of ten elementary special education teachers who used IWBs to instruct students diagnosed with ASD. Major themes and subthemes evolved from the data gathered through individual interviews, focus groups, and participants letters. The theoretical framework for this study includes the persuasive technology theory (Fogg, 2003) and the social learning theory. The following sections include a (a) Summary of Findings, (b) Interpretation of Findings, (c) Theoretical and Empirical Implications, (d) Implications for Policy and Practice, (e) Limitations and Delimitations, and (f) Recommendations for Future Research.

Summary of Findings

The findings revealed several themes that shed light on the advantages, disadvantages, and specific applications of IWBs, as well as their implications for teaching and learning in special education. The engaging nature of IWBs, as reported by participants, supports the idea

that interactive technologies can enhance student motivation and attention in the classroom. The ability to access online resources through IWBs provides teachers with a wealth of materials and instructional tools to cater to diverse learning needs. The adaptability of IWBs, incorporating visual, auditory, and kinesthetic exercises, aligns with research on multisensory learning and its benefits for students with ASD. The use of popular IWB features, such as virtual adapted books and calendar applications, aligns with research on the effectiveness of visual supports and structured routines for students with ASD.

However, the findings also shed light on challenges and limitations in the use of IWBs in special education. Technical issues, such as system lag and reliance on internet connectivity, can hinder the seamless integration of IWBs into instruction. The lack of appropriate applications for low-functioning students with ASD highlights the need for further development and customization of resources to meet their specific needs.

Interpretation of Findings

In interpreting the findings of this study, I want to highlight several key takeaways that shed light on the utilization of IWBs in a self-contained special education classroom for students diagnosed with ASD. The insights I gathered from the participants' perspectives and experiences provide valuable insights into the benefits, challenges, and potential implications of integrating IWBs into the learning environment for these students. This study’s findings were interpreted based on the results from 10 teachers who participated in individual interviews, focus group sessions, and participants letters.

Engaging

The most notable finding expressed to me during this study was that the IWB enhances engagement and active participation among students diagnosed with ASD. Active participation is

often associated with improved learning outcomes. The fact that students with ASD are more willing to actively engage with IWBs implies that this technology can promote active learning, allowing students to explore and interact with educational content actively. The dynamic and interactive nature of IWBs seems to captivate the students' attention, motivating them to actively engage in lessons. IWBs allow for the customization of content and instructional materials. This flexibility enables teachers to tailor lessons to the specific interests and learning styles of students with ASD, which can further boost engagement. The participants' accounts of increased student interaction, enthusiasm, and willingness to participate reflect the promising impact of IWBs have on students diagnosed with ASD.

Dynamic Learning

This study also highlights the role of IWBs in addressing individualized learning needs. The participants in this study emphasized the flexibility of IWBs in accommodating various learning styles and preferences, allowing teachers to tailor instruction to meet the diverse needs of students diagnosed with ASD. It was apparent that the visual and multisensory features of the IWB seem particularly beneficial in supporting students who thrive in a more visual and interactive learning environment.

Professional Development

While the IWB offers many advantages, this study revealed that utilizing the IWB in a classroom for special need students is not without its challenges and limitations. The most prominent challenge observed was the need for comprehensive teacher training and technical support. All 10 participants emphasized that while IWBs offer immense potential, teachers need adequate training to effectively integrate these tools into their desired learning objectives. This study revealed that teachers would like to see their schools provide ongoing professional

development to ensure they are equipped with the skills to optimize IWB usage for students diagnosed with ASD.

Conclusions

As I consider the implications of the findings of this study, it is evident to me that the integration of IWBs into special education classrooms holds promise for enhancing the learning experiences of students diagnosed with ASD. However, this should be approached with careful consideration of the unique needs of these students and the context in which they are taught. I believe to fully capitalize on the benefits of IWBs, educators, administrators, and policymakers should prioritize providing comprehensive training, fostering a supportive environment, and continually adapting teaching strategies to effectively harness the potential of these interactive tools. Overall, this study contributes valuable insights into the practical realities of using IWBs to instruct students diagnosed with ASD in special education settings. This study underscores the need for a holistic approach that combines technology with effective teaching practices to create a learning environment that caters to the individual needs of students diagnosed with ASD.

Theoretical and Empirical Implications

The integration of IWBs into special education settings, particularly for students diagnosed with ASD, holds significant theoretical and empirical implications that resonate within the realms of special education practice, instructional theories, and technological advancements. This section elucidates the multifaceted implications derived from this study's findings, shedding light on the theoretical underpinnings and practical applications that can shape the future of inclusive education.

Theoretical Implications

This study's findings have theoretical implications for the field of special education and the integration of assistive technologies (particularly IWBs) into instructional practices. This study contributes to the existing literature by highlighting the advantages and challenges associated with using IWBs in special education classrooms, specifically for students diagnosed with ASD. The theoretical framework for this study reveals how persuasive technology theory (Fogg, 2003) and the social learning theory (Bandura, 1977) were applied using IWBs to instruct elementary students diagnosed with ASD.

Persuasive technology theory (Fogg, 2003) emphasized the importance of adapting technology to meet the needs and preferences for an individual or group setting. Special education teachers can adapt content, integrate visual aids, and present custom material in ways that resonate with each student, aligning with the persuasive technology theory principles of providing relevant and meaningful experiences. As assistive technologies evolve, IWBs stand as a testament to how persuasive technology can be utilized to motivate and encourage active participation.

Developed by Albert Bandura (1977), the social learning theory emphasized how social interactions, observations, and modeling contribute to influencing human behavior and knowledge. Teachers can use video modeling to demonstrate real-life scenarios that they can observe and imitate, aligning with social learning theory principles of observational learning. The IWB allows students to experiment with different approaches, provides immediate feedback, and refines their understanding through active participation, which directly applies to the social learning theory. Bandura's social learning theory aligns with IWBs offering vicarious learning. Vicarious learning that can occur as students are watching a video on a screen. This theoretical

framework can provide a solid foundation for understanding and interpreting the positive impact of IWBs on the learning experiences of students diagnosed with ASD.

Empirical Implications

This study aligns with previous research that highlights the benefits of assistive technology (specifically IWBs) integration in the classroom, especially for students diagnosed with ASD. Furthermore, this study corroborates previous studies by Anderson & Sorenson (2017) by confirming that IWBs have the potential to enhance learning outcomes, increase engagement, motivation, and participation for students. Additionally, the research conducted by Anderson et al. (2016) on video modeling supports the findings of this current research study that video-based instruction (facilitated through IWBs) can be effective for groups and individuals in learning and generalizing socially acceptable behaviors. This study's findings also emphasized the empirical validity of utilizing IWBs for behavior modeling for students diagnosed with ASD.

This study is unique from previous research as it focused specifically on the perspectives of special education elementary teachers and their experiences using IWBs to instruct students with ASD in a self-contained setting. To date, no research has combined the perspectives of special education elementary teachers and their experiences using IWBs to instruct students with ASD in a self-contained setting. Lastly, as indicated by Hsu (2016), specialized training and technical assistance for special education teachers are crucial for the successful implementation of Assistive Technology (AT), including IWBs. This study underscores the importance of initial and continuing education training programs tailored to the unique needs of special education teachers to effectively use IWBs for students diagnosed with ASD.

Implications for Policy and Practice

By addressing these implications in both policy and practice, policymakers and educators can maximize the potential of IWBs in special education, ensuring that students with disabilities have access to inclusive, engaging, and effective learning experiences. These efforts can contribute to improved student outcomes, increased accessibility, and enhanced educational opportunities for students with diverse learning needs. The recommendations for policy are as follows:

Implications for Policy

The integration of IWBs in special education classrooms, particularly for students diagnosed with ASD, requires strategic policy considerations to ensure effective implementation, professional development, and positive learning outcomes. Policymakers play a crucial role in shaping the educational landscape for students diagnosed with disabilities. I would encourage policymakers to prioritize the allocation of sufficient funding and resources to facilitate IWBs in special education settings.

Funding and Resources. Policymakers should prioritize funding and allocating resources for the acquisition, maintenance, and support of IWBs in special education settings. Adequate funding should be provided to ensure equitable access to IWBs across schools and districts. Additionally, policymakers should consider allocating resources for ongoing professional development for special education teachers in IWB usage.

***Inclusive Technology Policies*.** Policies should be developed to ensure that IWBs and related technologies are designed and developed with accessibility and inclusivity in mind. Standards and guidelines should be established to promote the development of IWB applications which provide customizable options to cater to the diverse needs of students with disabilities. I

believe administrators should identify and make available to teachers specific IWB applications that specifically accommodate students with disabilities.

Integration in Special Education Curriculum. Policies should encourage the integration of IWBs into the special education curriculum, considering their potential to enhance engagement, support individualized instruction, and foster inclusive learning environments. Special education curriculum frameworks should explicitly highlight the use of IWBs as a tool for instruction. Special education teachers should be given guidance on how to effectively integrate IWB applications across different subject areas and educational settings.

Research and Evaluation Support. Policymakers should prioritize research and evaluation initiatives to assess the impact of IWBs in special education. Funding should be allocated to support rigorous research studies and evaluation programs that examine the effectiveness, outcomes, and best practices of IWB usage in special education classrooms. This research can provide evidence to inform policy decisions and guide effective implementation strategies.

Collaboration and Partnerships. Policymakers should foster collaboration and partnerships between educational institutions, technology developers, and researchers to promote the development and implementation of IWBs in special education. Collaborative efforts can lead to the creation of customized applications, resources, and professional development programs that align with the unique needs of special education students. Policymakers can incentivize collaboration by providing grants, establishing innovation hubs, or creating platforms for sharing best practices and success stories.

Implications for Practice

The findings of this study underscore several key implications for the effective integration of IWBs in special education classrooms, particularly for students diagnosed with ASD. These implications offer valuable guidance for educators, administrators, and policymakers seeking to enhance the educational experiences and outcomes of students diagnosed with ASD. Policymakers should foster collaboration and partnerships between educational institutions, technology developers, and researchers to promote the development and implementation of IWBs in special education.

Professional Development. The study's findings highlight the need for comprehensive and ongoing professional development for special education teachers in the effective use of IWBs in the classroom. School districts and educational institutions should prioritize providing training that focuses on IWB-specific strategies, applications, and best practices for supporting students diagnosed with ASD. This training should address not only the technical aspects of IWB usage but also the pedagogical approaches that maximize student engagement and learning outcomes.

Customization and Adaptation. Special education teachers should be encouraged to customize IWB resources and applications to meet the specific needs of their students. This may involve creating or modifying existing content to align with individualized education plans and learning goals. Teachers can leverage the interactive features of IWBs to tailor instruction, incorporate visual supports, and provide differentiated learning experiences that cater to diverse student abilities and learning styles.

Collaboration and Sharing. Teachers and administrators should foster a culture of collaboration and sharing within and across schools to maximize the benefits of IWB usage.

Special education teachers should be encouraged to collaborate with their colleagues, both within their own school, school district, and in online communities, to exchange ideas, resources, and strategies for effectively integrating IWBs into their instructional practices. Sharing success stories, lesson plans, and innovative approaches can inspire and support other special education teachers in implementing IWBs in their classrooms.

Assessment and Progress Monitoring. IWBs can be valuable tools for assessment and progress monitoring in special education. Teachers can utilize the interactive features of IWBs to collect real-time data, conduct formative assessments, and track student progress. This data can inform instructional decisions and help identify areas where additional support or interventions may be needed. Special education teachers should be encouraged to use IWBs as a means of gathering evidence of student learning and adjusting instruction accordingly.

Limitations and Delimitations

This study's intentions were to shed light on how special education teachers use IWB to instruct elementary students diagnosed with ASD in a self-contained setting. I acknowledge the inherent limitations and delimitations that influence the scope and applicability of the findings. By acknowledging the following limitations and delimitations, this study offers for future researchers the opportunity to further refine and broaden the insights into the utilization of IWBs to instruct students diagnosed with ASD in special education settings.

Limitations

While this study contributes valuable findings on the experiences special education teachers have using IWBs for students diagnosed with ASD, it is important to recognize the limitations that may influence the scope, generalizability, and depth of the insights provided.

These limitations provide opportunities for further research and exploration in this domain. I recognize that both sample size and contextual factors limit the impact of findings.

Sample Size. This study may have a limited sample size (10), which can affect the generalizability of the outcomes. It is important to consider that the experiences and perspectives shared by the participants may not be representative of all special education teachers or students diagnosed with ASD. Having a larger sample size would more accurately represent more teachers who utilize IWBs to instruct students diagnosed with ASD.

Contextual Factors. This study was conducted in a specific geographical area which could limit the applicability of the findings to other contexts. Factors, such as school resources, technological infrastructure, and support systems may vary, impacting the implementation and effectiveness of IWBs for students diagnosed with ASD. This study was conducted in a large suburban district; if this study was conducted in an urban environment, results may differ.

Delimitations

This study's delimitations provide a framework for understanding the specific context and boundaries within which the research was conducted. Acknowledging these delimitations helps to accurately interpret the findings and recognize their applicability to the defined scope of the study. The study on the experiences of special education teachers using IWBs to teach students with ASD in self-contained classrooms acknowledges several delimitations that provide context for the scope and boundaries of the research:

Focus on Special Education and ASD. This study specifically focused on the use of IWBs in special education elementary classrooms, particularly for students diagnosed with ASD. While this study has shed light on the experiences of special education teachers using IWBs to instruct students diagnosed with ASD, it is important to acknowledge that the findings may not

be directly transferrable to all special needs students with different cognitive learning disabilities. The distinct characteristics of ASD are set apart from other cognitive learning disabilities, which can impact the applicability of the study's insights to a broader range of disabilities.

Participant Selection. The participants in this study were special education teachers who had experience using IWBs in their classrooms in a self-contained elementary school setting. While their insights are valuable, this study did not include perspectives from other stakeholders, such as students, parents, or administrators, who could provide additional insights into the effectiveness and challenges of IWB usage. Having additional participants' perspective using IWB to instruct special needs students diagnosed with ASD from middle or high school would also be valuable. It is important to acknowledge these limitations and delimitations when interpreting the findings of the study. These limitations and delimitations provided context for understanding the scope and boundaries of my research as well as the opportunity for further exploration and refinement in future studies.

Recommendations for Future Research

Given the variability among cognitive learning disabilities, future research could explore the experiences of special education teachers using IWBs with students diagnosed with specific disabilities, such as Down syndrome, intellectual disabilities, or specific learning disorders. I also would recommend conducting a longitudinal study that follows the progress of students diagnosed with ASD over an extended period, monitoring engagement and learning outcomes using IWBs. Doing so may provide insights into the benefits and potential challenges associated with integrating IWBs into special education curricula. Another opportunity would be to investigate the implementation of IWBs in inclusive classroom settings, where students with diverse learning needs (including ASD), learn alongside with peers without disabilities. This

would offer a more comprehensive understanding of the unique challenges, strategies, and outcomes associated with IWB usage across different disabilities. Said research could explore how IWBs facilitate collaboration, engagement, and learning outcomes in inclusive classrooms.

Conclusion

In conclusion, IWBs have demonstrated significant advantages in special education classrooms, enhancing instruction and promoting engaging and meaningful learning experiences for students diagnosed with ASD. Throughout this study, I have explored the key themes and subthemes related to IWBs in special education, including initial training and support, advantages, disadvantages, behavior modeling, and community learning.

One of the primary findings of this study is the importance of initial training and ongoing support for special education teachers in utilizing IWBs effectively. While participants reported a lack of specific IWB training for children with ASD, they found support from their colleagues and basic training provided by vendors or county employees. However, the need for continuous professional development and access to resources specific to special education students was evident.

The advantages of IWBs in special education were found to be substantial. The engaging nature of IWBs captured students' attention and motivation, leading to increased participation and active learning. The integration of online resources provided immediate access to a wealth of materials, allowing for personalized and differentiated instruction. The adaptability of IWBs catered to diverse learning preferences, promoting multisensory experiences, and better engagement for students with special needs. Popular IWB features, such as virtual adapted books, calendar applications, and specialized resources, such as Disney Picks, further enhanced instruction and addressed specific learning goals.

Despite these advantages, it is crucial to acknowledge the challenges and limitations associated with IWBs in special education settings. Technical issues, such as lag times and reliance on internet connectivity, can affect the seamless integration of IWBs into lessons. Furthermore, the lack of appropriate applications for low-functioning students with ASD highlights the need for further development and customization to meet their specific needs.

Behavior modeling emerged as an essential aspect of IWB usage in special education. The visual support provided by IWBs aided comprehension and reduced frustration for students, allowing teachers to model desired behaviors and outcomes effectively. The use of videos as a precursor to real-life modeling was particularly beneficial in promoting understanding and generalization of skills.

Community learning, characterized by increased collaboration and group engagement, was another key aspect of IWB usage in special education. The ability to share student successes, collaborate in real-time, and engage in group activities fostered a sense of belonging and promoted social and communication skills among students. The IWB enables teachers to create an inclusive and engaging learning environment that fosters community learning.

In conclusion, IWBs have demonstrated considerable potential in special education settings. The advantages IWBs offer in terms of engagement, access to online resources, adaptability, behavior modeling, and community learning contribute to effective instruction and meaningful learning experiences. By nurturing a learning environment where IWBs complement effective pedagogy, we can increase engagement, achievement, and empowerment among students diagnosed with ASD.

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Appendices

APPENDIX A: IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

May 3, 2022

John Terrell
Gail Collins

Re: IRB Exemption - IRB-FY21-22-859 A QUALITATIVE DESCRIPTIVE CASE STUDY OF SPECIAL EDUCATION TEACHERS' EXPERIENCES UTILIZING INTERACTIVE WHITEBOARDS FOR STUDENTS WITH AUTISM SPECTRUM DISORDER IN ELEMENTRY SELF-CONTAINED CLASSROOMS

Dear John Terrell, Gail Collins,

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study to be exempt from further IRB review. This means you may begin your research with the data safeguarding methods mentioned in your approved application, and no further IRB oversight is required.

Your study falls under the following exemption category, which identifies specific situations in which human participants research is exempt from the policy set forth in 45 CFR 46:104(d):

Category 2.(iii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).

Your stamped consent form(s) and final versions of your study documents can be found under the Attachments tab within the Submission Details section of your study on Cayuse IRB. Your stamped consent form(s) should be copied and used to gain the consent of your research participants. If you plan to provide your consent information electronically, the contents of the attached consent document(s) should be made available without alteration.

Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this exemption or need assistance in determining whether possible modifications to your protocol would change your exemption status, please email us at irb@liberty.edu.

Sincerely,
G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

APPENDIX B: RECRUITMENT LETTER

[Date]
[Recipient]

[Company]
[Address 1]

Dear [Recipient]:

As a doctoral candidate in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctorate of Education (Ed.D). I am conducting research to better understand your experiences using IWBs to instruct your elementary students diagnosed with ASD. The purpose of my research is to understand how elementary special education teachers describe their experiences using IWBs to teach students with ASD in a self-contained classroom setting, located in a suburban northeastern school district in Georgia and I am writing to invite eligible participants to join my study.

Participants must be:

- Currently employed as an elementary special education teacher for at one year.
- Are currently using an Interactive Whiteboard to instruct elementary age students diagnosed with ASD.

Participants, if willing, will be asked to:

- Participate in a 60-minute interview with the researcher either via Zoom meeting, phone, or face-to-face. The interview will be record audio via Zoom application.
- Participate in a focus group (via Zoom) with other special education teachers who currently use IWB to instruct elementary age students diagnosed with ASD. The focus group will take approximately 45 minutes. The focus group will be record audio via Zoom application.
- Write a hypothetical letter to a special education teacher or administrator not using IWBs to instruct ASD elementary students. This letter (300-600 words) will give you an opportunity to describe your experience using IWBs for another special education teacher who may be considering adopting this technology. This should take about 20 minutes.
- Review the transcript of your interview and your part of the focus group for accuracy. This should take about 15 minutes.

Participation will be confidential. Your name and other identifying information will be requested as part of this study, but you and the school district will be assigned pseudonyms so that the information will remain confidential. To participate, please click here. Complete the online survey and submit. Contact me at [redacted] for more information.

After I have reviewed your screening survey for eligibility, if you are chosen to participate in this study, you will receive an email with a consent form attached. The consent document contains additional information about my research. If you choose to participate, you will need to sign the consent document and return it to me via email prior to or at the time of the interview.

If you choose to participate in the interview, focus group, and complete the hypothetical letter you will receive a $25.00 Visa gift card.

Sincerely,
John Terrell
Ed.D Candidate
[redacted]
[redacted]

APPENDIX C: SCREENING SURVEY

1. Please enter your first and last name.
2. Are you a special education teacher?
3. How many years have you been a special education teacher?
    - Less than one year
    - 1-2 years
    - 3-6 years
    - 7-10 years
    - 11-15 years
    - 16-20 years
    - More than twenty years
4. How many years have you worked in this school district?
    - Less than one year
    - 1-3 years
    - 4-6 years
    - 7-10 years
    - 11-15 years
    - 16-20 years
    - More than twenty years
5. How many years have you worked in this elementary school?
    - Less than one year
    - 1-3 years
    - 4-6 years
    - 7-10 years
    - 11-15 years
    - 16-20 years
    - More than twenty years
6. What type of technology do you have in your classroom? Select all that apply.
    - Desktop Computers
    - Laptop Computers
    - iPads d. Other Tablet-based Products
    - Interactive Whiteboards
    - Promethean Boards
    - Other Interactive White Boards
    - Apple TV i. Digital Cameras
    - Handheld Camcorders
    - Flat Screen Monitors
    - Scanner m. Portable CD/ DVD RW drive
    - Laser Printer
    - 3-D Printer
    - Color Printer
    - Basic Black Printer APPENDIX D: ACKNOWLEDGEMENT EMAILS

Acceptance Email

Dear Valued Educator,

Thank you for completing the screening survey for my research study to better understand the experiences of special education teachers who use Interactive Whiteboards (IWB) to instruct students diagnosed with autism spectrum disorder (ASD) in elementary self-contained classrooms. Congratulations, you have been selected to participate in the study. A consent form, that contains additional information about my research, is attached to this email. Please print and sign consent form and return this to me at the time of the interview or email a signed copy to [redacted]

You will be given a copy of the consent form at the time of the interview for your records. Thank you for your willingness to participate!

Should you have any questions, please contact me.at [redacted].

Sincerely,
John Terrell, Ed.D. Candidate

Denial Email

Dear Valued Educator,

Thank you for completing the screening survey for my research study to better understand the experiences of special education teachers who use Interactive Whiteboards (IWB) to instruct students diagnosed with autism spectrum disorder (ASD) in elementary self-contained classrooms. At this time your assistance is not needed to participate in the study. Should you have any questions, please contact me.at [redacted].

Sincerely,
John Terrell, Ed.D. Candidate

APPENDIX E: CONSENT FORM

Title of **the Project:** A QUALITATIVE DESCRIPTIVE CASE STUDY OF SPECIAL EDUCATION TEACHERS' EXPERIENCES UTILIZING INTERACTIVE WHITEBOARDS FOR STUDENTS WITH AUTISM SPECTRUM DISORDER IN ELEMENTARY SELF-CONTAINED CLASSROOMS

Principal Investigator: John Terrell, Doctoral Candidate, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be currently employed as an elementary special education teacher for at least one year and are currently using interactive whiteboards (IWBs) to instruct elementary-age students diagnosed with autism spectrum disorder (ASD). Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the study about and why is it being done?

The purpose of this descriptive qualitative case study will be to describe the experiences of special education teachers who use IWB to instruct students diagnosed with an autism spectrum disorder in the elementary self-contained classroom setting. This study will contribute to the body of literature regarding factors that impact special education teachers who use IWBs to instruct ASD elementary students.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following things:

1. Participate in a 60-minute interview with the researcher either via Zoom Meeting, phone, or face-to-face. The interview will be audio recorded via the Zoom application.
2. Participate in a focus group (via Zoom) with other special education teachers who currently use IWB to instruct elementary-age students diagnosed with ASD. The focus group will take approximately 45 minutes. The focus group will be audio recorded via the Zoom application.
3. Write a hypothetical letter to a special education teacher or administrator not using IWBs to instruct ASD elementary students. This letter (300-600 words) will give each participant the opportunity to describe their experience using IWBs for those special education teachers considering adopting this technology. This letter will take each participant approximately 30 minutes to complete. The letter must be sent to jterrell5@liberty.edu no later than two weeks after our group discussion.
4. Review the transcript of your interview and your part of the focus group for accuracy. This should take about 15 minutes.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study. However, participants may benefit from taking part in a collaborative conversation during the focus group with other special education teachers who also use IWBs as they teach children with ASD.

Benefits to society include a greater understanding of factors affecting ASD students using IWBs may lead to developing informed institutional policies designed to improve overall academic and social performance.

What risks might you experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. Data collected from you may be shared for use in future research studies or with other researchers. If data collected from you is shared, any information that could identify you, if applicable, will be removed before the data is shared.

- Participant responses will be kept confidential through the use of pseudonyms. Interviews and focus groups will be conducted in a location where others will not easily overhear the conversation.
- Data will be stored on a password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted.
- Interviews and focus groups will be recorded and transcribed. Recordings will be stored on a password-locked computer for three years and then erased. Only the researcher will have access to these recordings.
- Confidentiality cannot be guaranteed in a focus group setting. While discouraged, other members of the focus group may share what was discussed with persons outside of the group.

How will you be compensated for being part of the study?

If you choose to participate in the interview, focus group, and participant letter you will receive a $25.00 Visa gift card.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address/phone number included in the next paragraph. Should you choose to withdraw, data

collected from you will be destroyed immediately and will not be included in this study. Focus group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is John Terrell. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact him via email at [redacted]. You may also contact the researcher's faculty sponsor, Dr. Gail Collins, at [redacted].

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA 24515, or email at irb@liberty.edu

Disclaimer: The Institutional Review Board (IRB) is tasked with ensuring that human subjects research will be conducted in an ethical manner as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record me as part of my participation in this study.

_____

Printed Subject Name

_____

Signature & Date

APPENDIX F: INTERVIEW QUESTIONS

1. How would you describe you experiences using IWBs to teach your students with ASD? (CRQ)
2. Describe your general introduction to Assistive Technology in the classroom. (SQ1)
3. Describe your general introduction to Assistive Technology specifically for ASD elementary students. (SQ1)
4. Describe your introduction to IWBs in the classroom, specifically for ASD elementary students. (SQ1)
5. What types of training or preparation did your school provide you before implementing the IWB as an instructional tool for your students? (SQ1)
6. How would you describe organizational support concerning IWB continuing education? (SQ1)
7. How would you describe your transition from chalk and talk, to virtual tools to instruct your students with ASD? (SQ1)
8. What have been the barriers or challenges of using IWBs as an instructional tool for elementary ASD students? (SQ2)
9. Describe your top three favorite features of the IWB when instructing your ASD in a self-contained classroom? (SQ2)
10. What makes these feature so valuable? (SQ2)
11. What do you consider to be the least three valuable features of the IWB when instructing your ASD in a self-contained classroom? (SQ2)
12. What makes these feature unfavorable? (SQ2)
13. How do you use IWBs to enhance you students' learning experience? (SQ3)

14. How do you use IWBs to model a behavior? (SQ3)
15. How would you describe using IWBs to support social-emotional learning? (SQ3)
16. How would you describe using IWBs to support abstract concepts, as compared to previous chalk & talk methods? (SQ3)
17. What is your perspective on how the IWBs have/have not increased group collaboration? (SQ3)

APPENDIX G: FOCUS GROUP QUESTIONS

1. During your one-on-one interview with me, what issue when using IWBs to instruct ASD elementary students, stood out to you the most?
2. What advice would you share with a special education teacher who is using IWB for the first time to teach students with ASD?
3. What would you say to other special education teachers who would like to use IWBs to instruct their students with ASD, yet are met with resistance from their administration?
4. How would you describe your time preparing lessons using IWBs as compared to chalk and talk methods?
5. What is the greatest benefits IWBs you have experienced to instruct ASD elementary students?
6. What is the greatest barriers IWBs have you experienced to instruct ASD elementary students?
7. If you had the resources, how would you improve IWBs services for your ASD students?
8. How would you describe how your student reacts to IWBs when introducing a concept, abstract concepts or emotional and behavioral modeling when working with just one student at a time?
9. How would you describe how your student reacts to IWBs when introducing a concept, abstract concepts or emotional and behavioral modeling when working with the class as a whole?

10. What other experiences would you like to discuss that have not been brought up in this focus group discussion?

APPENDIX H: PARTICIPANT LETTER INSTRUCTIONS

Write a letter to a special education teacher who is not currently using IWBs to instruct elementary students with ASD. In this letter, describe your experience using IWBs, specifically:

- How your students respond to this technology
- Discuss if you feel that your students with ASD have benefited from this technology and if so, how your students benefited.
- As a teacher how have you benefited from using IWBs while instructing your students with ASD?
- Finally, discuss if you have experienced barriers while using this technology and what those barriers are and how you work around them.

Please keep the word count to 300-600 words. Once you have completed the participant letter, please email me a copy to: [redacted]

Appendix J: REFLEXIVE JOURNAL

2/21/ 2021	Before I conduct my study, I am aware of my following biases: I have extensive education and experience with assistive technology, my son has ASD and IWBs are used daily in class.
9/15/2021	As a result, I have seen first-hand how valuable IWBs are to his both academic and social development. I have used SIWBs to instruct adult learners and have found the visual features help reinforce my key learning objectives. I suspect the participants will express a similar view.
10/7/2022	From the first three participants I interviewed, I began to see that special education teachers felt they were lacking in applications and training for their students. They expressed that it seems the developers of educational application were only for the general population not special needs students diagnosed with ASD.
4/10/23	After completing most all interviews and focus group interviews, I was surprised to see the lack of training special education teachers had as it related to AT focus on special needs students. It seems in most cases that teachers get basic training from the vendor or county as to the ABC's on how to use AT, then it is up to the teachers to create/modify material to meet the learning objectives for each special needs student.

APPENDIX K: AUDIT TRIAL

Date	Events
6/24/2020	My first task was to acquire permission from the school district to conduct my research.
5/3/2021	Once approved from LU IRB, I gathered two willing participants to interview.
6/18/2021	Interviewed via Zoom same day.
7/1/2021	Modified some of my questions as some were redundant
9/1/2021	Felt confident to move forward with my interviews, focus group and participant letters.
9/26/2022	Received IRB approval
9/30/2022	Sent Dozens of my recruiting emails to school principals
10/12/2022	No responses from principals, printed letters out and hand delivered them to all schools in my district.
11/13/2022	Three participants responded and willing to participate.
3/10/ 2023	After getting approval to expand to other districts I was finally able to interview 10 participants and conduct 2 focus group times.
4/3/2023	Received participants letters