2022

Exploring How Special Education Teachers Use Interactive Whiteboard Technology in Self-Contained Classrooms

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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the review committee have been made.

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Abstract

How Special Education Teachers Use Interactive Whiteboard Technology in Self-Contained Classrooms

by

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EdS, University of Southern Mississippi, 2001

MA, University of Georgia, 1994

BA, University of Georgia, 1989

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

February 2022

Abstract

Researchers have indicated special education students tend to be motivated by working with interactive whiteboard (IWB) technology; however, few researchers have examined how this technology is used in adaptive classrooms. Many high school teachers have not been able to use IWB technology to create student-centered learning experiences for special education students. The purpose of this exploratory case study was to examine how high school special education teachers use IWB technology to instruct students with moderate to profound disabilities. The constructivist theories of learning provided a conceptual framework for this study. The research questions addressed high school teachers' observed and reported use of IWB technology in adaptive classrooms and whether that use was student-centered as promoted by the constructivist theories. Data were collected through individual semistructured interviews and classroom observations to explore how 12 high school teachers use IWB technology with students with moderate to profound disabilities. The study was conducted in two public school systems located in the Southeastern region of the United States. Data analysis was conducted through open-coding and an axial coding process to determine major and minor themes. Four major themes emerged from the data: (1) IWB usage observed, (2) IWB usage reported, (3) lesson design, and (4) teacher perceptions. The findings in this study reveal participants primarily use IWB technology for displaying materials rather than student-centered activities. The implications for positive social change are that the findings provide additional data and recommendations for stakeholders to make informed decisions to increase the effective use of IWB technology in special education classrooms.

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Acknowledgements

I am grateful for my committee members: Dr. Derek Schroll, Dr. Stephanie Gaddy, and Dr. Nancy Williams. Your recommendations, support, and positivity enabled me to complete my dissertation. Dr. Schroll, your encouraging comments were well-timed and inspired me to continue.

I am forever grateful to my husband, Michael: my best friend, study partner, coworker, scuba buddy, and better-half for almost 40 years. Thank you for all the sacrifices you made to give me time to work on my dissertation. Your enthusiasm and support influenced me to finish this enormous endeavor.

I am eternally grateful to my parents, Bill and Elizabeth Anne Patton. Thank you for always encouraging me to be a life-long learner and to help others. Your love, advice, and inspiring examples of lives well-lived continue to guide me daily, even in your absence

I am tremendously grateful to God for blessing me with encouraging committee members, a loving husband, and wonderful parents. This network of support gave me the ability to complete this dissertation in order to further fulfill my endeavor of helping students with disabilities.

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Chapter 1: Introduction to the Study

This exploratory case study was conducted to examine how special education teachers are using interactive whiteboard (IWB) technology in self-contained classrooms to instruct high school students with mild to profound disabilities. This study was undertaken to explore whether special education teachers in self-contained high school classrooms are incorporating student-centered instruction guided by the principles of constructivism in the use of IWBs in classrooms. Determining whether teachers are incorporating student-centered instruction in the use of IWBs and how they are integrating it is important because all students benefit from teachers satisfactorily addressing learning needs. Shepley et al. (2016) reported that research examining the use of IWB technology in conjunction with evidence-based practices is scarce, particularly for students with disabilities. The results of this study may be used to provide teachers and school leaders with data and recommendations to enable them to make informed decisions about how to improve the use of IWB technology in classrooms to benefit high school students with mild to profound disabilities.

This chapter includes the background of the study, the problem statement, the purpose of the study, and the research question. This chapter also contains the conceptual framework that grounds the study, the nature of the study, and definitions of words or phrases in the study that are not common or may have more than one meaning. Finally, any assumptions, limitations, and the significance of the study are addressed.

Background

Researchers have determined that the use of interactive technology with students, especially those with disabilities, holds promise. In fact, Regan et al. (2019) determined that special education classrooms are the settings where students would benefit the most from technology integration due to the ability to personalize instruction for these diverse learners with individualized education programs (IEPs) to enable them to access the general curriculum. Some researchers have studied specific populations of students with disabilities and the potential benefits of interactive technology. Roberts-Yates and Silvera-Tawil (2019) reported that technology can improve the engagement, learning, physical activity, and interactivity of students with special needs, particularly those with intellectual disabilities and autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), and those with physical impairments. However, few studies have been conducted to address the use of IWB technology with students with mild to profound disabilities. According to Kaur et al. (2017), there is a scarcity of research addressing technology use with students with disabilities.

In addition, researchers have determined that IWB technology is only beneficial to instruction when teachers can effectively incorporate the technology into the curriculum in a student-centered manner; therefore, not all attempts to incorporate digital technology into classrooms have been successful (Hougham et al., 2018). In a 3-year study of barriers to technology integration, Francom (2020) determined that access to technology does not ensure effective use of technology. To maximize the potential for student learning, teachers must be knowledgeable about how to best integrate technology into instruction. Likewise, Young et al. (2017) explored the use of IWB technology in middle school mathematics classrooms and concluded that without adequate teacher training to enable teachers to incorporate IWB technology into classrooms, the IWB may reduce quality class time and inhibit pacing rather than enhancing the teaching process and increasing student motivation and participation. Worse yet, technology can impede learning and cause students to become disengaged from classroom activities when sound pedagogy and careful planning are not used (Bond et al., 2020; Parker et al., 2019).

Therefore, the purpose of this study was to address the gap in practice of IWB use with students with mild to profound disabilities in self-contained high school classrooms. This study was needed to examine the use of IWB technology with this population to determine whether teachers are incorporating student-centered instruction practices when using IWB technology for students with mild to profound disabilities.

Problem Statement

Many classrooms are equipped with IWBs, and in numerous studies, researchers have found that students are motivated to use IWB technology (Schipper & Yocum, 2016; Travers & Fefer, 2017). Researchers have indicated that instructing students with the use of technology can increase active engagement and improve interaction among students to enhance learning (Bond et al., 2020; Yavich & Davidovich, 2019). According to Campbell et al. (2019), effective use of IWB technology consists of frequent use by teachers who use the interactive elements of IWB technology to provide student-centered learning activities. The problem addressed in this study was that many teachers with access to IWB technology have not been able to use IWB to create student-centered learning experiences in classrooms (Gregorcic et al., 2018). In addition, some researchers claim a need for more research using all classroom technology with students in self-contained classrooms, particularly those with ASD, for the use of technology has already been determined to be an evidence-based practice (EBP) for students with ASD (Asaro-Saddler et al., 2016; Mariz et al., 2017). According to Shepley et al. (2016), peer-reviewed research related to the use of IWBs with evidence-based practices is scarce, particularly with students with disabilities, so there is a need for additional research in this area, particularly to determine if special education teachers in self-contained settings are using IWB technology effectively to teach high school students with mild to profound disabilities.

Teachers are often unsure how to implement instruction with IWB technology using best practices (Gregorcic et al., 2018). In fact, Metatla (2017) stated that special education teachers consider their technological knowledge to be insufficient and the use of technology in the educational setting to be limited. When teachers rely on IWB technology for primarily projecting images or showing videos, the beneficial interactive component of IWB technology for students is eliminated unintentionally (Regan et al., 2019). The gap in practice related to the literature examined was to determine to what extent special education teachers in self-contained settings use IWB technology in line with constructivist principles to teach high school students with mild to profound disabilities.

Purpose of the Study

The purpose of this exploratory case study was to explore how special education teachers use IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The goal was to determine if self-contained special education teachers incorporate the student-centered instruction guidelines recommended by the principles of constructivism in the use of IWBs in classrooms. The results of this study may be used to provide teachers and school leaders with data and recommendations for more informed decisions about how to improve the use of IWB technology in classrooms to benefit high school students with mild to profound disabilities.

Research Questions

Research question: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?

Subquestion 1: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices as delineated by the constructivist principles of learning?

Subquestion 2: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices that are not delineated by the constructivist principles of learning?

Conceptual Framework

Effective teachers create learning opportunities for students that address prior knowledge, are student-centered, and encourage social engagement with others. These crucial elements are supported by the constructivist theories of learning, which offer several guiding principles essential to planning instruction. Based on findings by Dewey (1902), Vygotsky, (1986), and Piaget (1948), the constructivist theory promotes the planning of meaningful learning experiences with consideration of students' prior knowledge, enabling them to engage in interactive experiences that give them the opportunity to problem solve and encouraging them to communicate with others during the learning process. In addition, learning is expected to occur more rapidly in meaningful contexts and through learner-directed activities led by a facilitator using scaffolding to promote comprehension (Akpan & Beard, 2016; Deering et al., 2016).

Presenting information in multiple ways and providing activities that nurture problem-solving skills are necessary (Akpan & Beard, 2016; Anderson & Putman, 2020). Planning activities that promote social interaction and generalization to real-world concepts is imperative and fulfills the need for interaction with others, which Bruner (1964) claimed is necessary for internalizing new knowledge. IWB technology can provide teachers the means to offer student-centered lessons enabling students to make connections to prior learning and encouraging social interaction. Therefore, the constructivist theories were used as the contextual lens for this study because its founders promoted thoughtful planning and instruction to enable students to interact with learning materials to assimilate them. Likewise, it is desirable for teachers to consider these constructivist theories when planning lessons using IWB technology for students. This exploratory case study was conducted to gather data about how special education teachers use IWB technology in self-contained classrooms and whether the teachers provide learning activities guided by the theories of constructivism.

Nature of the Study

The qualitative research design used in this inquiry was an exploratory case study. Purposeful sampling was used to gather information due to the low-incidence population being studied. More specifically, homogeneous sampling was conducted to ensure that only high school special education teachers who have IWB technology in self-contained classrooms for students with mild to profound disabilities were included.

As recommended by Yin and Gwaltney (1982), data for this exploratory case study were collected through multiple data collection strategies including individual interviews and classroom observations. This use of more than one source of evidence provided triangulation, which served to strengthen the study and improve the quality of the research findings (Yin, 2009). Fourteen special education teachers who have IWB technology in self-contained high school classrooms were each invited to participate in one semistructured interview that was audio recorded, and one observation. These semistructured interviews were used to provide rich, detailed information about how teachers incorporate student-centered IWB technology into lessons and to answer the research question and subquestions. Classroom observations were conducted to determine firsthand how these same high school special education teachers were using IWB technology in classrooms with students with mild to profound disabilities.

Data collected from the observations and interviews were coded and tabulated as described by Yin (1981). I did this by hand analysis of the qualitative data using open-coding and then an axial coding process to determine concepts and themes based on how the special education teachers use IWB technology in self-contained classrooms. Finally, to report the findings from the research, a narrative discussion was developed based on concepts and themes determined through thematic analysis using open-coding and an axial coding process.

Definitions

The following definitions are given for terms used throughout the study.

Constructivist learning theory: A theory of learning based on findings of Piaget (1948) and Vygotsky and Cole (1978) who established all learning is based on prior knowledge, and an instructor's role should be that of a learning facilitator.

Interactive whiteboard (IWB): A large technological board that interacts with and projects images from a connected computer (Mariz et al., 2017). The board can be activated with devices such as pens and a mouse or even the touch of a finger (Menon, 2018). Smartboards and Clear Touch Panels are devices that use IWB technology.

International Society for Technology in Education (ISTE): An organization whose members research and develop policy for the use of technology in education (Murphy et al., 2018).

ISTE National Educational Technology Standards (NETS): Technology standards developed by ISTE members to promote the integration of technology in classrooms (Parra et al., 2019).

Moderate intellectual disabilities and *profound intellectual disabilities*: Considered low-incidence disabilities because they are less common in the general population; students with disabilities at these lower ability levels need intense evidence-based instructional practices to learn a wide set of skills (Pennington & Koehler, 2017).

Self-contained classroom: A classroom where students with mild to profound disabilities spend time in school working with special educators, therapists, and other professionals in a small group instruction setting (Pennington & Koehler, 2017).

Assumptions

The first assumption in this study was participants would answer interview questions honestly. The second assumption was participants would provide the opportunity for me to observe lessons that would be typical for the instruction they provide in classrooms on a regular basis. These assumptions were necessary for the process of gathering data for this qualitative study design.

Scope and Delimitations

The purpose of this study was to examine the use of IWB technology in adaptive self-contained classrooms for high school students with mild to profound disabilities. The study was limited to five high schools located in Northeast Georgia. Interviews and observations were conducted to collect data from several teachers of high school students with mild to profound disabilities. Because the qualitative approach was used in this study, only limited generalizations should be made regarding the findings of this study.

Limitations

Although there are potential limitations of this study, adequate precautions were taken to address them. The use of a qualitative method can be viewed as a limitation because it does not lend itself to generalizations as readily as quantitative methods do. However, because the intent of this study was to explore the use of IWB technology for students with mild to profound disabilities, a qualitative method was preferable.

Another potential limitation was that I teach in the same school as some participants. Nevertheless, participants instruct in self-contained classroom settings, whereas I teach in collaborative classroom environments. I am not in a supervisory role with any participants, and I do not teach any students taught by participants.

In addition, I know that I am biased about how beneficial I think IWB technology can be with students with mild to profound disabilities, especially when students are presented with interactive learning activities that incorporate the constructivist principles of learning and instruction; however, my intent was to examine the perceptions and activities of participants regarding IWB use. Throughout my data collection, I noted my own opinions and biases about the subject in a journal, so the actual data collected and the interpretation of the data did not include my personal opinions and biases.

Significance

There is a need for more research to determine the actual usage of IWB technology in classrooms to explore whether effective teaching practices are being used in special education self-contained classrooms. As Vercellotti (2018) has noted, in multiple studies, researchers address the benefits of IWBs, but more research is needed to determine whether teachers are using effective pedagogical strategies to develop IWB lessons that promote active, collaborative learning experiences for students. Currently, the research including the use of IWB technology primarily addresses general education students and teachers' perceptions in the use of the technology (Chen et al., 2020). Few researchers have approached the topic of how teachers are using IWB technology to instruct students with disabilities. Even leading researchers in IWB technology, such as Jozwik and Douglas (2017), have not examined how the technology is being used in self-contained special education classrooms.

Some researchers have found there is little research addressing the teaching methods being used with students with disabilities served in self-contained classrooms. According to Kurth et al. (2016), more research is necessary to ascertain the general experiences of special education students in self-contained classrooms due to the limited availability of research findings with this population. Fewer researchers have conducted research with students in low-incidence populations, so there are few studies addressing best practices with these students (Kurth et al., 2016). Anderson and Putman (2020) report that although direct observation of teachers instructing students with disabilities in self-contained classrooms is valuable, little data exist concerning common instructional practices with this student population. Direct observations of teachers with more moderately disabled students provide more complete information than having teachers simply self-report about perceived instructional practices (Anderson & Putman, 2020). Therefore, this study included both participant interviews and direct observations of classroom instruction to provide a more complete picture of common instructional practices in self-contained classroom environments.

The results of this study provide an original contribution to the field of education because many teachers have not used IWB technology to develop constructivist learning environments by including student-centered learning experiences in classrooms, especially in special education settings (Regan et al., 2019). An exploration of the use of IWB technology with high school students with mild to profound disabilities was conducted. This study could have implications of positive social change in that the findings provide educational leaders with additional data and recommendations to make informed decisions that could create an increase in the effective use of IWB technology in classrooms. The increase in effective use of IWB technology could lead to students with disabilities benefitting from having more collaborative and active learning opportunities as described by Anderson and Putman (2020) and Ciampa (2017).

Summary

Researchers have determined that student and teacher perceptions of IWB technology use in classrooms is positive. In addition, researchers have determined that the use of IWB technology is beneficial to learning when teachers can use it in a student-centered manner as promoted by constructivist learning principles. However, little research is available on how IWB technology is used by teachers in self-contained classrooms for high school students with mild to profound disabilities. This study is distinctive in that I explored the use of IWB technology based on constructivist principles with a less studied group of participants, high school teachers of students with mild to profound disabilities taught in self-contained classroom settings.

The following chapter includes an explanation of the review of the relevant literature including key variables and concepts. The conceptual framework based on the constructivist theory of learning is also described in depth.

Chapter 2: Literature Review

Many teachers have access to an IWB. Researchers have indicated that students are motivated to learn with the technology, but frequently teachers have not been able to use it to create student-centered learning experiences (Gregorcic et al., 2018). This is because many teachers are unsure how to implement instruction with IWB technology using best practices. When teachers rely on IWB technology for primarily teacher-centered activities, such as projecting images or showing videos, the beneficial interactive component of IWB technology is unintentionally eliminated for students.

Because the effective use of IWB technology has been shown to enhance student learning through an increase in active engagement and improvement in social interactions among peers, this study was conducted to examine whether special education teachers in self-contained settings are using IWB technology effectively to teach high school students with mild to profound disabilities. The goal was to explore whether special education teachers in self-contained settings use IWB technology in line with constructivist principles to teach students with disabilities.

In this chapter, key variables and concepts are included in an explanation of the review of the relevant literature. The constructivist theory of learning, upon which the conceptual framework of this study was based, is also described in detail.

Literature Search Strategy

Several search engines were used to find peer-reviewed journal articles that relate to the use of IWB technology in classrooms. These search engines included the Educational Resource Information Center, ProQuest Central, SAGE Journals, and

Academic Search Complete. The Walden University library was used for many of the searches. Books and peer-reviewed articles from professional journals were examined during the search. The literature was searched to compare studies using quantitative, qualitative, and mixed design methods to determine the most effective research design for this study. The search terms included: *interactive whiteboard, digital technology, technology integration, International Society for Technology in Education (ISTE), National Educational Technology Standards (NETS), TPACK for content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK), Universal Design for Learning (UDL), students with disabilities, mild to severe disabilities, special education, high school instruction, secondary education, constructivism, constructivist learning theory, member-checking, best practices, case study design, self-contained classrooms, Yin, Piaget,* and *Vygotsky*. The results from these searches are described in the literature review later in this chapter.

Conceptual Framework

Constructivist thinkers consider the acquisition of knowledge to be a process of becoming instead of memorizing concrete facts (Akpan & Beard, 2016; Olofson et al., 2016). New information is manipulated and assimilated based on previous knowledge and becomes the basis for considering future knowledge (Akpan & Beard, 2016). According to Akpan and Beard (2016), using the constructivist approach encourages students to interact with learning materials within a social context that enables them to develop deeper knowledge than a lecture format allows. Francom (2020) reported that teachers who have constructivist, student-centered beliefs about learning are more likely to integrate technology into classrooms. Therefore, it is considered a priority for teachers to present new information in a student-centered approach that learners can reconstruct with peers to facilitate comprehension.

The combined works of Dewey, Piaget, and Vygotsky provide the foundation for the constructivist theory (Shah, 2020). Dewey (1902) described the necessity of consciously interacting with learning materials to assimilate them, whereas Vygotsky (1986) introduced the theory of social constructivism (Menon, 2018). In Piaget's theory of cognitive constructivism (1948), he described the learning process as one in which the learner actively works to organize new information based on previous experiences. Vygotsky's social constructivism (1986), on the other hand, promoted the idea that learning is a social process based on language, culture, and interpersonal connections and more powerful learning occurs when a facilitator scaffolds a student's learning experience to promote comprehension. Although Piaget and Vygotsky's theories were once viewed as conflicting, many researchers now consider them to be complementary of each other (Shah, 2020). These complementary theories—that learning is based on actively engaging in new material based on previous knowledge and that learning is a social process—provide support for why carefully planned IWB instruction can be so powerful.

Dewey (1902), Piaget (1948), and Vygotsky (1986) did not have the opportunity to consider how these theories would apply to the use of futuristic technology instruction in classrooms; however, Reynolds (2016) determined that offering learners the opportunity to manipulate information with digital technology encourages them to interact socially to build knowledge as promoted by the founders of the constructivist theory. Through student-centered technological activities, students can actively and socially engage in learning experiences to learn new concepts as was promoted by the constructivist theorists. Therefore, the purpose of this study was to explore how teachers integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices for students with mild to profound disabilities as delineated by the constructivist principles of learning.

Literature Review Related to Key Concepts and Variables

Integrating Technology Into Instruction

To fully prepare students for the 21st century, teachers need to effectively incorporate technology into classroom instruction. Today's students are considered digital natives; they have grown up using technology (O'Bannon et al., 2017). Furthermore, Goryunova and Jenkins (2017) determined that instruction based on interactive technology benefits these digital learners by promoting improved learning outcomes and student engagement.

Even though many young preservice teachers are also considered digital natives, studies have shown preservice teachers benefit from having direct instruction in how to incorporate technology into future classrooms to optimize students' learning (Walters et al., 2016). Researchers conducted a mixed-methods study with 104 preservice teachers and determined that having participants involved in a digital problem-solving project increases the use of technology by making them more aware of the relationship between auditory, visual, and verbal representations in math problem-solving to better incorporate the use of technology in future classrooms (Walters et al., 2016).

Because integration of technology into the classroom is so important, the members of ISTE, a respected organization that researches and develops policy for the use of technology in education, developed ISTE NETS to promote the integration of technology in classrooms (Trust, 2018). These standards are based on a constructivist view and encourage teachers to incorporate technology instruction that is meaningful, interactive, and based on students' prior knowledge (Trust, 2018).

More recently ISTE members revised and updated the national education technology standards and named them the 2017 ISTE Standards for Educators (Parra et al., 2019). These standards address facilitating and inspiring student learning and creativity, designing and developing digital age learning experiences and assessments, modeling digital age work and learning, promoting and modeling digital citizenship and responsibility, and engaging in professional growth and leadership (ISTE, 2017). The use of these standards encourages teachers to become technologically savvy themselves, so they can integrate technology into classroom instruction in creative, meaningful ways. In fact, Regan et al. (2019) determined that teachers who demonstrate proficiency in ISTE NET standards are more confident in using technology in classrooms, collaborate with other teachers, and strive to find ways to effectively incorporate technology into instruction. Regan et al.'s qualitative study was conducted using interview data based on survey responses from 47 general education and special education middle-school teachers to inquire about classroom use of technology for writing instruction (Regan et al., 2019).

Another model developed to describe the elements critical for integrating technology into instruction is technological pedagogical content knowledge (TPACK). Based on Shulman's (1987) idea of pedagogical content knowledge (PCK), Mishra and Koehler (2006), after 5 years of research focused on teacher and faculty professional development in higher education, determined that content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) are necessary for a teacher to successfully incorporate technology into classroom instruction (Mourlam, 2017; O'Bannon et al., 2017). Researchers determined that to effectively incorporate technology in classrooms, teachers must be knowledgeable in the content they are teaching and demonstrate effective teaching strategies and the skillful use of current technology and that these skills are best developed through collaborative, constructivist, and problem-solving techniques (Mourlam, 2017).

Effective special education teachers must determine the best ways to provide classroom instruction while considering the social, behavioral, and academic needs of each individual student with disabilities. Atanga et al. (2019) conducted a qualitative research study by surveying elementary and middle-school teachers of students with learning disabilities and determined that special education teachers with proficient knowledge in the areas of TPACK can use effective techniques incorporating differentiated technology instruction to meet the diverse needs of students. Therefore, ISTE standards and the TPACK model for integrating technology into instruction are both worth considering when examining whether teachers are using technology effectively in classrooms.

Interactive Whiteboard Instruction

An IWB is a technological tool connected to a projector and a computer. It enables the transfer of images from the computer to the whiteboard (Mariz et al., 2017). Teachers and students have the capability to manipulate images on an IWB by clicking, dragging, drawing, or writing on the board, which greatly enhances student participation in the classroom (Menon, 2018).

According to a quantitative study conducted by Chen et al. (2020), incorporating technology such as IWBs in math lessons promotes student responding, provides visual representations of math activities, and increases student engagement. The year-long study conducted with 178 second-grade students measuring formative assessment with the use of IWB technology in math classes was beneficial, particularly for female students (Chen et al., 2020).

As expected, study results have indicated that when teachers take a student-centered, constructivist approach to teaching, technology integration is more likely to occur in classrooms (Francom, 2020; Vongkulluksn et al., 2018). In a 3-year quantitative time series study involving 1,906 teachers of kindergarten through high school students, Francom (2020) found the most common barrier to integrating technology in a student-centered fashion to be time. Teachers reported that time restraints prohibited them from being able to test a technological tool or to plan transformative ways for its classroom use (Francom, 2020).

In a similar study by Vongkulluksn et al. (2018), 624 teachers of sixth- to 12th-grade students and 20 school administrators were surveyed to determine how value beliefs of technology affect the ability to integrate technology into classrooms in a student-centered fashion. The results of the study indicate that teachers with positive value beliefs are better able to use technology for student-centered instruction and tasks involving critical thinking (Vongkulluksn et al., 2018). Therefore, teachers who value technology are more likely to incorporate it in more effective student-centered applications to benefit students.

Polly and Rock (2016), who conducted a study with 85 preservice elementary education candidates to determine the integration of technology into interdisciplinary teaching units, found that IWB technology was used more by teachers than students and was typically used for lower-level basic skills. This led Polly and Rock to believe that more teachers still cling to teacher-centered views of integrating technology in classrooms even though student-centered instruction is preferable (2016).

Consequently, teachers should not just use IWB technology themselves. For students to get the full benefit of this prevalent technology, teachers must have more than just basic working knowledge of how to operate an IWB to share it with students. According to a quantitative survey study conducted by Siyam (2019) with 24 special education teachers of students from grade levels kindergarten through high school, special education teachers have positive attitudes about technology and are more likely to attempt to integrate technology into classrooms. The study results indicate that teachers who gained confidence by exploring the features available with classroom technology were able to converge technology and best teaching practices of student-centered instruction to develop and teach effective lessons (Siyam, 2019).

The visual representations available with digital technology provide students with authentic learning experiences enabling them to visualize and comprehend concepts that would be difficult otherwise for teachers to present in a classroom setting (Johnston, 2018). Because many students are visual learners, IWBs' ability to produce images from a computer or the internet assists many students in the acquisition and comprehension of concepts and skills. Furthermore, an IWB is unique in that it can provide virtual manipulatives. According to Shi et al. (2020), these IWB images are interactive, so teachers are able to demonstrate abstract concepts in authentic ways. These virtual manipulatives are computerized images that students can interact with on the whiteboard by dragging, clicking, or even cloning to practice basic skills and higher level concepts.

Student and Teacher Perceptions of IWB Technology

In a study to determine student and teacher preferences and attitudes about IWBs by researchers Ipek and Sozcu (2016), 1013 elementary through high school students reported they attributed IWB usage to having new opportunities to participate in classes and having better comprehension of lessons. In addition, 65 teachers participating in the same study agreed the use of IWB technology improves the presentation of classroom materials, classroom management, and student interaction and achievement (Ipek & Sozcu, 2016).

Students typically find lessons delivered on IWBs to be interesting and enjoyable. In fact, Hoffmann and Ramirez (2018) determined that IWBs positively impact student motivation. Students are usually more motivated when an activity interests them; hence, it follows they are more motivated to engage in an activity they consider to be interesting and enjoyable. Chou et al. (2017) reported that increased motivation that students experience with IWB usage results in improved attention and behavior. Researchers also found that students with all types of learning styles benefit from IWBs because of the multi-sensory input that these technological tools provide (Chou et al., 2017). Having students who are interested and motivated to engage in a learning activity promotes comprehension and a positive classroom environment.

Interactive Whiteboards Promoting Class Participation

Siyam (2019) acknowledged that, whereas most studies of IWB technology examine the perceptions of students and teachers rather than the actual usage of the technology, even fewer studies have been conducted to address how IWB technology is used in special education classrooms. Chou et al., conducting one of these special education studies, determined that in addition to IWBs being enjoyable and motivating, accessing curriculum through technological tools assists children in successfully participating in classroom activities (2017). Researchers further determined that IWBs enable students to become more active learners by stimulating participation, increasing communication, and enabling students to receive more consistent feedback while engaging in IWB activities (Chou et al., 2017). Active learning is achieved with well-designed classroom activities developed by teachers who are knowledgeable about the curriculum being presented and the benefits of integrating technology to positively impact students' learning and behavior (Siyam, 2019).

Knowledge of the efficient use of IWB technology is necessary to enable students to fully benefit from having access to a classroom IWB. According to Chen et al. (2020), teachers who were not provided sufficient training in the use of IWB technology and the methods to fully incorporate it into classrooms tend to rely on low-level tasks such as skill and drill math practice rather than addressing real-world math application scenarios on an IWB. These low-level skill and drill tasks are not an effective use of IWB technology because they mimic printed rote exercises not considered proven methods of research-based learning (Chen et al., 2020). Therefore, the investment in IWB technologies is ineffective without adequate teacher training in using the technology and incorporating it into the academic curriculum (Ciampa, 2017). This is not just a factor in the classrooms of more experienced teachers who grew up without interactive technology. Dassa and Vaughan (2018) determined that even young preservice teachers, considered digital natives, often lack the expertise and experience needed to incorporate interactive technology effectively into the classroom setting.

An IWB is one of the few instructional tools capable of providing the visual, auditory and kinesthetic stimulation that students with disabilities need to address specific learning styles. According to Shi et al. (2020), the effective use of IWB technology promotes active student involvement and encourages collaborative learning by allowing the students to engage interactively with the technology rather than having them just watch the teacher use it. Therefore, it is imperative that school districts provide adequate training for teachers, so they can use IWB technology to its full potential.

Even though many studies of IWB technology have been conducted, most of them concern the perceptions students and teachers have about the technology instead of the actual classroom use of IWB technology. According to Shepley et al. (2016), even fewer studies examine how teachers use IWB technology for children with disabilities in conjunction with evidence-based practices. Consequently, further study of IWB use with this population is needed.

Using Interactive Whiteboards for Students With Disabilities

Not only does the use of an IWB promote active learning, it can provide student-directed learning through self-instructional opportunities. When teachers train students to use IWB as a self-operated learning device, the teachers can serve as facilitators rather than one-to-one instructors. According to Anderson and Putman (2020), learning opportunities with integrating technology provide video and audio tools that facilitate all classroom learning and make each lesson more meaningful for every individual student. Furthermore, IWB can also accommodate a wide variety of needs, such as students' learning problems, by enabling teachers to offer differentiated instruction through interactive technology (Hoffmann & Ramirez, 2018; Lefebvre et al., 2016). This concept of being able to address individual learning styles and needs is especially beneficial in classrooms with students with disabilities.

The use of IWB technology may address some of the specific challenges presented with children with disabilities. For example, students with autism typically express an interest in using technology, and they often like to move when learning. Mariz et al, (2017) determined that having these students engage in activities on an IWB can address the desire to use technology and at the same time offer the opportunity to engage in a kinesthetic activity by actively manipulating images on the whiteboard. Researchers further claimed that IWB technology is promising as an intervention to address students' attention issues. The combination of tactile, verbal, and auditory features available with IWB technology provides interactive elements encouraging participation and motivating students to attend to innovative activities (Shi et al., 2020). In addition, special education teachers report that integrating technology in classrooms offers the benefits of differentiated instruction, writing adaptations, enhanced productivity, various representation of content, and improved engagement and motivation (Anderson & Putman, 2020;Ciampa, 2017) According to Shi et al. (2020) an IWB promotes social interaction between students and peers and teachers, frequently a goal for students with disabilities who tend to have fewer positive interactions with peers and teachers than typical classmates do.

Another benefit of IWBs is they were designed to be used by people with and without disabilities. Many technological tools are difficult for people with disabilities to use. Some forms of technology must be retrofitted to be used by people with disabilities. Other technological tools designed for people with disabilities are socially isolating because they do not look like the technological devices that peers without disabilities are using. In contrast, researchers found the use of an IWB promotes social interaction that encourages student engagement (Shi et al., 2020). Operating an IWB is much more like carrying an iPhone than lugging around a dedicated augmentative and alternative communication device. IWB users tend to enjoy the experience and want to share it with others.

Students With Mild to Profound Disabilities

Students with mild to profound disabilities need additional assistance to learn basic materials. According to Pennington and Koehler (2017), to learn academic skills, students with moderate to severe disabilities need intensive instruction described as explicit and systematic instructional strategies. Because these students are lower functioning than even mildly disabled peers, specialized instruction is necessary to address serious learning needs. Root et al. (2017), in an article describing research-based teaching methods for students with disabilities, acknowledged that it is challenging for educators to teach this population of students, for they need additional time to learn skills than other students with disabilities. In addition, researchers determined that students with moderate to severe disabilities experience more difficulty in learning complex skills, and the students require specific instruction to ensure generalization of learned skills to other settings and situations (Root et al., 2017). Furthermore, many students with moderate to severe disabilities may not use oral speech to communicate, which researchers determined makes teaching this population even more challenging (Pennington et al., 2018). Therefore, these students would be even more likely to benefit from the advantages of IWB instruction than non-disabled peers. IWB technology can provide them the ability to see visuals of more abstract concepts, enable them to respond during a lesson, and allow them to interact with peers in the classroom setting.

Best Practices in Teaching Students With Disabilities

To teach students effectively, particularly those with disabilities, it is beneficial to synthesize the recommendations of several educational philosophies when planning for instruction. The combined tenets of these insightful philosophies, which frequently overlap, constitute best practices in teaching. First, the complementary theories of constructivism from Piaget (1948) and Vygotsky and Cole (1978) promote that learning is based on actively engaging in new material based on previous knowledge and that learning is a social process. Therefore, best practices would constitute teachers planning lessons based on students' prior knowledge and enabling students to interact with one another.

Secondly, according to Parra et al. (2019), teachers should strive to incorporate the International Society for Technology in Education (ISTE) standards when planning instruction to integrate technology in classrooms. Parra et al. conducted a qualitative study with 22 preservice teachers to determine the benefits of (re)imaging a learning technologies course using TPACK standards (2019). The findings indicate that using the TPACK standards encourages teachers to become consumers of technology to learn to integrate technology into classroom instruction creatively and effectively (Parra et al, 2019).

Finally, teachers should consider the elements of Universal Design for Learning (UDL) when planning instruction for diverse learners (Smith Canter et al., 2017). Recognizing that there was limited research to promote UDL pedagogy, Smith, Canter et al. (2017) conducted a mixed-methods study with elementary through high school teachers across eleven inclusive classrooms and determined that “the UDL framework and infusion of technology result in instructional practices that are more inclusive of all diverse learners across educational settings” (p. 15). The UDL framework includes three principles for planning instruction: to provide multiple means of representation, to provide multiple means for action and expression, and to provide multiple means of engagement (Smith Canter et al., 2017). In other words, teachers are encouraged to provide a variety of learning materials to address all learning styles, provide multiple methods for students to demonstrate what they have learned, and to provide a variety of ways for the students to engage in the learning materials. Therefore, the constructivist theories of learning, ISTE standards, the TPACK model, and the Universal Design for Learning are all worth considering when exploring whether special education teachers are using best practices when attempting to incorporate IWB technology in classroom instruction for students with mild to profound disabilities.

Summary and Conclusions

An IWB can be an effective technological tool to use to teach students with disabilities. The use of IWB technology in classrooms motivates students to participate in class activities. Its use also promotes recommended instructional practices such as modeling, the opportunity for multiple responses, and timely feedback. Whereas IWB usage in general education classes has proven beneficial, it would be even more useful with students with disabilities who need additional opportunities for multiple response methods, appropriate modeling of instructional practices, and various methods of feedback.

Many studies have been conducted addressing IWB technology; however, most concern student and teacher perceptions of IWB technology rather than the actual use of the technology in general education classrooms. Even fewer studies include the use of

IWB technology for children with disabilities in conjunction with evidence-based practices. Therefore, this study provides more insight into the actual use of IWB technology because I explored the extent to which special education teachers are using IWB technology with high school students with mild to profound disabilities.

In the following chapter, the research method is further detailed. The research design and rationale and the role of the researcher are also explained. In addition, the methodology is described including the participant selection process, the instrumentation used, and the procedures for recruitment, participation, and data collection, including the data analysis plan. The chapter concludes with detailed information addressing the trustworthiness and ethical procedures relevant for this study.

Chapter 3: Research Method

The purpose of this exploratory case study was to explore how special education teachers use IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The goal was to determine if self-contained special education teachers are incorporating student-centered instruction guidelines recommended by the principles of constructivism in the use of IWBs in classrooms. In this chapter, the research method is further described. The research design, rationale, and the role of the researcher are explained. In addition, the methodology is described including the participant selection process, the instrumentation used, and the procedures for recruitment, participation, and data collection, including the data analysis plan. The chapter concludes with detailed information addressing the trustworthiness and ethical procedures relevant for this study.

Research Design and Rationale

The following questions were addressed in this study:

Research question: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?

Subquestion 1: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices delineated by the constructivist principles of learning?

Subquestion 2: How do high school teachers of students with moderate to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices not delineated by the constructivist principles of learning?

This study addressed the gap in practice of IWB use with students with mild to profound disabilities in self-contained high school classrooms. This study was needed to examine the use of IWB technology with this population to explore whether teachers are incorporating constructive practices when using IWB technology for students with mild to profound disabilities. Because I explored teaching practices to interpret the use of IWB technology in self-contained classrooms, qualitative rather than quantitative methods were used in this study.

While several qualitative designs were considered for this study, the research design used in this inquiry was a case study. According to Yin (1981), “the distinguishing characteristic of the case study is that it attempts to examine a contemporary phenomenon in its real-life context” (p. 59). I chose the case study design because it allowed me to gather multiple forms of data directly from participants to get perceptions on something they are experiencing. Yin (1981) distinguished three types of case studies: exploratory, descriptive, and explanatory. This study was an exploratory case study because I explored IWB usage with students with mild to profound disabilities in self-contained high school classrooms. Erikson (1986) maintained that a case study approach “enables the uncovering of events or processes that one might miss with more superficial methods” (p. 238). Therefore, authentic data collection was conducted by engaging participants in face-to-face interview sessions and classroom observations to thoroughly explore perceptions of IWB usage in self-contained classrooms.

Other research designs were considered but rejected. The grounded theory design was rejected because it is used to explain a process; instead, the purpose of this study was to explore how teachers use IWB technology (Levitt et al., 2018). Narrative design was deemed inappropriate because it is used to develop a narrative about an individual (Levitt et al., 2018). This study involved several participants to explore IWB usage rather than focusing on one individual. Ethnographic design was rejected because the data generated focus on the workings of a particular group (Levitt et al., 2018). According to Heath (2017), a case study provides a structure for using thick, holistic descriptions to describe the situational and interrelated nature of a case. Therefore, the research design used in this study was a case study.

Role of the Researcher

Throughout this study, my role as a researcher was to gather information from other teachers on the use of IWB technology with students with mild to profound disabilities. To examine this occurrence, I conducted individual interviews with participants to ask them about IWB usage. In addition, I observed each participant using IWB technology and documented relevant activities in classrooms.

One concern I needed to address as a researcher was I taught in the same school as some participants. However, I was not in a supervisory role with any participants. Furthermore, I did not teach any of the same students because participants instructed in self-contained classroom settings whereas I taught in collaborative classroom environments.

Another concern in my role as a researcher was being able to address my opinions and biases on the subject being studied. Because my intent in this study was to examine the perceptions and activities of participants regarding IWB use for students with disabilities, throughout my data collection, I noted my own opinions and biases about the subject so that the actual data collected and the interpretation of the data did not include my personal opinions and biases. I know that I am opinionated about how beneficial I think IWB technology can be with students with mild to profound disabilities, especially when they are presented with interactive learning activities that incorporate the constructivist principles of learning and instruction, so I took precautions when collecting and analyzing data to present participants' perceptions and use of IWB technology rather than my personal opinions about the usefulness of the technology.

Methodology

Participant Selection

Purposeful sampling was used to gather information due to the low-incidence population being studied. More specifically, homogeneous sampling was conducted. This method was used to ensure that only high school special education teachers who have IWB technology in self-contained classrooms for students with mild to profound disabilities were included.

As recommended by Yin and Gwaltney (1982), data for this exploratory case study were collected through multiple data collection strategies including individual interviews and classroom observations. Fourteen special education teachers who have IWB technology in self-contained high school classrooms were each invited to participate in one semistructured interview that was recorded, and one classroom observation. Twelve teachers participated in the February and March data collection process before I determined that data saturation had been achieved and discontinued any further data collection in this qualitative research study. Shortly after, in-person instruction was discontinued in the school systems due to the COVID-19 pandemic in March 2020.

Instrumentation

Individual interviews with high school special education teachers were held to collect data to explore the use of IWB technology with self-contained students with mild to profound disabilities. These semistructured interviews provided detailed information about how teachers incorporate student-centered IWB technology into lessons to answer the research question and subquestions. Interview questions were prepared based on ISTE standards for educators (Trust, 2018). For content validity purposes, the interview questions were piloted with three special education teachers otherwise not participating in the study. The interview protocol sheet (see Appendix C) included demographic questions such as how many years each participant had taught. In addition, the interview protocol included specific research questions used during each interview that prompted me during the interview process and enabled me to document with handwritten notes as the conversation was being recorded.

In addition, classroom observations were conducted to determine firsthand how high school teachers use IWB technology in classrooms with self-contained students with disabilities. An observation protocol sheet was developed (see Appendix D) based on ISTE standards for educators (Trust, 2018) to be used during each classroom observation.

This protocol includes references to facilitating and cultivating student learning and creativity, using technological learning experiences and assessments, modeling digital work and learning, and modeling and promoting digital citizenship and responsibility as promoted by ISTE standards (Parra et al., 2019). The use of these data collection instruments, the interview questions and the observation sheet, were efficient in the gathering and recording of data in this qualitative case study. To determine the data collection tools were credible and dependable, a peer review was conducted with several teachers who otherwise were not participants in the study.

Procedures for Recruitment, Participation, and Data Collection

An attempt was made to recruit 14 participants, every high school special education teacher with a self-contained classroom from all five high schools in two school systems located in the Southeast region of the United States, one being the system where I am employed. The county personnel office of the potential candidates was contacted for permission to conduct the study and to acquire a list of all special education teachers with self-contained classrooms in the high schools. Desirable candidates were high school teachers of students with mild to profound disabilities in self-contained classrooms with IWB technology. After permission was received from the school district personnel to conduct the study, each of the 14 potential candidates received an e-mail invitation (see Appendix A) to inform them about the study so that they could determine whether they intended to participate. Specific details about the study and expectations about anticipated participation were presented to the potential candidates. Teachers who agreed to participate were asked to sign a written consent (see Appendix B) concerning participation in the study. Participants were notified that participation was completely voluntary, and they could decide not to participate at any time during the study.

Although all 14 teachers expressed an interest in participating in this study, 12 participants engaged in the observations and semiformal interviews during data collection in February and March 2020. After collecting data from the 12 participants, I determined that data saturation has been achieved in this qualitative study. Shortly after that, both school systems discontinued in-person instruction due to the COVID-19 pandemic in spring 2020.

Each participant took part in one semistructured interview that was recorded and one classroom observation. Each interview took place in participants' classrooms either during a planning period or after school, whichever the participant preferred. These semistructured interviews were used to provide rich, detailed information about how participants incorporate student-centered IWB technology activities into lessons by answering interview questions with the use of an interview protocol sheet (see Appendix C). Classroom observations were conducted using an observation protocol sheet (see Appendix D) to determine firsthand how participants were using IWB technology in classrooms with students with mild to profound disabilities. At the conclusion of the study, each participant received a $20 gift card in appreciation of their participation.

Data Analysis Plan

Once the data from the observations and interviews were collected, they were coded and tabulated as described by Yin (1981). First, all interview transcripts and observation notes were read and typed into Google documents. Interview recordings were transcribed and also entered into Google documents. To keep the names of participants confidential, participant numbers were assigned, and all the data pertaining to them were coded to maintain anonymity. Because data were collected from two collection methods, face-to-face interviews and classroom observations, a concern was organizing all the data for synthesis. A hand analysis of the qualitative data using open-coding and then an axial coding process was conducted to determine major and minor themes based on how participants used IWB technology in self-contained special education classrooms.

As each interview transcript and observation was read and coded, four themes emerged: (1) IWB usage observed, (2) IWB usage reported, (3) lesson design, and (4) teacher perceptions. The information pertaining to the four major themes was entered into additional separate Google documents that assisted with organizing the data. Once the data from the four major themes were entered into the Google documents, the data were again sorted into common concepts that elicited minor themes for each major theme. For the major themes of IWB usage observed and reported, minor themes of school subjects and learning activities and teaching resources emerged. For the major theme of lesson design, the minor themes of teacher-centered designs, student-centered designs, and collaborative technology designs emerged. For the major theme of teacher perceptions, the minor themes of the benefits of IWB technology, the limitations of IWB technology, and teacher preparation emerged. Finally, to report the findings from the research, a narrative discussion was developed based on these major and minor themes.

Trustworthiness

To strengthen the credibility or internal validity in this qualitative case study and have trustworthiness in the findings, several procedural methods were used. I incorporated peer review, triangulation, member checking, a coding system, thick descriptions, and clarification of researcher biases during this study. The use of these procedural methods is described below.

First of all, a peer review, as recommended by Cypress (2017) and Johnson et al. (2020), was conducted with several teachers who are not participants in the study to determine whether the data collection tools were credible and dependable. However, I made the final decisions about the tools used for data collection after considering the points presented by the peer reviewers, for the researcher alone has the ultimate responsibility for the study results.

Then data were collected using more than one method to provide triangulation for establishing validity as recommended by researchers over the last quarter century (Cypress, 2017; Guba & Lincoln, 1989). The combined use of face-to-face interviews and classroom observations served as multiple-method research, for more than one method was used to gather data on a single phenomenon. This use of multiple-method research provided methodological triangulation as recommended by Cypress (2017) and Denzin (1978) to increase the depth of a study.

Furthermore, member checking was conducted to provide participants the opportunity to review interview data after careful transcription. This enabled participants to comment on the accuracy of the interview transcript. The member checking process of asking one or more participants to review transcripts for accuracy allows the researcher to further validate findings (Creswell & Guetterman, 2019). Emailing participants the meticulously transcribed interviews and offering the opportunity to comment on the accuracy provided stronger validation for this study.

In addition, a specific coding system was used in this study. Having a developed coding system enhanced the validity and the trustworthiness of the study findings when semistructured interviews are involved (Cypress, 2017). Because the semistructured interview format is more standardized than unstructured interviews, it was possible to use a coding system to sort and analyze the data.

Another procedural method for strengthening internal validity in a study is addressing possible researcher biases (Cypress, 2017; Johnson et al., 2020). Because I intended to explore the perceptions and activities of participants regarding IWB use for students with disabilities, throughout my data collection, I noted my own opinions and biases about the subject so that the actual data collected and the interpretation of the data did not include my personal opinions and biases. I took precautions when collecting and analyzing data to present participants' perceptions and use of IWB technology rather than my personal opinions about the usefulness of the technology. In addition, throughout this study, I continued to have prolonged contact with dissertation committee members at Walden University to help ensure that biases were avoided when determining the findings of the research study.

Transferability was addressed through thick descriptions to communicate the findings, so they are more meaningful to others interested in the research study. In addition, there was some variation in the participant selection inclusion of more than one school district and multiple high school settings. Furthermore, participants in the study also varied in that some of them taught students with mild disabilities whereas others taught students with more severe disabilities.

Ethical Procedures

Before the data collection phase of the study, permission was obtained from the Institutional Review Board (IRB) at Walden University to conduct this study, #03-28-19-0515788, with a research expiration date extended to February 27, 2021. Permission was also obtained from a representative from each of the school districts and the principals of each school involved in the research study. Then I met with each participant to offer information about the study so that the potential participants could decide whether they wanted to participate in the study or not. The teachers were provided specific details about the study and expectations about participation. Written consent was procured from each teacher who chose to participate. Furthermore, all participants were informed that involvement was completely voluntary and that withdrawal from the study at any time was permissible.

The data collected during this study will remain confidential. The schools and participants remain anonymous with participant numbers rather than participants' names. Information gathered during the research process was collected and stored securely in a locked cabinet in my home. The data collected were disseminated to my dissertation committee members at Walden University. In addition, an executive summary of the study was provided to administrators of each school involved in the study. After the end of the study, the data collected will remain locked in the cabinet located in my home for at least five years. After that time period, the data will be destroyed.

Summary

Chapter 3 included the research methodology used in the study. The research design and rationale and the role of the researcher were addressed. The methodology was described including the procedures for participant selection, instrumentation, recruitment, participation, data collection, and data analysis. In addition, trustworthiness in the study and precautions for ethical procedures were discussed. Chapter 4 includes the results of this study. Specifically, the chapter describes the setting, data collection, data analysis, study results, and evidence of trustworthiness of the findings.

Chapter 4: Results

This chapter provides an analysis of data collected from classroom observations and participant interviews. The purpose of this exploratory case study was to explore how special education teachers are using IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The following questions were addressed in this study:

Research question: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?

Subquestion 1: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices delineated by the constructivist principles of learning?

Subquestion 2: How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices not delineated by the constructivist principles of learning?

In this chapter, the study setting and data collection procedures are further described. In addition, the data analysis and study results are fully explained. The chapter concludes with detailed information addressing the evidence of trustworthiness for this study.

Setting

One condition worth noting in this study was that one school system was completing a 3-year rollout of swapping the technology in classrooms from IWB technology to interactive display technology. Although these types of technology are similar in how they are displayed at the front of a classroom for teacher and student use, the two technologies are accessed differently.

With IWB technology, images are displayed from a projector with the use of a separate computer. With interactive display technology, the equipment is much like a large computer tablet in which no additional computer is necessary. Although the end results are similar for the two types of technology—a large, technological classroom tool to be used by teachers and students—they are different forms of classroom technology. Therefore, participants using the older IWBs were more familiar with the technology in classrooms, whereas participants with the newer interactive display technology were in a transition stage learning to use the technology more recently provided in each classroom.

In addition, participants using IWB technology were in a transition phase for another reason. For the first time, the county provided Chromebooks for each of the students throughout the school district. Participants in the district with familiar IWB technology were learning to incorporate Chromebooks into classrooms and the curriculum while continuing to use IWB technology. Participants in the district transitioning over to interactive display technology already had Chromebooks assigned to each student, so participants were more familiar with how to incorporate individual Chromebook usage into classroom activities.

Each participant was learning to be more confident with new classroom technology during this study. Eight participants were becoming accustomed to using interactive display technology with their new Clear Touch panels, and five participants were learning to incorporate student Chromebooks when this study was conducted. According to Aydin et al. (2017), teachers are frequently challenged to effectively implement emerging technologies. In this study, I examined participants’ use of newer classroom technology whether it was interactive display technology or collaborative use of this technology in conjunction with recently acquired student Chromebooks.

Participants invited to be included in this study were high school special education teachers instructing students in self-contained classrooms with interactive screen technology. Participants selected were employed in two school districts in the Southeastern region of the United States. Of the 14 teachers in self-contained classrooms employed in the two school districts invited to participate in the study, 12 ultimately participated. After data were collected during observations and interviews with 12 participants, I determined that data saturation had been achieved and discontinued any further data collection as recommended by Hagaman and Wutich (2017) and Lowe et al. (2018). All the data collection in the study took place in February and March 2020, just before most school systems across the country discontinued in-person instruction due to the COVID-19 pandemic.

Participants ranged in teaching experience from 4 to 26 years; overall, they had an average of 12.58 years of teaching experience. Participants also varied in the educational degrees earned. Of the 12 participants, one had a bachelor’s degree. Six had earned a master’s degree. Four had obtained a specialist’s degree, and one had earned a doctoral degree. Participants also varied in students served. Although all students received instruction in high school self-contained classrooms, the students’ identified disability levels varied from mildly, moderately, severely, and profoundly disabled. Four participants taught students on more than one disability level in which either mild and moderate or severe and profound students were served together. Overall, eight participants taught some students with mild disabilities, and six of them taught some students with moderate disabilities. Two participants taught some students with severe disabilities, and one participant taught students with profound disabilities. All demographic information is presented in Table 1.

Table 1

Demographics of Participants

Participant	Years of experience	Degree obtained	Disabilities taught	Class technology
P1	4	Specialist	MID	Smartboard
P2	7	Specialist	MID	Clear Touch
P3	26	Specialist	SID, PID, VI	Smartboard
P4	25	Master’s	MID, MOID	Smartboard
P5	15	Doctoral	MID	Clear Touch
P6	6	Master’s	MOID	Clear Touch
P7	14	Master’s	MID	Clear Touch
P8	14	Master’s	MOID	Clear Touch
P9	21	Master’s	MID, MOID	Clear Touch
P10	7	Specialist	MID, MOID, SID	Smartboard
P11	6	Master’s	MID	Smartboard
P12	6	Bachelor’s	MOID	Clear Touch

Note. Mildly intellectually disabled = MID, moderately intellectually disabled = MOID, severely intellectually disabled = SID, profoundly intellectually disabled = PID, and visually impaired = VI.

Data Collection

All participants were initially contacted through an email (see Appendix A) that provided my introduction as the researcher, briefly described the study, and explained that an additional email would be sent the upcoming week to whomever expressed an interest in participating in the study. The following week, the interested teachers were sent a second email including the consent form (see Appendix B) and an offer to answer any questions about the research study. All 14 teachers expressed an interest in participating in the study, and data collection opportunities were successfully completed with 12 participants before I determined that data saturation in this qualitative research study had been satisfied and discontinued data collection procedures. Data collection took place in February and March 2020 during the second semester of the 2019–2020 school year.

Participants provided opportunities for data collection through semistructured interviews and classroom observations. Although participants had been given the choice to interview during a planning period or before or after school, all chose to interview during a planning period. The semistructured interviews were used to provide rich, detailed information about how participants incorporated IWB or Clear Touch technology activities into lessons by answering interview questions posed with the use of an interview protocol sheet (see Appendix C). To maintain confidentiality, each participant and the corresponding data were assigned a participant number, so participants would remain anonymous.

Classroom observations were conducted using an observation protocol sheet (see Appendix D) to determine firsthand how these participants were using IWB or Clear Touch technology in self-contained classrooms with high school students with mild to profound disabilities. The data collected during these interviews and observations were recorded with the use of a digital audio recorder and documented with handwritten notes during each session. Each participant engaged in one semistructured interview and one classroom observation. The individual observations ranged from 20 to 58 minutes in length with the average observation being 45 minutes. The semistructured interviews ranged from 17 to 31 minutes in length with the average interview being 21 minutes.

After conducting observations and semiformal interviews with 12 participants, I stopped collecting data after determining saturation had been achieved. According to Hagaman and Wutich (2017), data saturation in qualitative research is defined as “the point in data collection and analysis when new information produces little or no change to the codebook” (p. 25). Similarly, Lowe et al. (2018) described reaching saturation in qualitative research as “a point at which observing more data will not lead to discovery of more information related to the research questions” (p. 191). I had enough data, collected with the use of an interview protocol sheet (See Appendix C) and an observation protocol sheet (See Appendix D), from the initial 12 participants to examine actual and reported use of IWB technology without including data for any additional participants.

Otherwise, there was no variation in data collection from the plan presented previously. I was able to schedule observations and interviews with each of the 12 participants before schools were closed unexpectedly in March 2020 due to the COVID-19 pandemic. Data collection for this study took place during February and March 2020 just before school systems transitioned to online learning formats due to the pandemic.

Data Analysis

Once the data from the observations and interviews were collected, they were coded and tabulated as described by Yin (1981). First, each of the 12 sets of interview notes and observation notes were read and typed verbatim into separate Google documents. Then, the audio recording of each interview was carefully transcribed verbatim and entered into a separate Google document. Following the transcriptions, a hand analysis of the qualitative data using an open-coding method was used to organize all the raw data. To accomplish this, the transcriptions were read multiple times, and phrases were broken into discrete parts then labeled with specific codes. Then an axial coding process was conducted to group relevant data, enabling me to identify common themes as they emerged. I did this by examining each code labeled in the open-coding process and grouping the codes into common categories. During this process, four category themes emerged from data collected during observations and interviews: (1) IWB usage observed, (2) IWB usage reported, (3) student- versus teacher-centered usage, and (4) teacher perceptions. Then, the data were organized into additional Google documents based on individual themes identified and sorted in a manner indicating the participant from whom it was collected. To keep participants' names confidential, each was assigned a participant label from P1 to P12. All the data pertaining to a specific participant was labeled in this manner to maintain anonymity. Finally, to report the findings from the data collection, a narrative discussion was developed based on themes determined through the thematic analysis using open-coding and axial coding processes.

The data collected in these four themes were examined to investigate the question of how high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms. I also examined how participants integrate IWB technology to incorporate student-centered learning practices delineated by the constructivist principles of learning. In addition, in the interviews when participants were asked to explain whether the use of IWB technology was more student- or teacher-centered and why, they described perceptions of use of the technology including the benefits of and perceived barriers to full integration of the technology into classrooms. Each of the four themes will be further discussed in the following results section.

Results

The results from this research study were based on data collected during observations and interviews to address research questions concerning usage of IWB technology in self-contained classrooms of high school special education teachers and whether usage was student- or teacher-centered. All observation and interview data were examined to determine major themes and minor themes in data collected.

Research Question 1

The first research question was “How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?” Two major themes emerged from the data analyzed from classroom observations and participant interviews to address this research question: (1) IWB usage observed and (2) IWB usage reported.

Theme 1: Interactive Whiteboard (IWB) Usage Observed

The first major theme, (1) IWB usage observed, emerged from classroom observations conducted to address how high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms. Most studies involving IWB technology use surveys to address how satisfied teachers and students are when using the technology in classrooms (Vongkulluksn et al., 2018; Polly and Rock, 2016; Hoffman and Ramirez; 2018) However, few studies have been conducted to address how the technology is actually being used. According to Siyam (2019), even fewer studies have been conducted to address how IWB technology is used in special education classrooms. The results in this study differ in that, rather than being based solely on survey results, each participant was observed using IWB technology in a self-contained classroom for students with disabilities. The data in this study indicated usage of IWB technology in each classroom was similar but did vary in school subjects, learning activities, and teaching resources participants were addressing and using with IWB technology. Therefore, the minor themes that emerged under the category of observed IWB usage were (a) school subjects and learning activities and (b) teaching resources.

School Subjects and Learning Activities. During the classroom observations, participants were observed teaching multiple subjects through a variety of learning activities. Eleven participants were observed teaching English/language arts, mathematics, and social studies; no science activities were observed. In addition to these subject areas, eight participants were observed using IWB technology for teaching life skills and addressing classroom management and routines. While teaching these subjects, participants demonstrated a variety of learning activities for students with mild to severe disabilities.

When the 12 participants were observed using interactive board technology in classrooms, they frequently taught more than one subject during the observation. Six participants demonstrated use of the technology to instruct students in English/language arts skills, and six were seen using IWB to teach mathematics concepts. Three participants were observed using the technology to address social studies concepts. In addition, seven participants were observed using IWB technology to address life skills, and two participants used the technology to address classroom management and routines. One participant used IWB technology to offer students rewards during the classroom observation.

Six participants were observed conducting IWB activities to teach English/ language arts skills to students with disabilities. Participants' most common usage of IWB technology in this subject area was to display digital books and other texts to be read aloud in classrooms rather than having students read from handheld books or handouts. Four participants, P1, P3, P4, and P9, were observed displaying text on IWB technology to address students' word recognition and reading comprehension skills. P1 was observed having students read paragraphs about famous African Americans from the Smartboard to determine the main idea of each paragraph. P3 displayed story slides on the Smartboard to present a plot summary of the novel, *Hatchet* by Gary Paulson. P3 provided students with severe and profound intellectual disabilities traditional tactile boards with physical elements from the novel, such as a small, rubber hatchet, to promote engagement while asking the class comprehension questions about the book. P9 displayed and read two articles about sports with students from the Clear Touch panel and then presented comprehension questions on the interactive panel for the students to discuss. P4 displayed an article about the Daytona 500 on the Clear Touch panel and used the technology to have the article read aloud to the students. P4 presented a second article about women astronauts and used the Clear Touch panel to display the article and provide picture prompts for difficult vocabulary to increase word recognition and comprehension while reading the article aloud to the class.

Six participants demonstrated additional uses of IWB technology when presenting other English/language arts lessons. P1 presented a lesson covering nouns and verbs, singular and plural nouns, and sentence correction by displaying exercises on the Smartboard. P1 also posted a writing topic on IWB to prompt students to write a journal entry about a community field trip to the mall earlier that day. P4 had students watch a video clip on IWB of a summary plot of the movie, *Call of the Wild,* and posed comprehension questions about the plot in a class discussion. P4 also directed a reading comprehension activity in which students were instructed to read a list of food items on a restaurant order and use the process of elimination to determine which item was missing from each order. The orders were posted on the Smartboard, and students were encouraged to use Smartboard pens and eraser to mark items to help determine which item was missing from the list. After determining which item was missing, each student would describe the inaccurate order and comment on the severity of the menu omission.

P8 taught an English/language arts lesson focusing on sign language by showing students a video to review forming the letters for sign language correctly. P8 also had the students say the days of the week while forming the sign language symbols. P10 used the Smartboard to engage one lower functioning student in a letter and name writing activity. P9 presented a video of gymnasts training on the Clear Touch panel and had students complete comprehension questions about the video.

Six participants were observed teaching mathematics lessons using IWB technology. Five participants, P2, P4, P5, P11, and P12, demonstrated assisting students with money activities involving identifying coins and bills or counting money. P11 had a student at the Smartboard reviewing coin counting with classmates using digital coins on the Smartboard and TouchMath procedures. In a similar fashion, P5 had students reviewing counting money and determining change by having students come to the Clear Touch panel individually to answer workbook questions posted on the panel by having students place TouchMath dots on digital coins displayed with the workbook page. P4 was observed having students use menu cards and scenarios posted on the Smartboard to decide how much various meal orders would be and then determine the bills necessary to pay for them. P2 had students practicing check writing using a money workbook displayed on the Clear Touch panel for the students. The students took turns coming to the board to complete money word problems and then write checks for the appropriate amounts owed.

P12 was observed having students identify and count bills and coins on the Clear Touch panel. P12 also had the students complete a Kahoot! quiz displayed on the panel to review word problems addressing telling time and determining elapsed time. P1 had higher functioning students with disabilities working on basic algebra skills displayed on the Smartboard. The students were completing word problems and solving for x during the classroom observation.

Four participants, P1, P6, P9, and P11 included social studies in lessons during the classroom observations. P9 displayed and discussed a map of the United States on the Clear Touch panel. P6 used IWB technology while teaching a lesson on the Titanic by presenting and discussing several video documentaries and pictures of the famous passenger liner. P6 also used the Clear Touch panel to display comparisons of the Titanic's passenger numbers to those of local populations. P1 used the Smartboard to display text describing three famous African Americans. Then P1 used an interactive graphic organizer for a class activity in which students were to match historical facts to the famous people being discussed. Afterwards, P1 had students complete a true or false activity presented on the Smartboard based on the facts about the famous Americans presented during the graphic organizer activity.

P11 used the Smartboard throughout a social studies lesson on the bombing of Pearl Harbor. P11 displayed and discussed several pictures with IWB technology including an aerial view of the harbor, the destruction of Pearl Harbor and the USS Arizona, and a map indicating the proximity of Japan to the harbor. P11 also used IWB technology to show a documentary and an animated video describing the events of Pearl Harbor. P11 also displayed and discussed a news article from the *Honolulu Star-Bulletin* entitled "War! Oahu Bombed by Japanese Planes" on the Smartboard. P11 attempted to present a map of Pearl Harbor on the board but discovered the map had been recently blocked. Finally, P11 concluded the social studies lesson by using a Google document with IWB technology to review notes taken in a previous class lesson and have students take additional notes on Pearl Harbor while modeling note-taking on the Smartboard.

Seven participants were observed teaching at least one lesson focusing on life skills for students with disabilities. Four participants, P3, P4, P8, and P10 had classroom activities addressing calendar and scheduling skills. P3 was observed teaching a lesson from the Smartboard that included an interactive calendar with songs and visuals linked to correspond to the days of the week and included information about the current weather. P4 also addressed the days of the week in an interactive calendar using the Smartboard. The presentation included a dress-a-person activity, weather, and a cavities and tooth brushing activity. P8 led a calendar lesson involving multiple activities with the Clear Touch panel. The students drag scheduled classroom events into a digital calendar and dragged answers to calendar comprehension questions into a February calendar. P8 also had students play a calendar comprehension game and had them say the days of the week paired with sign language symbols displayed on the interactive panel. P10 had students engage in calendar and scheduling activities on the Smartboard.

Three participants addressed current events with students. P2 presented a video on facial recognition technology on the Clear Touch panel and led a class discussion on the topic. In a similar fashion, P11 had students view a video on the Coronavirus that led to a class discussion on the importance of handwashing. Rather than addressing a current event, P7 used IWB technology to show students current videos demonstrating how to make hamburgers. Then the students were engaged in a class discussion about the procedures viewed before visiting a classroom kitchen to actually make hamburgers.

Four participants were observed using IWB technology for addressing classroom management and routines. P3 displayed a class roster on the Smartboard and had one student take attendance by referring to the board and determining who was present in the classroom. P3 also used IWB technology to present a Smartboard presentation with embedded pictures and music as P3 and two paraprofessionals completed a physical therapy routine with students with more severe disabilities. P5 also used IWB technology to have the students take attendance. A class roster was displayed through the Positive Behavioral Interventions and Supports (PBIS) website. When the students arrived on time, they were to check in to class by touching their name on the Clear Touch panel indicating they were present and awarding them points for positive behavior. P5 also used IWB technology to display visual timers as the students were working on classroom assignments. The timers counted down the time remaining in the activity and displayed characters completing a timed event such as a swimming or running competition to visually indicate how much time students had left to work on each assignment.

P10 and P11 used IWB technology to address having students make their daily lunch choices. P10 had students approach the Smartboard to read the lunch menu and drag a picture of a lunch choice under their name listed on the board. P11 also addressed lunch menu choices with the Smartboard by having a student come to the board and read each choice to classmates, so they could vocalize lunch choices. These seemingly similar lunch choice activities demonstrate how some participants use integrated IWB technology, and others display items on IWB technology as a substitution for traditional paper and pencil tasks.

Teaching Resources. During classroom observations, the 12 participants used a variety of resources with IWB technology when teaching lessons and engaging students with disabilities in classroom activities. The most common resources used by participants during the observations were videos. Seven participants, P2, P3, P6, P7, P8, P9, and P11, showed one or more video presentations during at least a portion of classroom observations. P9 displayed videos throughout the entirety of the classroom observation. These videos and video clips were materials participants accessed through several sources including YouTube, CNN News, viewpure.com, safeshare.com from National Geographic, and usatoday.com/humankind.

Five participants were observed using interactive board technology for another display purpose, presenting text and articles for students with disabilities to read and discuss in class. Participants P1, P4, P6, P9, and P11 presented articles they found on the internet. The sources for these texts included materials from News2You and USA Today. In addition, four participants, P1, P2, P4, and P5, used IWB technology to display workbook pages. All four participants digitized copies of math workbooks to present to students on the Smartboard or Clear Touch panel. P1 also used English workbook pages to present grammar and parts of speech activities for students with disabilities. P6 and P11 both used interactive technology to display pictures from the internet during observed lessons.

Five participants, P1, P3, P4, P10, and P11, included at least one teacher-made activity during classroom observations. P1 used a graphic organizer she created. P3 displayed a map she had designed and story slides she created with pictures and sounds to present an adapted version of a book. P4 displayed digital task cards she developed to have students detect missing items and created documents with bills to display on the Smartboard for students to practice counting money and determining change. P10 was observed using interactive calendar activities and a writing activity she created for students. P11 used the Smartboard to create documents to demonstrate notetaking and to review previous class notes. P11 was also observed using an IWB activity she created to review counting coins with students.

Some resources were only observed in one or two participants' classrooms. Two participants used News2You during classroom observations. P4 and P9 presented articles to students from the News2You website. P4 also used News2You to present a calendar, a tooth brushing activity, and an interactive memory game. P5 used some resources that only she was observed using. P5 incorporated elements from the Positive Behavior Interventions and Supports (PBIS) website to take attendance and offer students reward points and presented math materials from TouchMath.com and used a countdown timer from Stopwatch.com on the Clear Touch panel.

P8 was observed using Starfall.com and ABCya.com on the Clear Touch panel to teach students calendar skills. P3 used an adapted story from a state resource board to display and discuss the plot summary of a book. P12 accessed Kahoot! online to present a comprehension quiz to students on the Clear Touch panel.

Theme 2: Interactive Whiteboard Usage Reported

The second major theme, (2) IWB usage reported, emerged from individual participant interviews conducted to address how high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms. Although the classroom observations revealed how each participant used IWB technology during the individual observation, they had a variety of additional ways of using IWB technology that I was unable to view in single observation sessions.

The open-ended interviews enabled participants to share multiple uses of IWB technology and describe the various software programs and activities being used to teach students with disabilities in self-contained classrooms. Overall, the reported usage of classroom IWBs was similar, but the observed usage described above did vary in the teaching resources, school subjects and learning activities participants reported addressing and using with IWB technology. Consequently, the minor themes that emerged under the category of IWB usage reported were (a) teaching resources and (b) school subjects and learning activities.

Teaching Resources. When asked about the resources used with IWB technology, the 12 participants shared a wide variety of resources used to plan lessons and activities for students with mild to profound disabilities. Some resources were mentioned again and again whereas others were brought up infrequently.

The most common resource mentioned by participants was Unique Learning Systems (ULS), an interactive standards-based curriculum specifically designed for students with special needs. Eight participants interviewed said they use Unique Learning

Systems online activities with the students in the special education classrooms. P1, P2, P4, P6, P8, P9, P10, and P11 described using the program successfully. P4 described how students enjoy "making choice selections with [the Smartboard]. They like to use the pens to make selections and write." P4 further explained:

> We do some click and drag with it also with the ULS program. The News2You program does not have a lot of click and drag, but with ULS they can click and drag. There will be a bank of answers like a one square selection and a bank of five answers they can click and drag. They like that. You know it just gets them up moving. You know our kids. They can't sit still. It gets them up out of their seats, and it's fun.

News2You, an online weekly newspaper designed for individuals with special needs, was another popular resource. Seven participants, P1, P4, P8, P9, P10, P11, and P12, described having students use News2You on a regular basis. P11 further described using CNN Student News, a ten-minute daily news program designed for middle and high school students because these students with disabilities are higher functioning. P2 agreed that CNN Student News is a helpful program to share current events with students. P11 further explained:

> We do use News2You sometimes in this room, but with my students being so high, it's just not always appropriate...it's fun with the Smartboard when they can get up there and push it and do things. We just don't use [News2You] on a daily basis because it's not academically appropriate for my group.

Six of the seven participants with Clear Touch panels in the classrooms, P5, P6, P7, P8, P9, and P12, reported relying on Snowflake, a software package available on Clear Touch for creating interactive educational tasks, for some classroom activities. P5 clarified that although she has used Snowflake that she is not very familiar with it yet.

Five participants, P1, P2, P3, P10, and P11 spoke of using Google Suite applications with IWB technology. These participants specifically mentioned Google Docs, Sheets, Slides, and Calendars when planning and creating activities for students. During an interview, P11 stated, “As far as tools, I use a whole lot of Google everything.” P11 explained that there was an issue with using Google applications with Smartboard technology, because “the pens and everything don’t always work on the Google stuff, but if I download it as a PowerPoint...it’ll work on it.”

P11 was not the only participant to explain the benefit of using Microsoft PowerPoint as a design tool. Five participants spoke of using PowerPoint presentations in classrooms. P3 delineated a preference for using PowerPoint to create presentations:

> I use a lot of PowerPoint. For me it is easier to manipulate where the pictures go and add in the sounds. I’ve done Google Slides, but honestly, it’s not as user friendly as PowerPoint, and you can transfer it right over to Google Slides if you need to.

Several participants mentioned using videos and video clips in classrooms, and P7, and P8 specified finding many videos on YouTube. Both described using YouTube videos to demonstrate cooking techniques.

Four of the five participants with Smartboards in classrooms mentioned using programs through Smart technology. P1 and P3 described using Smart Learning Suite applications to access and create activities for students. P3 explained:

> I have the [Smartboard Learning Suite] technology loaded on my laptop. It doesn't connect to the Smartboard; it's just for me to be able to [create an activity] at home and then bring it in. And so that's nice that I can sit there and really try [the activity] before I present it to the class.

On the other hand, P4 and P11 complained that, because the school site license for Smart Learning Suite and Smartboard Exchange had lapsed, participants were no longer able to access even the materials created previously for students in Smart Learning Suite. P4 stated, "I'm actually thinking next year of just getting [a site license for Smart Learning Suite] myself, asking how much a subscription is and buying it myself.

Three of the 7 participants with Clear Touch panels, P5, P6, and P7, specified that Note, software provided on a Clear Touch panel that enables users to write, draw and create, was useful in classrooms. P11 and P12 reported liking to have students use Kahoot! learning games to take quizzes. Meanwhile, P6 and P8 use ABCya.com, a website with activities and games for students in pre-kindergarten through sixth grade. According to P6, ABCya.com has "all kinds of printables, and it's got games. It's really cool. It's got a lot of really neat stuff in there for beginning learners, emerging readers."

P4 and P11 described sometimes downloading resources from Teachers Pay Teachers, a marketing website that offers materials created by teachers. P4 explained gathering activities from the [State] Resource Board, a website that provides adapted materials for students with special needs.

P8 explained that two of the resources she accesses are online speech therapy resources provided by the school speech therapist and the Starfall website to find activities for the students. P10 reported that Starfall calendars "always seemed elementary" for the higher functioning students with disabilities. P10 said, "They would roll their eyes every time I said it was time to look at our calendar," so P10 started designing calendars to present on the Smartboard.

There were several resources that were only suggested by a single participant. P1 described relying on easyCBM, an online program offering curriculum-based measures or reading and math benchmark assessments and reports for students with special needs. P5 mentioned using Nearpod and NewsELA for articles to present to students on the Clear Touch panel. P5 also described using Online Stopwatch to present visual timers in the classroom. P6 described using Education.com and ESL.com with students with special needs. P12 spoke positively about the use of Brainpop, a site for students featuring animated activities in multiple subject areas. P12 highly recommended the use of Storyline online and further explained:

> It is a wonderful [resource]. One of my professors...turned me onto that. It's through the SAG Foundation, you know the Screen Actors' Guild, so famous people are reading children's books. Oh, it's so cool! They basically turn the book into a little movie. Like it's the exact pages from the book, but they animate some of the stuff so you can watch. Oh, I love it!

In addition to sharing what resources were being used, participants were asked to specify what subjects were taught with IWB technology and to elaborate on what learning activities were used the aforementioned resources to accomplish. Participants explained what subjects were taught and described a wide variety of learning activities depending on students' special needs and participants' learning objectives for specific students. Detailed descriptions of the school subjects taught and the various learning activities reported by participants follow.

School Subjects and Learning Activities. When asked what school subjects were addressed, all 12 participants reported teaching similar subjects: English and language arts, mathematics, science, and social studies. In addition, participants reported using IWB technology for teaching life skills and for addressing classroom management and routines. Participants also described the use of IWB technology to offer students classroom rewards. All subjects for which participants reported using IWB technology are presented in Table 2.

Table 2

Subjects for Which Participants Reported Using IWB Technology

	Language arts	Math	Science	Social studies	Life skills	Management	Rewards
P1	X	X	X	X		X	
P2	X	X	X		X	X	
P3	X		X	X	X		X
P4	X	X	X	X	X		X
P5	X	X	X		X	X	
P6	X	X	X	X		X	
P7				X	X	X	X
P8	X				X	X	X
P9		X					
P10	X	X			X	X	
P11	X	X	X	X	X	X	
P12	X	X	X	X	X	X	X

Note. The subject *life skills* includes cooking activities, calendar skills, personal hygiene lessons, using menus, viewing and discussing current events, and training for community-based instruction. *Management* refers to using IWB technology for classroom routines and management, and *rewards* refers to classroom rewards being delivered with IWB technology.

When asked what learning activities were conducted with IWB technology, participants shared a wide variety of learning activities that students with mild to profound disabilities engage in. Some activities were mentioned frequently. However, some learning activities and lessons were incorporated by only a small number of participants.

When asked to describe the use of IWB technology in classrooms, all 12 participants explained using the technology to instruct students in English/language arts skills and math concepts. Eight participants described using IWB technology to teach science, and eight participants described using the technology to address social studies concepts. Eight participants explained using IWB technology to address life skills. Ten participants detailed using the technology to address classroom management and routines, and five reported having students use IWB technology as a classroom reward (See Table 2).

All of the 12 participants reported conducting IWB activities to teach English and language arts skills to students with disabilities. Participants' most common usage described was using IWB technology to read books and other texts aloud in classrooms. Eight participants, P1, P3, P5, P6, P8, P9, P11, and P12, reported relying on IWB technology to address students' reading recognition and reading comprehension skills in this manner. P1 specified using the easyCBM program with IWB technology to address students' comprehension skills because the program has a read-aloud option. P9 stated preferring to present reading materials on a Clear Touch panel with MobyMax lessons and activities. P3 described having students listen to adapted novels with the Smartboard and then creating activities for the students to complete related to each book. P3 described creating a game for students to make a digital Frankenstein monster after the students read and listened to an adapted version of Mary Shelley's *Frankenstein*. P3 shared one of the elements on the Smartboard to use with reading groups:

> They have interactive dice that I really like to use... not just numbers. You can do pictures. You can do options, so I put the body parts on the dice. [I tell the students], 'Well, you already have two legs; you can't have another one. It's someone else's turn.' Whoever built their monster the fastest won.

P5 uses Nearpod videos, described as virtual field trips, with IWB technology for reading instruction. P5 explained that the comprehension questions in the Nearpod video will show up on the Clear Touch panel, and the students have to answer them. P6 described using audiobooks:

> Most of the time I have to read stories as a whole group, or we'll listen [to a book]. We'll have the text on the Clear Touch, but it will be an audiobook. And so some of the kids can follow along and look at the pictures and some of the words while we listen to the text. So we use that for a lot of stories, any stories I can find that include an audio version. I always try to do those.

P8 described accessing reading material through IDocs to help students with reading skills:

> If I go to IDocs, it can also speak, so let's say if [a student] is having difficulty with a word, he clicks on it, and it will repeat. It will, you know, tell what that word is. And then he can repeat after it. That's another thing we use.

P12 described the use of Storyline Online, a free program in which "famous people are reading children's books." P12 noted, "Sometimes it's more interesting to hear Harry Styles instead of Mrs. [P12]" read a book. Rather than using audiobooks, P10 described the use of adapted books with a Smartboard when teaching a recent novel to students with disabilities:

> We are reading the *Chronicles of Narnia*. We teachers are actually reading it out loud to [the students], but each chapter, we put the adapted version on the Smartboard, and they have to read it from the Smartboard. Technically we are

> reading each chapter twice, but [the teachers] are reading the real one, and the [students are] reading the adapted one off the Smartboard.

Six participants, P3, P4, P5, P6, P8, and P12, described the usefulness of IWB technology for teaching sight words, vocabulary, and spelling. P4 described using the Smartboard to present digital flashcards to promote language development with students. P4 stated, “It’s a really good communication tool. It helps with language development. We can see and talk about what we see. It makes it more fun and interactive instead of me just holding up a flashcard.” P3 explained liking to have the students “match the picture to the vocabulary word” on the Smartboard to aid with language development. P6 described using sight words from ESL.com to present with IWB technology for the class, and P12 reported using a Clear Touch panel to present Dolch sight words and Snowflake spelling activities for students.

P5 described using the pens and highlighters on a Clear Touch panel to aid with language development and reported putting articles up on a panel for students to “highlight text as they’re reading or circle their key vocabulary words...so that they know to write [them] down.” P8 also mentioned the advantage of being able to put materials on a Clear Touch panel to highlight or circle text for students whether reading an article or completing a Starfall spelling lesson. P8 further explained, “While we are still on a website, we can write notes while we are answering questions” during English language arts lessons.

Six participants, P1, P2, P4, P6, P10, and P12, reported using IWB technology to address written expression and grammar lessons in self-contained classrooms. P1 reported using a Smartboard to have students correct sentence formation errors and to journal about various topics. P6 described presenting writing opportunities for students on a Clear Touch panel and liking to have the students complete pre-writing brainstorming exercises and graphic organizers as a class with IWB technology to help the students organize ideas before beginning a writing assignment.

P2 reported teaching grammar lessons by posting DOL (Daily Oral Language) assignments, that include sentences with errors, on a Clear Touch panel because "the kids have to come up and correct it...They like that!" P4 explained using IWB technology to have the students practice writing "personal information: name, address, phone number." P4 has lower functioning students identify their name and circle it on the Smartboard for a writing task. P10 also reported incorporating IWB handwriting in English language arts skills and described having some lower functioning students practice writing their names and others engaging in more difficult writing tasks. P10 explained:

> We use the board daily [for writing] and journaling...I did a letter writing activity a couple of weeks ago, and I use the Smartboard as an example of how to address the envelope. I put an example up there for them...Well, sweet [student's name] had to get like five different envelopes because he kept writing the address like everywhere. He would just look at me. I'd say, 'it's on the board.'

Some language arts activities were only mentioned by a few participants. P6 reported using ESL.com, ABCya.com, and Unique Learning Systems to present language arts skills for students in game formats. Likewise, P12 described having students play games of Kahoot! to reinforce language arts skills and also reported using a Clear Touch panel to teach a poetry reading unit with students. P8 was the only participant who reported teaching students sign language with the use of IWB technology. In addition, P8 described helping a reluctant student improve oral expression skills by having him direct his lower functioning peers through language arts lessons presented on the classroom Clear Touch panel.

All 12 participants reported regularly using IWB technology to teach a variety of mathematics skills to students with disabilities, the most frequently mentioned being money skills. Seven participants, P2, P4, P5, P6, P10, P11, and P12, specifically described teaching some form of money concepts, including counting money, purchasing, and determining change, with Clear Touch or Smartboard technology. P2 described having students use a program on a Clear Touch panel "where you can pull dollars and change on it, so we can use that to count money" and commented on the realistic pictures of the money provided with the program. P4 described having students work on purchasing skills digitally by having them "do a money, a cash register [activity] where you can operate the cash register and pay [by clicking and dragging] the right amount of money to the register." P11 explained that the students with special needs are responsible for running the school store at the high school. P11 uses Smartboard technology to have the students engage in money skills to determine "pay" based on an hourly wage for the time each student participates in running the school store and then allows them to determine purchases of items from the school store with any calculated "income."

P5 reported enjoying using a Clear Touch Panel to have students practice money counting and purchasing concepts by displaying TouchMath activities on the board. P5 described having students complete the activities at desks and then having them come to the board to demonstrate how to complete one of the math problems. P5 explained:

> We usually review our TouchMoney math on the Clear panel, so they come up and they take turns volunteering. And if they don't volunteer, they get voluntold to come up anyway and show their work. They are familiar, they are very familiar with using the board in that way. So they can circle their answers, show their work, mark their answers. They like to show off that they got the right answer, and they know how they got there.

Five participants, P4, P6, P7, P9, and P12, mentioned relying on a Smartboard or Clear Touch panel to review basic math facts and to offer guided practice for students. P4 described using a board to display math flashcards to review facts with students, and P9 said that students access MobyMax, an academic computer program, to practice basic math skills in the classroom.

Four participants, P2, P3, P4, and P12, expressed using IWB technology to teach students how to tell time and how to determine elapsed time. P2 stated that "clocks are easy to do on [the Clear Touch], drawing hands on the clocks or telling time on the clocks." P4 explained incorporating time-telling and elapsed time activities on a Smartboard as functional skills. P4 reported:

> We have done time and elapsed time like, 'In 15 minutes it will be what time?' So they have to make the clock show that time. 'You get a 30-minute break. What time do you report back to work?' You know if it's one o'clock, you come back at one thirty. It's that math/vocational [combination] really.

The practice of displaying digital math workbook pages on IWB technology was mentioned by four participants. P1, P2, P5 and P12 described the usefulness of having traditional worksheets projected on a board or panel to model how to solve math problems for students or have students come to the board to interact with the materials and model math-solving skills for peers. P1 reported that higher functioning students with disabilities were accustomed to solving algebra word problems displayed on the Smartboard. P2 explained that displaying worksheet pages on a Clear Touch panel has "actually made it a lot easier to write on top of worksheets" to teach a math lesson to the whole class. P2 further stated, "I like workbooks that start off easy and build on each other." P12 stated, "If we're doing a worksheet, I'll project the worksheet up there so that I can use the marker or the highlighter to help them with answers and stuff on the board as they're copying it down."

Three participants described relying on IWB technology to teach math alternate assessment standards to students with disabilities. P1 explained that using a Smartboard was beneficial when teaching word problems requiring algebraic equations. P4 explained for math instruction using the technology "a lot for [alternative assessment standards], just a lot of those activities" in general. P8 described the benefits of looking at a blueprint of a state's alternative assessment math standards and using IWB technology "to teach those standards in the classroom."

Three participants spoke of teaching individual math skills that were not mentioned by any other participants. P1 described engaging students in lessons on reducing fractions by presenting problems on a Smartboard to model how to reduce them by displaying the problems and then having students take turns orally reasoning how to reduce each fraction correctly. P2 described using a Clear Touch panel to display "kitchen math" activities where students are taught to half or double a recipe. P6, on the other hand, explained that "any kinds of surveys or polls, we do on Clear Touch." P6 clarified that once students complete a survey or poll, it gives them the opportunity to develop a graph or chart based on collected data results.

The eight participants who reported using IWB technology for science described several learning activities. Four participants, P3, P4, P8 and P11 specifically described using the technology for teaching state alternative assessment science standards. P3 reported using a Smartboard to teach interactive science lessons about DNA and RNA. P11 explained having the students create individual flipbooks to organize materials on state alternate assessment science standards. P11 stated, "A lot of this crew wants to go to a post-secondary...program, so we do practice note-taking skills." To accomplish this, the students refer to example notes on the Smartboard to complete individual flipbooks. P11 further explained, "We did solutions, and we did acids and bases...Teaching almost all of my [alternative assessment] standards uses the Smartboard in some sense. A lot of times it is for visuals like when we are doing experiments."

P9 also mentioned note taking as a science activity using a Clear Touch panel. P9 explained that five students leave the classroom to go to an elective veterinary science class and that the agriculture teacher provides digital class notes for the students. When the students with disabilities return to P9's classroom, the notes are presented on the Clear Touch panel, and the students complete the notes. P9 said, "They know how to go up there and navigate to switch it to the next slide so that... they can... look at it" to take any vet science notes.

Three participants, P5, P6 and P12 described additional science activities using IWB technology. P5 reported having students play Bingo with science vocabulary words on a Clear Touch panel. P6 explained using IWB technology to teach science lessons on force and motion. P6 said, "Earlier in the year, we looked at the tallest buildings, and we built racecars that we were using to see force, and we're going to do rollercoasters. I have some [students] that really get into it!" P12 described using a Snowflake activity with an interactive "blank body diagram with all the organs of the digestive system" with science students. P12 described frequently using a Clear Touch panel to teach science concepts:

> We did more than just the digestive system. We did like a whole unit on human anatomy, so we did the skeletal system and the cardiovascular system. We've also done atoms, subatomic particles, and gravity. We've done the phases of matter, the plant life cycle, and the food web. Those are the major ones.

Of the eight participants who described using IWB technology to teach social studies, three, P4, P8, and P11, reported using a board to address state alternate assessment standards. P11 described using flipbooks from Teachers Pay Teachers to teach information about the United States Constitution to address one of the teaching standards. P11 described posting the digital flipbook on a given topic on a Smartboard and having paper copies of the flipbooks for the students to complete while explaining and filling in the important notes on the IWB. P11 reported:

> I really love flipbooks with their [alternative assessment] standards, you know, like taking notes. The [alternate assessment] standards are not the most fun, so a lot of times there'll be an example up on the Smartboard or some things to copy from the board, but the [students] are making a flipbook...our last one we did was the Constitution. We like using a flipbook so that they're using their hands to put it together.

P11 further described using IWB to teach a lesson on Mardi Gras with News2You so that "the kids [could] get up and play with the board." P11 explained that News2You "had a really good issue [on Mardi Gras], and the kids liked it." P11 also reported using a Smartboard to teach a social studies unit on Pearl Harbor and described showing documents, pictures and maps to display factual information about Pearl Harbor rather than just having students listen and take notes.

P2 also described completing social studies projects using IWB technology. P2 explained preferring the students do group projects:

> We do lots of research projects where we are studying different topics, and then they are assigned to make a Google slide or two that they actually will come up and present. We'll put it together and there will be ten slides, one slide from each student in the class, and we'll present it together.

Another social studies activity mentioned by P3 and P7 was map skills. These participants described using IWB technology to display and discuss maps. P7 described providing each student a paper map, and then interacting with the Clear Touch panel in to point locations "out to them and see if they're really getting it." P7 further explained the use of IWB technology for social studies activities by describing how the previous week "the social studies group discovered this game where they can match the flags and the countries, so I let them use it for that."

In a similar fashion, P1 described having students use IWB to complete an activity based on the social studies standards. P1 described having students "drag and drop states and capitols" on the IWB as a geography activity.

P12 described using IWB technology to address multiple social studies topics. P12 described having students complete lessons using the Clear Touch panel and then giving quick reviews with Kahoot! quizzes displayed on the panel. P12 further elaborated on the social studies topics addressed with students:

> Our most common ones are economics, so budgeting, supply and demand, you know, wants verses needs, US history, world history...government, city, state, to federal. And then sometimes we do special [themes]. Like the month of February, we did a lot for Black History Month.

Because many self-help skills need to be taught directly to students with more moderate disabilities, seven participants P2, P3, P4, P7, P8, P10, and P11, reported using IWB technology to directly teach life skills to the self-contained students in special education classrooms. The most common topics, mentioned by P2, P3, P4, P8, P10, and P11, were calendars, scheduling, and current events. P2 described using CNN10 every day by having the students view the news and then having a class discussion on the current events introduced. P2 also described having students complete calendar activities with a Clear Touch panel:

> My students love the calendar. It's more like a high school version of the calendar. You know, it's not quite like the kindergarten calendar...it is all linked to their Chromebooks, and some of them even link it to their phones. So if I put that we have a fieldtrip on the calendar, then it goes to their Chromebooks, and it goes to their phones.

P2 reported having students do calendar and current events activities daily in the classroom. P3 described conducting calendar and current events activities with students regularly. P3 also described pairing tactile examples with the daily calendar activities presented on the Smartboard to benefit more moderately impaired students and students with low or no vision. P3 explained:

> Due to the multiple handicaps in here, we have to have more tactile things that maybe go along with what it is up on the board...In January, I had a pair of mittens so that we could hear about how mittens are made or how they came about... It will be fun when we do March and April. The will be some flowers and stuff they will get to pick up. They will touch the seeds that will match the pictures on the screen.

P4 reported using News2You for daily calendar and current events lessons. P8 addressed preferring to use News2You for current events lessons and presenting the Starfall calendar for daily calendar activities. P10 reported having the class of higher functioning students with disabilities watch the news and creating interactive calendars to present each day on the Smartboard. P10 explained:

> I screen shot a calendar, and then I just put in all the stuff we have during the month, and we kind of drag and drop throughout the month into the calendar. I'll use that to just kind of talk through the days of the week and ask questions. It's kind of different every day... [Several students] have their own personal calendar, and they get it out and write what's happening during the week based on what we do on the board, so kind of scheduling type things.

P11 reported presenting the news to students almost every morning. P11 clarified, "It just depends on what they're talking about. Now we're hearing about the coronavirus."

Four participants, P4, P7, P8, and P11, described teaching students career preparatory skills using IWB technology. P4 reported having higher functioning students fill out job applications online from the Smartboard. P8 also described having students use IWB technology for job applications and resumes and described liking to "pull up a template on the Clear Touch and give the students paper copies" to fill in during a lesson. P7 described the advantage of using IWB technology when teaching students about interviewing for jobs. P7 explained:

> If we're talking about appropriate dress for an interview, you know, I might put some pictures up there for them to identify what's appropriate and what's not appropriate...One of my students said, "What is khaki? What does khaki look like?" So I, you know, got a picture and put it up there to show them, you know, what khaki is.

P11 reported using the Smartboard to teach students note-taking skills and to prepare for weekly Community Based Instruction (CBI) worksites at businesses including TJMaxx, Publix, Cici's Pizza, a small local zoo, a bike shop, and a primary school. P11 clarified initially displaying and explaining job tasks with a Smartboard and then shrinking and copying the pictures with IWB technology to make small instruction booklets with prompts for the students to take to jobsites. P11 explained:

> When we are training to go to the job sites, we try to find pictures that are close [to the anticipated tasks], so that way when they go onto the job sites the first time, they kind of know what to expect...I take my [jobsite] notes and show them as step-by-step visuals...on the Smartboard... (*showing the interviewer an example of a series of pictured tasks)*. We made [one student's booklet] small for his TJMaxx job...he carries his with him at work.

Participants P4, P7, P8, and P9 reported using IWB technology to teach grocery shopping and cooking skills. P4 described doing a shopping activity with students using simulated grocery aisles. P7 explained using a Clear Touch panel to present cooking skills before having students commence a cooking activity. P7 said, "Before we go to the life skills room to cook...I use it to show them a clip of whatever it is we are cooking and [the procedures] to be done when we go in there." P8 described having students select recipes, buy ingredients on CBI fieldtrips, and cook the recipes with little assistance. Furthermore, P8 described videotaping students' cooking presentations and showing the class the videos so that classmates can discuss how to improve individual cooking skills. P8 said that students learn from each other by viewing all the videos and addressing "teaspoon versus tablespoon errors," for example, demonstrated by classmates. P8 and P9 also described having students watch cooking videos during lunch or recreation times in classrooms on the Clear Touch panels.

P10 and P11 reported frequently teaching budgeting and accounting skills to students with special needs using IWB technology. P10 explained having students help run the school store and described having the students update the stock inventory with a Google spreadsheet displayed on the Smartboard after returning from CBI trips with stock purchased at Sam's. P10 clarified, "We'll project it up like a list and assign a kid [to each product] so that they can see what their job is to restock."

P11 explained using IWB technology to display visuals of accounting logs and checkbooks for students to use when determining "time cards, wages, and pay" for working in the school store. P11 said that the students "get paid [a fake minimum wage] based on work with the school store" and that "they spend their money on snacks and get to socialize and enjoy their snacks after they complete their individual checkbook" entries correctly. P11 also described using a Smartboard to prepare students to order from menus independently when going to restaurants on frequent CBI trips. P11 said:

> We'll use the Smartboard, and we'll pull the menu up...and we will actually go ahead and make their menu selections before going...When we do the menu review, they also have to figure out their tax and their tip before going, so they know...an estimate of how much money to bring with them.

Participants P4 and P10 described teaching lower functioning students to recognize safety signs and symbols in life skills lessons. P4 explained using the

Smartboard to present interactive activities for students to match or circle safety signs, such as a “Do not enter” sign, to have them recognize the signs.

P2 reported teaching students medical life skills by having them use a Red Cross interactive program on the Clear Touch panel. P2 said, “There’s a really cool interactive CPR/first aid program where you go in and you touch different things, and you have to move the stuff away from the person having a seizure.” P2 also explained using IWB technology to teach personal hygiene lessons to students with disabilities.

Nine participants, P1, P2, P5, P6, P7, P8, P10, P11, and P12, reported using IWB technology to assist with classroom routines and management. P8 described using Clear Touch panels as a calming device for students. P8 explained having a higher functioning student who “likes to punch things.” Initially afraid of the student possibly breaking the panel, P8 later realized:

> To my surprise, [the Clear Touch panel] has actually come as a blessing to that particular child because he likes to scribble and that is, I think, kind of a therapy that works for him. He will cover the whole board in red. Then he will just change colors and then draw a face in it...I think that is satisfying for him and kind of therapeutic... That helped him calm down, and we use it all the time to help him relax.

P1, P2, and P8 each described using IWB technology to have others work with students with disabilities. P1 described having student teacher from a local university use the Smartboard for classroom instruction to benefit the students and so that the student teacher will gain more experience in using the technology. Likewise, P2 has trained student aids, general education students assigned to help in the classroom, to use the Clear Touch panel to assist peers with disabilities. P2 said, “I try really hard to teach my student aids how to teach also, so they’ll run small group” instruction using IWB technology. P8 described training one of the higher functioning students with disabilities to lead small group instruction with peers during calendar lessons. P8 explained:

> I let him take the initiative to work with my small group...the [goal] is to improve [the higher functioning student’s] social communication because he is very introverted. He does not like to talk a lot...It gives him confidence because he knows that he can do something for [his classmates] and that he’s capable of teaching them something.

P10 and P11 reported using IWB technology to have students make daily lunch choices. P10 explained having a student who has Celiac disease, which causes him to have an immune reaction to eating gluten. P10 has students preview the menu on the Smartboard daily to ensure the student diagnosed with Celiac disease has chosen a gluten-free lunch and so that all the students can discuss lunch preferences. P11 described discussing the daily lunch menu presented on the Smartboard as part of the students’ typical routine.

P5 reported several uses of IWB technology for classroom routines and management. P5 described having students “clock in” on the Clear Touch panel when arriving each day. This practice enables the students to be responsible for taking class roll and results in them earning Positive Behavior Intervention and Supports (PBIS) points. P5 also described using IWB technology to present bell ringers, independent activities the students complete upon entering the classroom to get them in the seats and ready for class. P5 also explained using timers from Online Stopwatch on the Clear Touch panel to encourage students to work diligently on assignments. The timers have visuals of cartoon characters competing in races. P5 said, “They like [the timers]. They place bets on who’s going to win, and I’m like ‘y’all that’s not real.’ But they don’t care.”

P6 explained a routine of using the Clear Touch to present graphic organizers to use with lessons. P7 described using IWB technology whenever advisement/homeroom students are scheduled to meet. P7 shows the presentations that administrators send to share with advisement students on the Clear Touch panel.

Five participants, P3, P4, P7, P8, and P12, reported using IWB technology to provide some type of classroom reward or entertainment for students. Two participants, P8 and P12, described letting students watch cooking shows with the board. P12 described watching the show Cake Wars with students. P12 said, “They love it! They watch the cupcake or the Cake Wars because a lot of mine really like to cook.” P8 said that students enjoy watching cooking videos. They avoid the noisy lunchroom and eat in the classroom together instead. P8 explained,

> Since we got this [Clear Touch panel]...they like to come in here, and when they’re eating, they like to watch cooking videos. So one student that I have is interested in being a chef, so he comes, and he takes over. He will play YouTube [cooking videos]. He will get into it. He will choose what he wants to watch, and we will sit there and listen to that music. Because we are eating, we are not feeling hungry while we are watching. I think everybody in here gets something

> out of it, either identifying ingredients or identifying the utensils or noting temperature or time...we're still being productive during our lunch time, and they don't even realize that they are learning.

Two participants, P8 and P12, described having some students use IWB technology for drawing and coloring as a reward activity. P7 and P12 both mentioned having students play games on IWB as a reward. P7 describe allowing "students to use Snowflake to do different games. They usually use it for matching games and [digital] puzzles." P12 said students use the board "occasionally during rec and leisure time," and they like to play sorting and matching games on Snowflake "because they actually can get up and touch" the panel to play each game. P12 explained that some lower functioning students in class the previous year would play some instruments offered through Snowflake. P12 said, "Sometimes I would pull up the drum set and then let them play the drums or the keyboard...it was a little more appropriate for them."

P3 mentioned allowing students to watch videos. P3 preferred having students "watching videos of people telling jokes." P3 further described collecting video links for students and admitted, "It's not very interactive, but [the students] are able to pick things out by making choices" of which videos they would like to view as a reward.

P4 described doing entertaining holiday activities with IWB technology for students. P4 elaborated, "For example when it was Halloween, we did trick-or-treating with it, like a virtual trick-or-treating where they got to choose the candy to put in the bag. It is a click and drag kind of thing." P4 explained that the students enjoy celebrating holidays by doing interactive activities with the board.

Summary of IWB Usage, Observed and Reported. According to the data in this study, the usage of IWB technology in each classroom was similar, but it did vary in the school subjects, learning activities, and teaching resources participants were addressing and using with IWB technology. Participants were observed using the technology to teach English/language arts, math and social studies. Participants also reported using the technology to teach science. Participants were observed and reported using a wide range of learning activities and teaching resources that consisted of commercial and teacher-made materials.

Research Subquestions 1 and 2

The research subquestions asked “How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices that are or are not delineated by the constructivist principles of learning?” Two additional major themes emerged from the data analyzed from classroom observations and participant interviews to address these research subquestions: (3) lesson design and (4) teacher perceptions.

Theme 3: Lesson Design

The third major theme of this study, (3) lesson design, emerged from the data collected concerning whether teachers use IWB technology in a teacher- or student-centered fashion. Participants responded by demonstrating and offering examples IWB technology usage. This resulted in descriptions of various lesson designs including teacher-centered, student-centered, and collaborative technology. All participants in this study worked for school systems in which Chromebooks were provided for each high school student. Five participants reported using IWB technology in conjunction with students' Chromebooks resulting in a collaborative technology design. Therefore, the minor themes that emerged under the category of lesson design were (a) teacher-centered designs, (b) student-centered designs, and (c) collaborative technology designs.

Teacher-Centered Designs. Nine participants, P1, P2, P3, P5, P6, P7, P9, P10, and P11, demonstrated or described lessons using teacher-centered designs. For example, during the classroom observation, P1 and student teacher used the Smartboard to review math properties and introduce algebraic word problems. They also used the board to display a graphic organizer during a social studies lesson. P1 and student teacher displayed parts of speech and sentence corrections on the Smartboard. For each lesson, students gave oral answers while the adults interacted with the board technology. Frequently, the student teacher scrolled through the activities while the P1 typed the answers suggested by the students from a keyboard. The students never approached or touched the Smartboard during the observation.

P2 described a balance of teacher- and student-centered activities in the self-contained classroom. The example of a teacher-centered lesson design described was for one of the learning centers. P2 described showing the news show, "CNN10, so the kids aren't actually coming up [to the IWB]. They are watching it."

When asked whether use of the IWB was more teacher- or student-centered, P3 reported that "right now, due to the sensory deficits, it is more teacher-centered. And I guess I could do everything without the visual of the Smartboard, but it helps keep my one student that sees" engaged in the lessons. P3's classroom is made of up students with severe and profound disabilities; most of the current students are in wheelchairs and have low vision or no vision. P3 went further to explain that,

> Last year, we had one or two that could get up and move things on the board, so we kind of did it the same way, but with a lot more interaction from the kids who could get up and move and touch, so it just kind of switches from year to year.

During the observation, P5 displayed a visual stopwatch for students to view during a lesson. This was the only teacher-centered use of IWB technology, however. P5 reported that whether the Clear Touch use is teacher- or student-centered varies according to the classroom activity and explained, “If the goal is instruction, and I’m teaching them new concepts, then it’s more teacher-centered because they’re not interacting with it. I am.”

Although P6 described use of the Clear Touch as “a fair balance” between teacher- and student-centered lesson designs, students in the classroom were not observed interacting with the Clear Touch during the classroom observation. Instead, P6 demonstrated several teacher-centered uses of IWB technology. P6 showed documentary videos on the Titanic, displayed an entry from Wikipedia, and showed several pictures and graphs on the Clear Touch panel relating to the Titanic. When asked about additional uses of IWB technology, P6 described using the Clear Touch as teacher-centered for literature lessons. P6 explained,

> Most of the time I have to read stories as a whole group, or we’ll listen. We’ll have the text on the Clear Touch, but it will be an audiobook. And so some of the kids can follow along and look at the pictures and some of the words while we

> listen to the text. So we use that for a lot of stories, any stories I can find that include an audio version.

When asked whether classroom use of the Clear Touch panel is more teacher- or student-centered, P7 responded,

> I have probably more teacher-centered than student-centered [activities] because the only time I would say it is student-centered is when they’re on Snowflake. I kind of let them have at it. But all the other times I would say it is more teacher-centered because it’s me guiding them.

P7 described one of the teacher-centered uses as “using it sometimes just to show worksheets, you know, to blow it up so they can see it as we go along.” P7 also described using the IWB,

> For video clips, mainly for my life skills class. I use it to show them a clip of whatever it is we are cooking and however it is to be done when we go in there, just to have that visual. I might put some pictures up there for them to identify what’s appropriate and what’s not appropriate or if they have a question . . . One time one of my students said, “What is khaki? What does khaki look like?” So I, you know, got a picture and put it up there to show them, you know, what khaki is.

During the observation, P7 showed students three videos about how to form and cook hamburger patties. P7 explained to the students about working in small groups during respective lunch periods to cook hamburgers for lunch. The Clear Touch activity observed in the classroom was teacher-centered to prepare the class for a culminating hands-on cooking activity.

During observation, P10 demonstrated scheduling with a calendar displayed on the Clear Touch. P10 slid pictures onto the calendar while the students wrote on individual calendars to schedule activities. When asked whether the use of the Clear Touch panel is primarily teacher- or student-centered, P10 described a teacher-centered use of the technology,

> I would probably say a good mix of both. It probably depends on the activity...I do a lot of stuff like this where I am just projecting up materials for them to use in their work, so they can all see it.

P11 reported tending to use the Smartboard in a teacher-centered fashion because the board in the classroom has developed some irregularities in performance recently. P11 explained the use now is more “showing an example on the board” rather than having students interact with it. During the observation, P11 demonstrated numerous teacher-centered uses of the board. P11 displayed a menu and had a student go to the Smartboard and read the lunch menu for the day aloud. P11 had the students view a CNN video about the Coronavirus on the board. After that P11 displayed “An Arial View of Pearl Harbor” and pictures of the aftermath of Pearl Harbor on the IWB and showed an animated video clip about Pearl Harbor and a slide of a newspaper article, “Oahu Bombed.” Then P11 showed a video about the attack on Pearl Harbor and displayed a picture of the memorial over the USS Arizona. P11 also displayed a map to demonstrate where Japan is located in relation to Pearl Harbor and used the Smartboard pen to write the answer to a question about Pearl Harbor.

During the visit to P9's classroom, the students were never observed working on the Clear Touch panel. P9 did use IWB as a display to show various materials, such as maps, pictures, and articles, throughout the class period while the students completed activities using Chromebooks. P9 reported using the Clear Touch panel primarily for teacher-centered activities. P9 explained that although students "do the Clear Touch notes, and they know how to go up there and navigate to switch it to the next slide," P9 tends to be the one controlling the panel. When asked if the students ever use IWB rather than the Chromebooks, P9 stated,

> We use it too, we use it to watch Cake Wars. They love it! A lot of [their work] is more individual, so they do more on their Chromebooks than we do here [on the Clear Touch]. I mean we utilize this as a big projector, I guess, more than really what it's [for].

Student-Centered Designs. Nine participants, P2, P3, P4, P5, P6, P7, P8, P10, and P12, demonstrated or described lessons using student-centered designs. For example, P2 explained daily student-centered activities in the self-contained classroom. P2 stated,

> We do nine centers a day every day. The centers are 20 minutes long, so I mean once you incorporate that in different ways . . . they're, you know, playing games where they go up and try to make matches and then, of course, it's very student-centered, so it just depends on what the centers are. They are assigned to make a Google Slide or two that they actually will come up and present. We'll put it

> together and there will be ten slides, one slide from each student in the class, and we'll present it together.

P2 also indicated that when students do a Daily Oral Language (DOL) lesson that "the kids have to come up to correct" on IWB. P2 also described some student-centered math lessons on the board such as, "drawing hands on the clock or telling time on the clock. Fractions are good. They can go in and color the portion that they are supposed to" engaging students in a student-centered activity.

P3 reported that one student-centered use of the Smartboard is employing the dice feature and described connecting an adaptive switch to the Smartboard so that the students can make selections and roll the digital dice on the board. P3 explained, "The dice is so much fun, and I can use a switch with it. You know, hit a switch and it activates the Smartboard." The use of an adaptive switch with the Smartboard enables the students with more severe and profound disabilities to interact with the board. P3 reported, "When we read *Frankenstein* last year, we had to build a monster, and so I put the body parts on the dice." P3 reported telling the students during the activity, "You already have two legs; you can't have another one. It's someone else's turn." P3 further explained, "Whoever built their monster the fastest won" the game.

When asked about using IWB in a teacher- or student-centered manner, P4 described multiple ways that students interact with the board. P4 reported,

> They like to make choice selections with it. They like to see things highlighted. They like to use the pens to make selections and write. We do some click and drag with it also with a ULS [Unique Learning Systems] program . . . with ULS

> they can click and drag, but there will be a bank . . . of five answers that they can click and drag. They like that. You know it just gets them up moving. You know our kids. They can't sit still. It gets them up out of their seats, and it's fun.

An additional student-centered activity described by P4 was "a cash register [activity in which students] operate the cash register and pay. [They] click and drag the right amount of money to the register [to] incorporate some functional math." P4 recounted using the IWB to have students work on activities to teach about telling time and determining elapsed time and demonstrated with, "You get a 30-minute break. What time do you report back to work? You know if it's one o'clock, you come back at one thirty."

P4 also described using functional reading activities with having students interact with safety signs such as "matching of the safety signs . . . even just circling" the signs on the Smartboard. P4 also reported having the students engage in holiday activities on IWB. For example, P4 stated, "when it was Halloween, we did trick-or-treating with it, like a virtual trick-or-treating in which they got to choose the candy to put in the bag" by clicking and dragging choices on the Smartboard.

During the observation in P4's classroom, the students were involved in a variety of student-centered activities on IWB. The students engaged with the Smartboard to select items during a calendar and weather lesson, made choices during a lesson on cavities and tooth brushing, and answered comprehension questions about a reading selection from *The Call of the Wild* after the text was read aloud by the Smartboard. The students also interacted with the Smartboard to complete a menu math activity.

Sometimes students took turns using the Smartboard pens and eraser to complete the activities while classmates completed the work on printed copies. Classmates frequently gave oral suggestions when a single student worked at the Smartboard. To further promote engagement, P4 used a laser pointer to encourage focusing and attention during some Smartboard activities. As a reward at the end of the class period, P4 had individual students play an interactive memory game on the Smartboard.

P5 reported that whether the Clear Touch use is teacher- or student-centered varies according to the classroom activity and explained the use tends to be student-centered unless the students are learning a new concept. P5 described one example as when the students mark attendance on the Clear Touch as they arrive to class. P5 stated that when "they're learning how to be more independent and check in and let us know they've checked in, then it's student-centered because they're responsible for managing whether or not they have interacted with the board." As described, during the observation, the students were seen arriving in the classroom and touching their name and picture on the Clear Touch board to indicate their presence. P5 explained, "They have to hit their name on the board so that they can get their points for their PBIS rewards," the school-wide Positive Behavioral Interventions and Supports program.

P5 described another student-centered activity using IWB technology. P5 explained, "We usually review our Touch Money math on the Clear panel" and revealed that the students can "show their work and mark their answers" on the interactive panel. During the classroom observation, P5 modeled counting coins with touch points and solving a related math problem. P5 had students complete similar Touch Money problems from the board on paper at desks then checked for accuracy on students' written sheets before selecting students to work a problem on the Clear Touch board. Students competed to see who could raise their hand first to volunteer to work on the Clear Touch board. Each student had the opportunity to draw touch point dots and determine coin amounts. The students demonstrated proficiency and confidence when using their fingers to make Touch Math dots on digital coins and solve related math problems.

When P6 was asked whether she would consider use of the Clear Touch panel as more teacher- or student-centered, P6 responded, "I think it's a fair balance to be honest with you." For examples of student-centered activities, P6 reported, "We do a lot of money problems on there. Any kinds of surveys or polls we do on Clear Touch. Any kind of brainstorming, graphic organizers. We use a lot of graphic organizers on the Clear Touch." P6 further explained,

> Most of my students are nonverbal, so touch is a huge thing when it comes to answer choices. I will do a lot of things in Note. I use Snowflake a lot. We'll even go to Education.com and play education games.

She reported additional student-centered activities in the classroom with,

> We use Education.com. I do a lot of picture choices, you know, making our own little things. Anywhere we can find those interactive games. Oh, ESL! ESL is a great website for different kinds of games that they can interact with.

When asked whether the classroom use of the Clear Touch panel is more teacher- or student-centered, P7 admitted, "I have probably more teacher-centered than student-centered [activities] because the only time I would say it is student-centered is when they’re on Snowflake. I kind of let them have at it.” P7 further clarified, “I allow the students to use Snowflake to do different games and puzzles.” When asked whether the use of the Clear Touch panel in the classroom is more teacher- or student-centered, P8 reported,

> I think it is more student-centered. With me, the way I use it, I do it more student-centered because I let them take the initiative of doing it and let them work on it. It’s like an “It’s yours” kind of a thing. It is for you not for me. Nobody in here can say no to it. Everybody loves it!

Participant 8 described encouraging one student to present lessons on IWB. P8 said,

> I let him take the initiative to work with my small group. When we are working on Starfall calendar and ABCya calendar, he takes initiative to teach them. The focus with him to do that is to increase his social communication.

During the observation, several of the lessons in P8’s classroom were student-led in a manner in which a higher-functioning student was controlling the Clear Touch and encouraging lower-functioning peers to answer questions and to come to the front of the room to interact with the interactive panel. P8 was the facilitator in the classroom encouraging the student leader and stepping in to offer additional support when the lower-functioning students needed extra assistance. For example, the students were instructed to drag answers on the Clear Touch panel after giving answers orally. If students struggled, the student leader attempted to help them. If that was not successful, P8 provided re-direction and modeling. P8 also re-directed the student leader when he opened unnecessary tabs on the Clear Touch board. Throughout the observation, P8 rarely touched the Clear Touch because the students were controlling it.

When asked about the teacher- versus student-centered use of IWB technology, P10 explained, “For the stuff that we do daily, it’s student-centered usually.” During the observation, P10 had a student come to interact with the board to indicate where St. Patrick’s Day would be on the calendar. Then each student took turns making lunch choices by dragging a choice under their name on IWB. P10 worked at the board individually with one student who was using the Smartboard to write the letters in his name. Although P10 had to rely on primary reinforcers and verbal praise to encourage the student with moderate disabilities to perform the task, P10 prompted him to push “next” to move the screen to present the upcoming letter so that he would be controlling the board by himself.

P12 described the use of IWB technology as “student-centered because it’s either directly interactive, again Kahoot! or Snowflake, and if it’s not directly interactive, I’m using it as a projection screen for their benefit.” P12 clarified that the students who were in the room last year spent more time up at the Clear Touch board. P12 said,

> With the lower functioning [students] that we had last year, [the panel use was] a little more [student-centered]. We would leave the screen up there where [they] could just color on it. Now they are all up on that Chromebook during free time. That is all anyone wants to do during free time is Chromebook.

Collaborative Technology Designs. Although IWB usage varied from classroom to classroom, most participants demonstrated displaying images with IWB technology rather than having the students manipulate data on IWB. One reason for this is both of the participating school systems have individual Chromebooks provided for each high school student. Six participants, P1, P2, P5, P9, P11, and P12, stressed that the students are using technology by accessing data and completing assignments on Chromebooks rather than coming to the board individually to use IWB technology. The descriptions of using Chromebooks and IWB technology together are hereafter referred to as a collaborative technology design.

P1 described a collaborative technology design reporting the use of IWB is mostly teacher-centered because of the individual Chromebooks assigned to each student and the fact the students can take the Chromebooks home. P1 said every class period students use Chromebooks and IWB technology; P1 uses the Smartboard, and the students use Chromebooks. Although P1 and the student teacher in P1's classroom both used the Smartboard during the observation, the students never touched the Smartboard because they were completing activities on Chromebooks instead.

P2 gave examples of students using classroom IWB technology in conjunction with Chromebooks,

> My kids love the calendar [in Unique Learning Systems]. And the cool thing is that it is all linked to their Chromebooks, and some of them even link it to their phones. . . And then if you do the Google Docs and the Google Spreadsheets, the kids can actually use their Chromebooks, and it all shows up on the big screen together. You've got to be careful *(participant laughs)* 'cause sometimes they write things that aren't nice.

P5 also used Chromebooks in conjunction with IWB technology. P5 stated that although she “would sure love to know other ways to get them to interact with [the Clear Touch panel] more,” P5 acknowledged, “but they have Chromebooks, so that’s the other thing. They do a lot on their Chromebooks.” P5 further described how students interact with the Clear Touch panel through Chromebooks as a blogging activity by,

> We do Nearpod activities through Schoology. We use the Clear panel. That involves the panel and their Chromebooks. So like the questions in the video will show up on the panel, and they have to look at it and answer it through their Chromebook. Nearpod, you can go into it. It’s an app. The kids log in. They see the code. They log in. I choose the lesson. And, you know, they were able to answer questions and tell me what they saw, and they could put, you know, their responses up there. Just interact. They really liked it.

P11 reported that the Smartboard had stopped working consistently in the classroom and described using a more collaborative technology design. P11 commented, “We try to interact with [the Smartboard], but since it has a mind of its own, I can’t really count on it. But as a visual, it is used daily in some sense of software.” P11 stated that the students are still interacting with technology and explained, “The kids have their own Chromebooks which is awesome.” P11 reported tending to use the Smartboard for display purposes but that the students view materials on it and then complete assignments by interacting with Chromebooks.

During classroom visit, P12 was observed using a collaborative technology design. Using a wireless keyboard to control the Clear Touch panel, P12 ran the cursor over selections in a Kahoot! game while reading each choice aloud. Each student watched the choices indicated and then made selections on individual Chromebooks. P12 explained, “When using Kahoot! in conjunction with the Chromebooks, that means you’ve got a double dose of tech” referring to the combined use of Chromebooks and the Clear Touch panel in a single activity.

P9 also described a collaborative technology design using IWB technology in conjunction with Chromebooks and explained that students use Chromebooks for the IXL, MobyMax, Unique, and News2You programs. P9articipant described having students view materials for agriculture class from the Clear Touch panel but said students take notes over the materials and develop related PowerPoints on Chromebooks.

Three participants, P3, P10 and P4, used technology devices other than Chromebooks for collaborative technology designs. P3 was observed encouraging lower functioning students to use communication devices during IWB lessons. P3 also had a student take roll using the Smartboard and a communication device, turning the routine task of taking roll into a student-centered communication activity. The student reported which students and adults were present promoting engagement in a classroom activity and recognition of others in the room. Some students used communication devices to indicate preferences when presented with choices on the Smartboard that turned the inability to walk up and interact with the board into an opportunity to use communication devices. P10 also demonstrated a collaborative technology design by having a student use a communication device to answer questions posed during an IWB lesson.

P4 used a buzzer in conjunction with IWB in a collaborative technology design and described the attempt to actively engage each student in Smartboard activities. P4 said, “We try to find a way . . . to include [one specific student]. If he’s not up there doing it, he can still be the [reinforcement by telling his classmates,] you got the right answer.” P4 explained that he uses IWB, too, but that “he tends to just bang on it.” The observer witnessed the student referred to using a buzzer device to participate in interactive technology activities. He participated by pressing the buzzer after classmates provided correct responses at the Smartboard.

Theme 4: Teacher Perceptions

The fourth major theme, teacher perceptions, emerged from individual interview sessions in response to research subquestions 1 & 2, “How do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices that are or are not delineated by the constructivist principles of learning?” When participants were asked to describe the use of IWB technology and whether it was teacher- or student-centered and asked to explain why, participants volunteered perceptions of the benefits of IWB technology, the limitations of the technology, and preparation for using the technology in high school classrooms. Therefore, minor themes that emerged under the category of teacher perceptions were (a) benefits of IWB technology, (b) limitations of IWB technology, and (c) teacher preparation to use the technology successfully.

Benefits of IWB Technology. Participants described the benefits of using IWB technology in classrooms. Four participants, P4, P6, P8, and P10, explained that the ability to make activities larger on IWB screens was beneficial for students. P4 said that the Smartboard is particularly useful for students who “have some visual impairments going on. It’s great; you can make it larger, almost life size.” Similarly, P6 stated, “Because I have two students with visual impairments, it really helps them be able to see it, you know, bigger on the screen.” P10 described having one student work on handwriting on the Smartboard and explained, “We do daily name handwriting for [one student] who is also working on his motor skills because [the Smartboard screen] is big.”

P8 explained the advantage that the students “can minimize [the screen] or make it as big as they want.” P8 described how IWB technology benefits one student in particular saying,

> I have a student . . . that the parent has requested that we don’t present more than five or seven words at a time. So, what he does is he will just [maximize the screen] where he only sees four, five or seven words, however many he is comfortable with. And then we will just go to the next page, and we will continue reading it. And his reading has really improved. And . . . if I go to IDocs, [the Clear Touch] can also speak. So let’s say, if he is having difficulty with a word, he clicks on it, and it will . . . tell what that word is. And then he can repeat after it. That’s another thing we use.

Four participants, P6, P8, P10, and P11, described the benefit of IWB technology being interactive and enabling students to touch the screen to engage it. P6 stated, “Most of my students are nonverbal, so touch [on the Clear Touch] is a huge thing when it comes to answer choices.” P8 described one of the positive aspects of having a Clear

Touch panel and said, “It is beneficial in that it enables students who have difficulty working with a keyboard or mouse to just sit in front of it and work on it.” P10 described using the Unique Learning Program and News2You on the Smartboard in the classroom because “when you use them on a whiteboard, it is very interactive.” P10 explained that students enjoy learning by interacting with IWB in the classroom. P11 added that for high functioning students, it “is fun with the Smartboard when they can get up there and push it and do things . . . the kids like it because they can get up and play with the board.”

Three participants, P1, P2, and P12, reported that another benefit of having IWB technology is being able to use it in conjunction with students’ individual Chromebooks. P1 explained that students received one-to-one Google Chromebooks in the fall and that “every class, they use Chromebooks and [Smartboard] screen technology.” P1 described a typical class as being one in which the teacher is displaying lesson materials on the Smartboard while the students are completing follow-up activities and individual classwork on Chromebooks. P12 found using IWB technology with student Chromebooks beneficial and referred to the practice as “a double dose of tech.”

P2 stated, “My kids love the calendar [on the Clear Touch]. And the cool thing is that it is all linked to their Chromebooks, and some of them even link it to their phones.” P2 further explained how this use of collaborative technology with the Clear Touch panel and students’ individual Chromebooks helps the students gain confidence in the classroom. P2 described having students complete assignments independently on Chromebooks and that after checking a student’s work for accuracy, the student goes to the Clear Touch panel to write an example on the panel for classmates. P2 stated,

> [The students] know how to use [the technology] on their Chromebooks, so that way when they go to the front of the class, it's really exactly the same, so it's nothing new to manipulate which makes it easier for the kids, too. Especially like, my kind of kids that these things are hard. So, you know, the last thing that they want is to go up to the front of the class and be embarrassed because they can't do it. . . [The students] do like going up to the board to share their answers. It helps build their confidence. It gives them the reinforcement, and then other kids can kind of see if they did it wrong and know to ask for help.

Four participants, P2, P5, and P4, and P11, described using IWB technology to offer students repetition in skills by posting workbook pages, articles, flashcards, and flipbooks on the screen to make the materials interactive for students. P2 reasoned,

> I know workbooks are really old school, but I just feel like they are such a great way to learn. But having an interactive whiteboard turns a really old resource into something new and fun . . . [Clear Touch panels] have made a big difference because you don't even need the software anymore because it's all right there on the computer. It's actually made it a lot easier to write on top of worksheets. Before I would have to get the document camera or scan in the worksheets.

P5 described posting workbook sheets and articles on the Clear Touch panel for students. P5 explained,

> We use [the Clear Touch] for quite a few things. And if they don't volunteer, [the students] get voluntold to come up anyway and show their work . . . They are very familiar with using the board in that way. So they can circle their answers, show

> their work, mark their answers. They like to show off that they got the right answer and they know how they got there. I pull [articles] up on the board, and I have figured out enough to where I can highlight text as they're reading or their key vocabulary words. I know enough to circle it and highlight it so that they know to write it down.

P4 also stressed the benefit of using IWB for repetition when practicing skills with students with disabilities. P4 further explained the Smartboard,

> is a really good communication tool. It helps with language development. We can see and talk about what we see. It makes [learning] more fun and interactive instead of me just holding up a flashcard. You know our kids. They can't sit still. It gets them up out of their seats, and it's fun. [The more] ways you can input information into these kids the better. Repetition is important, but repetition can be boring, so as many ways as they can do it [the better].

P11 also described using IWB technology for repetition by showing examples of flipbooks on the Smartboard that students create individually to take notes on different topics. P11 explained,

> I really love flipbooks with their [alternate testing] standards for taking notes. I mean a lot of this crew wants to go post-secondary like to [a specific local college program for students with disabilities] or programs like that, so we do practice note-taking skills, but again I don't want to lecture. We try to make it fun.

Three participants, P4, P8, and P12, spoke of not liking IWB technology when first getting it in classrooms but instead really like it. When asked an opinion about using Smartboard technology in the classroom, P4 replied in a positive manner with,

> I really like it. I think it's a little scary if someone has never used it before, but it's just so fun. You just get in there and play with it. You know . . . it's indestructible. You can't mess it up. The kids really enjoy it. At first they don't want to get up [to the IWB], but once they get up there, they realize it's a lot of fun, and [they understand], oh look, I caused this. They see the cause and effect. I did this; this happened.

Now P4 finds IWB technology so beneficial and described being concerned about the possibility of it not being replaced when it begins to malfunction. P4 lamented,

> Once [the Smartboard] dies, we're not getting a new one. They say that now we are one-to-one here with the Chromebooks, and I hate it because I would rather have that [Smartboard] than the one-to-one Chromebooks, honestly. I said Chromebooks are fabulous, but when you have a child that has visual impairments, it's not large enough, or they can't operate that keyboard, or they can't operate the little mouse pad thing. I mean, I'm like it's great for the [general education students], but . . . mine don't even take them home. So we're very protective of [the Smartboard]; like, don't let it break! We let the kids come up to it. You saw that, but if someone is banging on it or having an aggressive day, I won't bring him up to it because I don't want him to break it because once it's gone, it's gone. At that point it will just be like a projector screen for me . . .

> We've got a big scratch on it at the bottom where a wheelchair took it out one day, but it still works, so we're thankful.

P8 expressed being apprehensive when first getting the Clear Touch panel in the classroom. P8 explained,

> It is nice. At first I was nervous like, I don't know about this, but then once . . . my students got comfortable, I was happy about that part of it. Then, ok this is really being used. It's really become part of our life now. And I think, what will come after this? But like I said, I was satisfied with [the Smartboard] projector, and now I'm satisfied with [the Clear Touch]. So, I'm sure I'll be satisfied with whatever has to come along after four or five years. [Technology] is getting better.

P12 described having the Clear Touch in a positive manner. P12 exclaimed,

> This is the third year with the Clear touch board. We had Smartboards before that. Everyone is getting increasingly more comfortable the longer they have [the Clear Touch panels]. Oh, we were talking so much smack when we first saw it. We were like, that looks like a giant TV screen! What in the world are we gonna [do with that]? But I love it! It's awesome! It does everything that you wanted a Smartboard to do! Like I remember when I would touch the Smartboard, I might touch it here, but it would draw something over here. You had to recalibrate it. Like that [Chromebook] is perfect! It's just like working on an iPad or an iPhone.

Six participants, P1, P5, P6, P3, P8, and P12, described favorite ways to use IWB technology while discussing the benefits of having it. P1 said the Smartboard is beneficial for using “Google Classroom, Google Forms, Google Slides . . . Google everything” in the classroom. P5 said that one benefit to IWB technology is having the ability to display virtual timers showing athletes competing in events to motivate students to finish tasks. P6 explained finding IWB technology beneficial because when students ask questions, “rather than just talk about it, [she] really [loves] to go and show them” on the Clear Touch.

P3 said that having the ability to “use the Smartboard blank slides and things like that for morning activity” is beneficial for inserting links for videos and music. P3 explained appreciating being able to use the Smartboard for the digital dice feature to connect it to a switch so that lower functioning students can participate in class activities by activating the switch. P3 stated that another benefit of the Smartboard technology is having the ability to download it onto a laptop. P3 explained, “It’s just for me to be able to do it at home, and then bring it in. And so that’s nice that I can sit there and really try it before I present it to the class.”

Although P8 appreciates that when displaying a website for students, one can take notes on the screen or highlight text without having to change screens, P8 stated that one of the most beneficial aspects of IWB technology is that some students “don’t even realize that they are learning” while using the Clear Touch panel. P8 further described having one student who leads the calendar activity each day who had weak communication and peer interaction skills; however, he has increased communication with his peers by leading lessons on the Clear Touch panel. P8 described how another student who dislikes reading and writing leads IWB spelling lessons for classmates. P8 explained, “That student doesn’t really realize that he is learning” the spelling words as he teaches them. P8 said the technology has also helped with an aggressive student in the classroom who is able to draw on the Clear Touch to calm himself.

P12 was very positive in a review of IWB technology use in the classroom but reported Clear Touch panel use varies from year to year depending on the students’ level of functioning. Regardless of ability levels though, P12 said, “That board is getting used for at least one if not all the subjects every single day across all content areas and then occasionally during rec and leisure time as well.”

Limitations of IWB Technology. Two participants reported having students work on the Smartboard less frequently than in the past because due to no longer having access to the Smart Learning Suite software that had provided readily accessible programs and academic tasks for students. Although the basic Smart Notebook software is readily available on each Smartboard, Smart Learning Suite and Smartboard Exchange are only accessible with a renewable site license. The upgraded software had also enabled participants to develop activities and programs to address students’ individual needs. Participants explained how the activities that had taken hours to develop through Smartboard Notebook previously were currently not accessible because the local school system was no longer paying to subscribe to the Smart Learning Suite software.

Another reason participants who have Smartboards reported using IWB primarily as a display is board usage is limited due to the age of the boards. Participants reported that the technology had developed quirks and would no longer work as it once had. Participants described attempting to use it to the best advantage but that because it was unreliable, participants were hesitant to put special education students on it to avoid them becoming unnecessarily frustrated. Participants were reluctant to notify the technology department about faulty boards for fear the boards would be removed and not replaced. Some explained that a malfunctioning IWB is better than no IWB.

Ten participants described limitations of IWB technology in classrooms. Concerns ranged from inappropriately leveled learning materials to software they no longer have access to. Participants also mentioned experiencing IWB malfunctions.

Five participants, P1, P3, P10, P11, and P12, explained that the software provided with IWB technology is not an appropriate academic level for students with disabilities. Participants described the time-consuming task of either finding or creating appropriate materials for the students to use on IWB technology. Participants with higher functioning students, P1, P10, P11, P12, complained that the materials provided are too low for the students. P1 explained,

> The school system provides the Unique Learning program and News2You for our self-contained students. Most of it is not challenging enough for my higher-functioning students though. Like, I tried to use the calendars for our class, but they just seemed too elementary for them. I have been using some Smart Notebook materials and creating some of my own so that the activities we do are more age appropriate for my high school students.

P10 explained struggling to find appropriate Smartboard materials, especially calendars, for higher-functioning students. P10 said,

> Having to hear the repetition of the days of the week every day was not these guys' favorite. They would roll their eyes every time I said it was time to look at our calendar. I tried to figure out a better way, and [one student] loves weather, so I had to add in a weather page. . . It took me a while to get to a calendar that I was comfortable using with these guys though because with [one student] age appropriateness doesn't bother him, but [the others] hated it because whatever I was using always seemed elementary, so I ended up . . . kind of creating one that works better for us. It's just more age appropriate.

P11 described the limited software activities provided by the county to use on the Smartboard,

> We do use News2You sometimes in this room but with my students being so high, it's just not always appropriate. And that is fun with the Smartboard when they can get up there and push it and do things. We just don't use it on a daily basis because it's not academically appropriate for my group.

Likewise, P12 explained the limitations of the Snowflake software provided for the Clear Touch panel,

> We're still limited on what's really realistic and obtainable [on the Clear Touch]. You can't do everything on Snowflake. So we're still limited. There are way more things on there that are just not appropriate for this level of functioning. We had some lower functioning [students] last year . . . these guys are a little higher functioning . . . so we don't really use [the Clear Touch panel] as much.

Meanwhile, P3, who has students with more severe disabilities, complained that often IWB technology activities are too high for students. P3 reported use of IWB and the appropriateness of the software fluctuates based on the ability levels of students each year. P3 explained that students the previous year had higher abilities, so the software was more appropriate for them. P3 added,

> Last year we had six kids in here, so we had everybody kind of gathered around over [at the Smartboard]. We had one or two that could get up and move things on the board, so we kind of did it the same way, but with a lot more interaction from the kids who could get up and move and touch, so it just kind of switches from year to year.

In an explanation of how some Smartboard activities are too difficult for the students, P3 described an activity unsuccessfully attempted with them. The students were instructed to build a person based on body parts by clicking and dragging on the Smartboard screen as part of a DNA science lesson. P3 explained,

> You had to go up, and you had to build your own person and . . . you had to use the clone [feature]. . . Well, the kids didn't understand. They thought once you moved [an object], it was done. [They] couldn't do it. So [I] had to go back and show them. Then everybody ended up with 15 arms. *(participant laughs)* And they were trying to get it, but . . . when you clone, it never stops.

Two participants, P4 and P11, explained the use of IWB technology was severely limited because the school system was no longer paying for the renewable site license for the more advanced Smartboard software. Participants reported no longer having access to the premade programs and academic tasks provided through Smart Learning Suite and Smartboard Exchange and not being able to run even the activities and programs personally designed by them to meet the individual needs of students. P4 described this serious downfall of having Smartboard technology without having access to subscription software. P4 explained,

> I used to use the Smartboard software so that I could open up Smartboard activities on that Smartboard exchange program, but they did not purchase us the Smart ware this year. So really this year, unless it is like an interactive website, that's all we can use it on or any PowerPoints I create. That stuff we can use it on. But to use all those cool activities that are on Smartboard Exchange, we can't operate them anymore . . . I'm actually thinking next year of just getting it myself, asking how much a subscription [for Smart Learning Suite] is and buying it myself.

P11 also expressed regret about no longer having access to Smart Learning Suite, the advanced Smartboard software. In addition to the school system no longer funding the software, P11 also reported that the Smartboard technology was malfunctioning. P11 explained,

> I don't even have Smart technology, so I can't even use it, but it's okay, we're thankful I can use it for when I can use it. I don't even use it to the extent that most self-contained classes could use it for, but that's because I've had to adapt this year since mine's been so funky. But, again, I don't want to report it because then I might [lose it]. . . Normally I've always had Smart technology. I had it on a

> trial basis at the beginning of the year . . . I used to make . . . stuff I have saved in Smart Notebook, so that's been . . . a huge learning curve for me not having the Smart technology. . . The biggest issue, as far as Smart technology, or Smartboard is that the pens and everything don't always work on the Google stuff. But if I download it as a PowerPoint . . . it'll work on it, but that also has to do with not having the Smart technology [software].

During the observation in P11's classroom, the technologically savvy participant unsuccessfully attempted to use an interactive map on the Smartboard. P11 reported that the same map had worked previously but was unsure why this time she was unable to access it on the Smartboard. Shortly afterwards, P11 had to recalibrate the Smartboard when it began to malfunction. P11 explained that sometimes the "Smartboard doesn't behave," but was hesitant to report that it is sometimes having problems because the teachers have been told that the boards will not be replaced. P11 said that sometimes the board "doesn't work right when they touch it" and then described how the malfunctioning board has limited the ways that it is able to be used in the classroom. P11 stated,

> Almost all of our academics somehow involve [the Smartboard]. We try to interact with it, but since it has had a mind of its own, I can't really count on it, but as a visual, it is used daily in some sense of software. . . it is definitely more teacher-centered now. It used to be more student-centered but not so much this year.

Several participants described other limitations when using IWB technology. P1 complained that the use of IWB technology "is only a problem when the Wi-Fi is down." P3 complained that "the new Smartboard projector makes a lot of noise." P9 explained that students "come and go" to the classroom, and many of them work independently on assignments rather than as a group, limiting use of the Clear Touch panel.

P4 described a downfall of having a Smartboard because it has a projector; it can throw a shadow, and a student's shadow can block the view of the board. P4 described how one student does not comprehend how to step to the side to avoid casting a shadow. Instead the student "just clicks [randomly] on top of her shadow."

P6 described a perceived limitation of the Clear Touch board. P6 was concerned about not being able to "cast" screen items from the Clear Touch to a Chromebook or from a Chromebook to the Clear Touch. (After the interview, I showed the P6 how to access the "mirror" feature available with Clear Touch technology to accomplish the task P6 had described.) However, during the interview, P6 stated,

> I do wish there was an option to cast whatever is on the Clear Touch to Chromebooks. So like, for my kid who sits back here who has some vision problems, but has to sit further away, it would be a lot better if I could cast it to his Chromebook, or if he was trying to get me to see something he did, I wish there was a way that we could cast it back and forth for kids to do presentations. And that's across the board. Like a kid does a PDF on a Chromebook then rather than putting it on a jump drive or whatever it may be, if we could just cast it to [the Clear Touch], that would be a cool feature.

Several participants explained that a limitation to IWB technology use was participants' inexperience with it. This concern will be addressed in the next minor theme, teacher preparation.

Teacher Preparation. Several participants with recently acquired Clear Touch boards reported not being familiar enough with the technology to have students work on it frequently. Instead, participants described using it primarily to display information in the classroom. Participants' acknowledged using the Clear Touch technology more than having students use it; participants reported not being confident enough with the technology to plan more student-centered activities. Two participants with Clear Touch panels expressed an interest in having additional training with the panels to learn how to better use the technology with students. One participant explained having accepted not being technologically savvy or learning how to use the Clear Touch panel proficiently.

P5 addressed the fact that the teachers in that district had very little training when the Smartboards were replaced with Clear Touch panels in the school system recently. P5 explained,

> I kind of wish we would have had more in-depth training. I felt like the training we got was appropriate for introducing [the Clear Touch] to us. It is kind of difficult to find the time in the day to familiarize ourselves with everything the panel can do. They had . . . a representative come out and train us. It was during preplanning, and I mean we got our feet wet, but then we were like "Well, what else does it do?" So sometimes when we're using it, if I miss-press or miss-click on something, the kids are in stitches. They think it is hilarious 'cause it takes me

> a couple minutes to get back to what we were doing. And then I sometimes troubleshoot, so I might press the settings button and try to figure out how to get back to where we were. All I knew was the [Smartboard], so this is a learning curve. I would sure love to know other ways to get [students] to interact with it more.

P5 clarified that although there are people on the instructional technology staff willing to help answer questions about the Clear Touch, teachers often do not have the time or knowledge to ask effective questions about the technology. P5 explained,

> We have some really great IT people on staff, and whenever we have questions about how to use the panel or the applications or different things, they are more than willing to help us, and that's appreciated. They'll come down to us, and whatever it is we don't know how to do, they don't mind showing us if they know how. Just time is our issue. Sometimes we don't know what we don't know until it's time to use it and we're like oh, I didn't know [that] I didn't know.

P7 admitted to feeling apprehensive about implementing the Clear Touch technology in the classroom after the familiar Smartboard was replaced. While P7 reported an increase in confidence in using the Clear Touch, P7 explained that it has taken over a year to feel comfortable with the technology. P7 reported first using a Clear Touch panel in the fall of 2018. P7 further explained,

> I just remember I was afraid. I'm telling you. That first, the beginning of last year, I thought, "What am I going to do? I don't know anything about technology. What am I going to do?" . . . I had to constantly watch the video to know how to

> even cut [the Clear Touch] on and get to where I needed to get to, be able to get to my email and stuff. So I had to do that, but, you know, then I got comfortable with that, and so that is why I feel like . . . I just started this year . . . a lot of the other little stuff, I've only implemented this year, with the video clips and feeling comfortable enough to put the worksheets up there or pull up a map to look at. I just got there this year, honestly. And like I say, I still feel so far behind.

P7 described use of the Clear Touch as using it "to show [students] a clip of whatever it is we are cooking . . . just to have that visual." P7 reported using the Snowflake program that came on the Clear Touch only because a paraprofessional teacher in the building suggested trying it with students. P7 further explained,

> That's about the extent of what I've used the Clear Touch for, thus far. I wish, you know, I was more tech savvy and could do more. That's about it, I guess, because I don't think I'm doing great things with it; I'm doing little stuff.

Then P7 humorously described attempts to use the Clear Touch effectively when it was new. P7 relayed asking others how to move items from the Clear Touch panel to a desk monitor by asking, "How do I get this over here?" P7 also described a struggle with using one program that came loaded on the Clear Touch, explaining,

> I wish I knew Notes, I'm not all that comfortable with Notes still. Last year I felt like I had learned it to an extent, but over the summer I forgot. When I get on Notes, I don't know how to get out, (*participant laughs with emotion),* and it's like embarrassing. I don't know, last time I had to go across the hall and ask [another teacher], "Could you please help me get out of this? I'm sorry." I said,

> "It's been a long time since I did this. Could you help me get out?" Then you're thinking, I'll remember next time, but it's not so simple if you don't use it all the time.

P7 described the desire to be more familiar with the Clear Touch panel saying,

> I really wish, you know, more training had come with it . . . since it's here and they paid so much money for it, I just wish more training would have come with it, you know, for the [Clear Touch] to be more effective . . . because I feel like there is just so much that I don't know, so . . . the piece of equipment is not as effective as it could be. That's how I feel about it. I feel like it could be so much more effective if I knew more!

P7 acknowledged that the school system did offer optional voluntary training for the Clear Touch but that it was only offered during summer vacation. P7 said,

> I guess if I could have [gone] to one of those [summer] sessions, you know, I could have learned about some of this stuff, maybe, but I didn't have time. This last summer was not a good summer for me. I probably could have learned more.

Then P7 further explained uneasy thoughts about attending the voluntary summer training, if she had been able to. P7 questioned, "What do I go in there and say? What, do I go in there and acknowledge that I don't know, you know. . . [Do I] go in there and say, I'm dumb?"

P7 was not the only participant who described feeling apprehensive when using the Clear Touch panel due to not being proficient with it yet. P8 explained that she and the students are mastering the basics of Clear Touch right now. P8 explained,

> Right now we are not going very fancy into it . . . because this is our first year, so we want to take a little at a time, and I just don't want to make my students overwhelmed with it. So we are just taking the little that we are comfortable with and that we really use and really benefits us.

P9 explained experiences with technology in general and with a Clear Touch panel specifically,

> Like, I'm not even super confident about writing on [the Clear Touch panel] . . . I'd love to delve into, you know, some of the apps that they have, and we've used some of those, those where you can download, you know touch on the apps where they've done the multiplication games. Sometimes when we do their packets or things like that we'll fill it in on the board but nothing complicated. Not like some of these teachers who, like [a specific co-worker] is amazing with the, this technology . . . I'm here [indicates low with her hand] and she's like here [indicates high with her hand]. I'm not there yet. I mean I feel like I'm older, and so I'm not as [proficient]. Like there are many days I look at [my paraprofessional] and I go, can you do this? Yeah, I didn't learn this in school. So, technology is not my thing. Technology is clearly her [indicates paraprofessional] thing, and that's why I have her. I do good to make a phone call on my phone. I'm just, I'm not very technologically savvy, and I use it for the bare minimum, and I hate it but that's where I'm at. One day. I'm an old school teacher. I like paper.

The five participants with Smartboards were anticipating what advanced technology teachers would be expected to implement in classrooms in the future. Since the Smartboards were older models, some participants expressed anxiousness over what, if any, technology would replace the aging boards. Participants explained that, despite being well-versed in Smartboard technology, a transition to newer technology would occur before long. Participants with Smartboards tended to reminisce about being able to use Smartboards in the past when the technology was new and the Smartboard Notebook software was funded by the school system. Participants also reported being in transition with learning how to fully implement Chromebook technology into the classrooms since the students had received Chromebooks earlier in the school year.

Summary of Lesson Design and Teachers' Perceptions. The constructivist principles of learning promote student-centered learning opportunities, and the International Society for Technology in Education (ISTE) Standards promote technology instruction that is interactive for students. Observations and interviews revealed participants in this study frequently used IWB classroom technology for teacher-centered activities.

However, the classroom observations did exhibit instances when participants were demonstrating student-centered activities with IWB technology. With individual student Chromebooks available in both school systems, some participants did not demonstrate interactive lessons as promoted by the constructivist learning principles and ISTE standards with the use of IWB technology; however, 12 participants were observed engaging students with technology in a meaningful and interactive way using either IWB technology, students' Chromebooks, or a combination of both.

Two participants with recently acquired Clear Touch boards expressed an interest in having more training with the technology. Participants explained the limited training offered to become familiar with the technology and described not feeling confident enough to plan interactive activities for students with disabilities.

Evidence of Trustworthiness

To strengthen the credibility or internal validity in this qualitative case study and have trustworthiness in the findings, several procedural methods were used: peer review, triangulation, a coding system, thick descriptions, and clarification of researcher biases. First of all, a peer review, as recommended by Cypress (2017) and Johnson et al. (2020), was conducted with three special education teachers who were not participants in the study to determine whether the data collection tools were credible and dependable. However, I made the final decisions about the tools used for data collection after considering the points presented by the peer reviewers, for the researcher alone has the ultimate responsibility for the study results.

Then data were collected using more than one method to provide triangulation for establishing validity as recommended by researchers over the last quarter century (Cypress, 2017; Guba & Lincoln, 1989). The combined use of face-to-face interviews and classroom observations served as multiple-method research, for more than one method was used to gather data on a single phenomenon. This use of multiple-method research provided methodological triangulation as recommended by Cypress (2017) and Denzin (1978) to increase the depth of a study.

In addition, a specific coding system was used in this study. Having a developed coding system enhanced the validity and the trustworthiness of the study findings when semistructured interviews were involved (Cypress, 2017). Because the semistructured interview format is more standardized than unstructured interviews, it was possible to use a coding system to sort and analyze the data collected.

Another procedural method for strengthening internal validity in a study is addressing possible researcher biases (Cypress, 2017; Johnson et al., 2020). Because I intended to explore the perceptions and activities of participants regarding IWB technology use for students with disabilities, through data collection, I noted my own opinions and biases about the subject so that the actual data collected and the interpretation of the data did not include my personal opinions and biases. I took precautions when collecting and analyzing data to present participants' perceptions and use of IWB technology rather than my personal opinions about the usefulness of the technology. In addition, throughout this study, I had contact with dissertation committee members at Walden University to help ensure that biases were avoided when determining the findings of the research study.

Transferability was addressed with thick descriptions to communicate the findings for them to be more meaningful to others interested in the research study. In addition, variation was present in participant selection for this research with data collected from five high schools located in two school districts. Furthermore, participants varied in that some invited to participate in the study taught students with mild or moderate disabilities whereas others taught students with more severe or profound disabilities. Participants also varied in years of teaching experience and teaching certification levels due to the advanced degrees in education many had earned previously.

Summary

The purpose of this exploratory case study was to explore how special education teachers are using IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The goal was to determine if self-contained special education teachers are incorporating the student-centered instruction guidelines recommended by the principles of constructivism in the use of IWBs in classrooms. During the study, classroom observations and individual interviews were conducted with 12 participants to explore the use of interactive technology. Four concepts emerged from the data collected concerning the observed use, reported use, student-centered versus teacher-centered use, and participants’ perceptions of IWB use.

While addressing research question—how do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?—the following major themes emerged: IWB usage observed, IWB usage reported, and teacher perceptions. Data revealed most participants had programs and applications for using the interactive technology in common.

While addressing Research Sub Questions 1 & 2, how do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices as delineated or not delineated by the constructivist principles of learning, the following theme emerged: lesson design, concerning student- versus teacher-centered usage. Data revealed that almost every participant was observed or reported using IWB technology in a teacher-centered fashion. Some participants were aware of the reliance on teacher-centered applications whereas others seemed unaware that the usage was not student-centered. Unbeknown to them, effective use of IWB technology consists of frequent use by teachers who use the interactive elements of IWB technology to provide student-centered learning activities (Shi et al., 2020).

Theme 1, IWB usage observed, was achieved through classroom observations. I conducted 12 observations, one with each participant, to see the actual usage of IWB in self-contained special education classrooms. Most participants were observed using IWBs for basic display or presentation purposes rather than having students engage in higher level cognitive activities with the board. As Francom (2020) concluded, access to technology does not ensure effective use of the technology. Additional researchers have determined that basic knowledge of how to use an instructional technology tool does not ensure that teachers will integrate it effectively into classroom instruction (Masullo, 2017; Mourlam, 2017). Sumak et al. (2017) further explained that teaching and learning processes can be enhanced only by a teacher with effective skills to integrate technology and supportive pedagogy in the development of students' creativity and thinking skills. In addition, Heath (2017) determined that a teacher's negative belief about the value of technology is the most significant barrier to effective technology integration. Most participants observed did not integrate technology and pedagogy in a manner to support student creativity and thinking skills since IWBs were primarily used for basic display or presentation purposes.

Theme 2, IWB usage reported, was achieved through participant interviews. I conducted 12 individual interviews to find out what IWB usage each participant would describe. Most participants reported using applications and programs in common; however, those applications and programs were frequently described as presentations by participants. Teachers relying on IWB technology for conventional teacher-centered methods, rather than allowing children to construct, compose and create new ideas, causes the unintentional elimination of the beneficial interactive component of IWB technology for students (McDermott & Gormley, 2016).

Theme 3, student- versus teacher-centered usage, was achieved through a combination of classroom observations and participant interviews. I watched for instances of both student- and teacher-centered IWB usage and asked participants in individual interviews whether they considered their IWB usage to be primarily student- or teacher-centered. Most participants either reported or were observed using IWB technology in a teacher-centered fashion. As reported by Tondeur et al. (2017), many teachers with access to IWB technology have not been able to use the technology to create student-centered learning experiences.

Theme 4, teacher perceptions, was achieved through the individual interviews conducted with each of the 12 participants. Participants shared opinions and perceptions of advantages and disadvantages of using IWB. Several participants also reported experiences with technology in general or with IWB technology specifically. Some participants also spoke of the desire to have more training to better use IWB technology. Participants addressing limited training with IWB technology appeared aware that inadequate teacher training may cause IWB technology to become a passive classroom instrument instead of technology enhancing the teaching process and increasing student participation and motivation as described by King et al. (2016).

Chapter 5 will include an interpretation of the findings and limitations of the study. The recommendations and implications of the study will also be described in depth.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this case study was to explore how special education teachers are using IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The goal was to determine if self-contained special education teachers are incorporating student-centered instruction guidelines recommended by the principles of constructivism in the use of IWB technology in classrooms.

The qualitative research design used in this inquiry was an exploratory case study. Purposeful sampling was used to gather information due to the low-incidence population being studied. More specifically, homogeneous sampling was conducted to ensure that only high school special education teachers who have IWB technology in self-contained classrooms for students with mild to profound disabilities were included.

Twelve special education teachers who have IWB technology in self-contained high school classrooms were invited to participate in one semistructured interview and one classroom observation. These semistructured interviews were used to provide rich, detailed information about how teachers incorporate student-centered IWB technology into lessons and to answer the research question and subquestions. Classroom observations were conducted to determine firsthand how these same participants are using IWB technology in self-contained classrooms with high school students with mild to profound disabilities.

The purpose of this exploratory case study was to explore how special education teachers are using IWB technology in self-contained classrooms to instruct high school students with mild to profound disabilities. The data collected were to determine if self-contained special education teachers are incorporating student-centered instruction as recommended by the principles of constructivism in the use of IWBs in classrooms. Four concepts—IWB observed use, IWB reported use, lesson design, and participants' perceptions of IWB use—emerged from the data collected during classroom observations and individual interviews.

While addressing the main research question—how do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms?—data revealed most participants had programs and applications for using IWB technology in common. Few unique applications of the technology were observed or reported.

While addressing research Subquestion 1 and Subquestion 2—how do high school teachers of students with mild to profound disabilities integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices as delineated by the constructivist principles of learning?—data revealed that almost every participant was observed or reported using IWB technology in a teacher-centered fashion. Some participants were aware of the reliance on teacher-centered applications, whereas others were not.

Theme 1, IWB usage observed, was achieved through classroom observations. I conducted observations to see the actual usage of IWBs in participants' self-contained special education classrooms. Most participants were observed using IWBs for basic display or presentation purposes rather than having students engage in higher level cognitive activities with the board.

Theme 2, IWB usage reported, was achieved through participant interviews. I conducted individual interviews to find out what IWB usage each participant would describe. Most participants reported using applications and programs in common; however, those applications and programs were frequently described as presentations by participants.

Theme 3, student- versus teacher-centered usage, was achieved through a combination of classroom observations and participant interviews. I observed and inquired whether participants were using student-centered interactive instruction or teacher-centered usage. Most participants either reported or were observed using an IWB in a teacher-centered fashion.

Theme 4, teacher perceptions, was achieved through individual interviews. Often when participants were asked whether they would consider their use of IWB technology to be more student- or teacher-centered and to explain why (Appendix C), participants acknowledged using the technology in a less preferable teacher-centered fashion and proceeded to explain perceived barriers hindering full integration of the technology in a classroom.

Participants frequently shared personal opinions and perceptions of using IWB technology. Participants reported experiences with technology in general, limited access to IWB software, malfunctioning equipment, and inadequate training in the IWB technology. Several participants spoke of the desire to have additional training to more fully integrate the technology into classrooms. Participants sharing perceptions of IWB technology was an unexpected outcome of asking whether their use of the technology was student- or teacher-centered, but it provided additional valuable data concerning personal opinions of the benefits of the technology and perceived barriers to using it more fully in a student-centered fashion.

Interpretation of the Findings

Many studies concerning student and teacher perceptions about the use of IWB technology have been conducted; however, few studies have been conducted to address the actual use of IWB activities in classrooms. According to Shepley et al. (2016), even fewer studies include using IWB technology for children with disabilities in conjunction with evidence-based practices. Consequently, this study of IWB technology usage with this population was conducted.

Theme 1: Interactive Whiteboard Usage Observed

Tondeur et al. (2017) acknowledged that whereas numerous studies have been conducted to examine student and teacher perceptions of the use of IWB technology, few studies have been conducted to address the actual use of technology in classrooms. This study was conducted to extend knowledge in the discipline and address this gap in the literature. I was interested in answering the question of how high school teachers in self-contained classrooms are using IWB technology to teach students with mild to profound disabilities. In a previous study to determine student preferences and attitudes about IWBs, students reported attributing IWB usage to having new opportunities to participate in classes and having better comprehension of lessons (Ipek & Sozcu, 2016). In one of few studies conducted to research actual IWB usage in classrooms, Lefebvre et al. (2016) determined that the fact the IWB is available does not necessarily mean it is used, let alone effectively integrated into teaching practices. Similarly, in this study, most participants were observed using IWBs for basic display or presentation purposes rather than having students engage in higher level cognitive activities with the board. According to Wang and Hsu (2017), this teacher-centered use of technology is common but not desirable; it prohibits students from interacting with technology to address cognitive processes.

Theme 2: Interactive Whiteboard Usage Reported

Theme 2, IWB usage reported, was achieved through participant interviews. I conducted individual interviews to find out what IWB usage each participant would describe. ISTE NETS promote the integration of technology in classrooms (Trust, 2018). These standards are based on a constructivist view and encourage teachers to incorporate technology instruction that is meaningful, interactive, and based on students' prior knowledge (Parra et al., 2019). In this study, rather than describing interactive instruction with IWB technology, many participants reported using applications and programs frequently described as presentations instead of interactive programs to engage students.

Theme 3: Student- Versus Teacher-Centered Usage

Theme 3, student- versus teacher-centered usage, was achieved through a combination of classroom observations and participant interviews. I observed and inquired whether participants were using student-centered interactive instruction or teacher-centered usage. Polly and Rock (2016) determined that IWB technology was used more by teachers than students, leading researchers to believe more teachers cling to teacher-centered views of integrating technology in classrooms. According to Liu et al. (2017), the effective use of interactive technology promotes active student involvement and encourages collaborative learning by allowing students to engage interactively with technology rather than just observing the teacher using it. However, in this study, most participants either reported or were observed using IWB technology in a teacher-centered fashion.

Theme 4: Teacher Perceptions

Theme 4, teacher perceptions, was achieved through individual interviews I conducted. Participants shared personal opinions and perceptions of using IWB technology. Several participants reported experiences with technology; others spoke of the desire to have more training to better use IWB technology. According to Chen et al. (2020), teachers who were not provided sufficient training in the use of IWB technology and methods to fully incorporate it into classrooms tended to rely on low-level tasks such as skill and drill math practice rather than addressing real-world math application scenarios on an IWB. These low-level skill and drill tasks are not an effective use of IWB technology because these tasks mimic printed rote exercises not considered proven methods of research-based learning (Chen et al., 2020).

In this study, most participants used IWB technology for low-level or teacher-centered tasks. In addition, several participants, especially those with the newer Clear Touch panel, reported having received little training in the new IWB technology. In a previous study, it was determined that school districts need to continue to provide training and support for teachers to be able to use electronic board technology effectively (Watson et al., 2020; Zhang, 2019). Participants reported additional teacher training in IWB technology would enable them to better use the technology with students.

According to Shah (2020), the combined works of Dewey, Piaget, and Vygotsky provide the foundation for the constructivist theory, the theory upon which this study was based. Dewey (1902) described the necessity of consciously interacting with learning materials to assimilate them, whereas Vygotsky (1978) introduced the theory of social constructivism. In Piaget's theory of cognitive constructivism (1948), he described the learning process as one in which the learner actively works to organize new information based on previous experiences. Overall, constructivist thinkers consider the acquisition of knowledge to be a process of becoming instead of memorizing concrete facts (Olofson et al., 2016; Shah, 2020). Therefore, the presentation of new information in a student-centered format that learners can reconstruct with peers to facilitate comprehension is considered a priority. New information is manipulated and assimilated based on previous knowledge and becomes the basis for considering future knowledge (Shah, 2020).

Furthermore, Reynolds (2016) determined that offering learners the opportunity to manipulate information with digital technology encourages social interaction to build knowledge as promoted by the founders of the constructivist theory. Through student-centered technological activities, students can actively and socially engage in learning experiences to learn new concepts as was promoted by the constructivist theorists. These complementary theories, that learning is based on actively engaging in new material based on previous knowledge and that learning is a social process, provide support for why carefully planned IWB instruction can be so powerful. Therefore, the purpose of this study was to explore how teachers integrate IWB technology into self-contained classrooms to incorporate student-centered learning practices for students with mild to profound disabilities as delineated by the constructivist principles of learning. However, I found few instances of student-centered learning activities with IWBs while observing and interviewing participants in this study.

There are several reasons participants were not conducting primarily student-centered learning activities on the IWBs. Two participants who were using older Smartboards reported having issues with malfunctioning technology and no longer having subscriptions to the software that enabled access to the Smart Classroom Suite programs and tools. Participants said this made it more difficult to present student-centered materials on IWB for students with disabilities.

Participants who were using the newer Clear Touch interactive panels were learning to use new technology. Three explained the limited training received in the school system to use the technology. Several participants reported not being familiar enough with the technology to plan more student-centered activities on the IWB.

All participants were in school systems that provided one-to-one Google Chromebooks for students, so, although students were not using IWBs in a student-centered manner, many individual activities were student-centered with the use of Chromebooks. Several participants remarked that students were engaging in technology in a student-centered format just not with the IWB at the front of the classroom. During the observations, I observed that this was the case in 9 of the 12 classrooms.

In addition, some participants seemed unaware that student-centered activities are thought to be more effective than teacher-centered activities when attempting to engage learners in new materials. These participants used materials and planned lessons without engaging students in student-centered activities with IWB or with individual Chromebooks. Some participants engaged in and described teacher-centered activities but labeled them as student-centered when conversing as if not familiar with the concept of teacher- versus student-centered learning. Overall, the findings in this study indicate that participants are not integrating interactive whiteboard technology into student-centered lessons and activities in self-contained classrooms for high school students with mild to profound disabilities. According to Sumak et al. (2017), some of the most frequent issues raised by teachers concerning IWB usage were the need for more adequate training to use IWBs to the full potential, technical difficulties while using IWB equipment in classrooms, and lack of time needed for preparing teaching materials. Findings in this study support this claim and suggest participants realize IWB technology is not being used to its full potential and acknowledge the need for additional training, support, and time to do so.

Limitations of the Study

Although there are potential limitations of this study, adequate precautions were taken to address them. The use of a qualitative method can be viewed as a limitation because it does not lend itself to generalizations as readily as quantitative methods do. However, because the intent of this study was to explore the use of IWB technology for students with mild to profound disabilities, qualitative methods were preferable. Using a case study design enabled me to gather multiple forms of data directly from participants to explore the actual use of IWB technology in high school special education classrooms to examine “a contemporary phenomenon in its real-life context” as described by Yin (1981, p. 59).

Another potential limitation was the small sample size of this study. To have a manageable amount of qualitative data, participants were chosen from only two school districts. Potential candidates for the study were limited because the study only included high school teachers of students with disabilities being served in self-contained classrooms. Even though the data collection for this small group study ended abruptly when schools halted in-person instruction due to COVID-19, I had already observed and interviewed 12 of the 14 potential participants.

Another possible limitation was that one of the observations and one of the interviews were fairly short. One participant explained rarely using IWB technology with the severe and profound students except to play videos and then ceased to provide additional information. When this occurred, I determined that “observing additional data would not lead to discovery of more information related to the research questions” and chose to end the interview and the observation earlier than expected (Lowe, Norris, Farris & Baggage, 2018, p. 191). Regardless, I am confident of obtaining accurate and complete information of each participant’s IWB usage.

Still another potential limitation was that I teach in the same school as some participants. Nevertheless, participants instruct in self-contained classroom settings whereas I teach students with milder disabilities in collaborative classroom environments.

Furthermore, I was not in a supervisory role with any participants and did not teach any of the same students.

In addition, admittedly, I am biased about how beneficial IWB technology can be with students with mild to profound disabilities, especially when presented with interactive learning activities that incorporate the constructivist principles of learning and instruction; however, the intent of the study was to examine the perceptions and activities of participants regarding IWB use. Throughout the data collection, I noted my personal opinions and biases about the subject in a journal so that the actual data collected and the interpretation of the data did not include personal opinions and biases.

Recommendations

This qualitative study explored how special education teachers are using interactive screen technology in self-contained classrooms to instruct high school students with mild to profound disabilities. Further studies, whether quantitative or mixed-method, could attempt to measure student learning using interactive technology rather than the actual usage and reported usage of IWBs in self-contained classrooms, especially since Beucher et al. (2020) determined that IWBs enables students to become more active learners by increasing motivation, collaboration with peers, and engagement in class activities. Additionally, future researchers could explore the benefits of integrating IWB technology with Chromebook technology, which seems to be a current trend.

The findings in this study reveal that these participants primarily use IWBs or Clear Touch panels for displaying materials rather than having students interact with them. Participants commented frequently on having received little training and not being confident enough with IWB technology to have the students work on it independently. These comments suggest that additional professional development in IWB technology for teachers may increase their reliance on student-centered activities. This study explored the use of IWB technology in special education classrooms with students displaying mild to profound disabilities. Further research could explore which disability levels benefit most from instruction with IWB technology and how to increase the effective use of IWB technology in classrooms. Future studies might address the following questions:

- Students from which level(s) of intellectual disability, ranging from mild to profound, benefit the most from instruction using IWB technology?
- Do additional professional learning opportunities for teachers addressing IWB instruction result in more student-centered applications in classrooms?
- Would additional professional learning opportunities for teachers addressing the benefits of student-centered learning increase the prevalence of student-centered technology usage in special education classrooms?
- Is there a correlation between teachers' perceived support from administrators and technology staff and the implementation of student-centered IWB instruction?

Finally, more studies are needed to address whether teachers eventually incorporate more student-centered IWB instruction in classrooms once more familiar with the new technology simply due to daily use. Furthermore, additional studies are needed to explore whether student-centered IWB instruction will increase social interaction for students with more severe disabilities.

Implications

The results of this study will provide an original contribution to the field of education because little research has been done to determine whether teachers use IWB technology to develop constructivist learning environments by including student-centered learning experiences in classrooms, specifically in self-contained special education settings (Shepley et al., 2016). Prior to this study, research addressing IWB technology primarily addressed general education student and teacher perceptions in the use of IWB technology (Chen et al., 2020). Few researchers have approached the topic of how teachers are using IWB technology to instruct students with disabilities. Therefore, an exploration of the use of IWB technology with high school students with mild to profound disabilities was conducted to determine how this technology is being actually used in self-contained special education classrooms. This exploration of the use of IWB technology adds new research data to the field of education.

This study could have implications of positive social change in that the findings provide educational leaders at the organizational level with additional data and recommendations to make informed decisions that could create an increase in the effective use of IWB technology in classrooms. These leaders will have data to share with stakeholders to justify budgeting for professional development opportunities to help teachers incorporate new technology into their classrooms by providing them adequate training and the opportunity to collaborate with peers. The additional training and collaboration may enable teachers to integrate IWB technology usage with student-centered learning practices. This increase in effective use of IWB technology could lead to individual students with disabilities in self-contained classrooms benefitting from having more collaborative and active learning opportunities as described by Anderson and Putman (2020).

The empirical implication of this study is that many high school teachers in self-contained classrooms are not using IWBs in a student-centered fashion for students with mild to profound disabilities. In almost all the classrooms in which observations were conducted, IWB technology was used for display and presentation purposes only. However, many participants used other technology or methods to engage students in student-centered learning activities. This led me to believe that these participants are interested in integrating IWB technology into student-centered lessons but, as participants reported, encounter barriers to implementing the technology in a student-centered fashion. This implication is consistent with the conclusions of Francom (2020), Siyam (2019), and Vongkulluksn et al. (2018) who determined that teachers, who frequently have not had adequate training with IWB technology, sometimes experience technical difficulties with the technology, and need additional planning time to incorporate the technology into class lessons, are more likely to perceive barriers to integrating technology into the classroom.

Further training opportunities are necessary for teachers to have the skills and the confidence to fully implement IWB technology in self-contained special education classrooms. Although some administrators might see this as a need for more formal professional development, teachers more frequently reported that informal professional development experiences helped strengthen technology instruction skills (Gill, 2019).

Participants in Gill’s study reported that knowledge of technology instruction increases through “personal connections with friends teaching similar courses in other locations and other staff members that either shared an interest or were assigned to the same courses at the school level” (Gill, 2019, p. 678).

Other researchers have addressed the fact that teachers need to have instruction in how to effectively integrate technology in individual classrooms. Mourlam (2017) determined that professional development for teachers, to encourage technology integration, must include content specific instruction. In other words, teachers need instruction in how to integrate technology into classrooms in ways that will be meaningful and support learning rather than just receiving basic instruction in how to use the technology (Masullo, 2017). This recommendation is even more significant for planning technology instruction for high school teachers of self-contained special education students, for the curriculum and teaching must be highly specialized to address the diverse needs of special education students.

Furthermore, Gill (2019) reported that there does appear to be a connection between the formalized structures that are available through professional staff development and the more informal networking that is nurtured through these opportunities. Therefore, these teachers of students with disabilities in self-contained classrooms need the opportunity to have some formal content-specific professional development in IWB technology to network with one another to share ways for implementing the technology in student-centered lessons in these special education classrooms.

As described by Tondeur et al. (2017), teachers can transform teaching skills by gaining confidence learning to converge technology and best teaching practices to develop and teach effective lessons with technology. Years ago, elementary teachers were frequently involved in “make and take” hands-on professional development opportunities, making materials for student lessons and taking the materials and skills learned to use in their classrooms. Similarly, high school special education teachers would benefit from “see and do” opportunities to network with peers teaching similar populations to increase the teachers’ knowledge and confidence in the use of IWB technology. During informal sessions, teachers could observe ways that peers are implementing IWB student-centered activities in self-contained classrooms to better integrate the technology in their own classes. This would provide these teachers with examples of how to effectively integrate the technology into self-contained classrooms rather than just being offered traditional training in how to use a device.

Conclusion

Effective use of IWB technology consists of teachers using interactive student-centered learning activities. Students are motivated to use IWBs, and many classrooms are equipped with the technology. Interactive technology instruction can improve interactions among students and increase active engagement. Although the use of technology has already been determined to be an evidence-based practice for special education students, particularly those with ASD, participants were not found to use IWB technology effectively to create student-centered learning experiences in special education classrooms.

When participants use IWB technology primarily for projecting images or showing videos, the beneficial interactive element of IWB technology for students is eliminated. Most intervention studies for students with moderate disabilities have been conducted with younger children. Therefore, this study was conducted to determine if special education teachers in self-contained settings are using IWB technology effectively to teach high school students with mild to profound disabilities. This research study explored to what extent special education teachers in self-contained settings use student-centered IWB technology in line with constructivist principles while teaching high school students with mild to profound disabilities.

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Appendix A: Initial Email Invitation to Participate in Research Study

My name is Suzanne Walshe, and I am currently a special education teacher at XXXXXX XXXXX High School. I previously taught in a self-contained classroom in XXXXXX County. As a doctoral student at Walden University, I am conducting a research study to explore how special education teachers use interactive whiteboard technology in self-contained classrooms. I will be coordinating interviews and observations to collect data on this topic.

Since you are a high school special education teacher for students with an adapted curriculum, I am interested in having you participate in my study. Your involvement would take approximately 1 hour. I realize your time is valuable, so I am offering a $20 gift card to each teacher who participates. Because I am curious about the information that I will gather on this topic and interested in finishing my degree, I would greatly appreciate your assistance! This study has been approved by county office representatives; however, declining participation or withdrawing from the study will not result in any adverse treatment from school officials.

I will email you within one week to ask if you have any further questions about this study. In addition, I will provide a consent form for your review prior to scheduling any data collection. Thanks in advance for your consideration!

Sincerely,
Suzanne Walshe
Xxxxxx Xxxxx High School
Xxxxxx County School District

Appendix B: Informed Consent

CONSENT FORM

You are invited to take part in a research study about how special education teachers use interactive whiteboard technology in adaptive classrooms. The researcher is inviting special education teachers in self-contained classrooms with access to an interactive whiteboard to be in the study. Your name and contact information was obtained from county office personnel. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to participate in it.

This study is being conducted by Suzanne Walshe, a researcher who is a doctoral student at Walden University. You might already know her as a fellow special education teacher, but this study is separate from that role.

Background Information:
The purpose of this study is to examine how special education teachers do or do not use interactive whiteboard technology in self-contained classrooms.

Procedures:
If you agree to be in this study, you will be asked to:

- Participate in one face-to-face interview for approximately 30 minutes
- Allow the researcher to conduct one classroom observation for approximately 30 minutes

Here are some sample questions:

- How often do you use interactive whiteboard technology in your classroom?
- What types of activities do you use your interactive whiteboard for with your students?
- Where do you get activities to use with your interactive whiteboard?

Voluntary Nature of the Study:
This study is voluntary. You are free to accept or decline the invitation. The researcher will respect your decision of whether or not you choose to be in the study. If you decide to be in the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:
Being in this study would not pose risk to your safety or wellbeing and may only involve possible fatigue as encountered in daily life.

The potential benefit of the study is that it will contribute to the gap in research concerning special education instruction and could lead to opportunities for additional support in integrating interactive whiteboard technology into self-contained classroom instruction.

Payment:
A $20 gift card will be provided for each participant at the conclusion of the study in appreciation of his or her participation.

Privacy:
The data collected during this study will remain confidential. The schools and participants will remain anonymous with fictitious names. The research interviews will not disclose the names of the informants. The researcher will not use participant information for any purpose outside of this research project. Data will be kept secure in a locked file cabinet in the researcher's home for a period of at least 5 years and then destroyed, as required by the university.

Contacts and Questions:
You may ask any questions you have now, or if you have questions later, you may contact me via e-mail at Suzanne.walshe@waldenu.edu. If you want to talk privately about your rights as a participant, you can call the Research Participant Advocate at Walden University at 1-800-925-3368 ext. 312-1210 or email address irb@waldenu.edu. Walden University's approval number for this study is **IRB will enter approval number here** and it expires on **IRB will enter expiration date.**

The researcher will give you a copy of this form to keep for your records.

Obtaining Your Consent

If you have no further questions and would like to participate in the study, please indicate your consent by signing below.

Printed Name of Participant	______________________
Date of consent	______________________
Participant's Signature	______________________
Researcher's Signature	______________________

Appendix C: Interview Protocol

Study: Examining How Special Education Teachers Use Interactive Whiteboards Technology in Self-Contained Classrooms

Date: ______/______/______
Time: _____:______
Location: _________________________________

Interviewer: Suzanne Walshe
Interviewee: _______________________________

Greetings:
Thank you for agreeing to meet with me today and participating in this study. My name is Suzanne Walshe, and I am a doctoral student at Walden University. You were given a copy of the consent form that you signed previously. The purpose of this interview is to gather information about how special education teachers use interactive whiteboard technology in self-contained classrooms. I will be asking you several questions about your use of this technology. Your responses will remain confidential. I will be recording this interview to have a permanent record; please do not say your name so that your identity will be protected. Is it ok if I start recording now? (Begin recording the meeting.)

Demographic Questions:
What is the highest degree level that you have achieved?
Bachelor's Degree Master's Degree Specialist's Degree Doctoral Degree
How many years have you taught? _____________
What student ability levels do you currently have in your classroom?
Mild Disabilities Moderate Disabilities Severe Disabilities Profound Disabilities

Interactive Whiteboard Prompts and Questions:
1. Describe your use of interactive whiteboard technology. What interactive whiteboard digital tools and software do you use? How often? Do you use the software for other uses? If so, please describe these uses.
3. Do your students use interactive whiteboard technology in the classroom? If so, describe their use of the technology.
4.Would you consider your use of interactive whiteboard technology as more teacher- or student-centered? Please explain why.
5.Can you describe some activities that you have used interactive whiteboard technology to accomplish?
6. Is there anything you think I should have asked or that you would like to add?
Thanks again for taking the time to participate in this study. Is there anything else you would like to add before I turn off the recorder? (Stop recording) Ok, have a great day!

Appendix D: Observation Protocol

Teacher observed: ________________________________ Date: ____/____/____
Subject observed: ________________________________ Time: ______:______
Lesson objective: ____
Description of the classroom: ____
____
____

Teaching strategies:
Lecturing _____
Modeling _____
Discussing _____
Facilitating _____

Student groups:
Whole class_____
Small group _____
Partners _____
Individuals _____

Observations:

Facilitate and cultivate student learning and creativity
____
____
____
____

Use technological learning experiences and assessments
____
____
____
____

Model digital work and learning
____
____
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Model and promote digital citizenship and responsibility
____
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Additional note
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