DIFFERENCES IN SPECIAL EDUCATION TEACHERS' APPLIED BEHAVIOR ANALYSIS SCORES: A CAUSAL-COMPARATIVE STUDY

by

Delilah Mae Fernandez

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

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ABSTRACT

This quantitative, causal-comparative study aimed to determine if there was a difference in applied behavior analysis scores from the applied behavior analysis test between traditional and non-traditionally certified teachers and veteran and new teachers. This research also aimed to identify if there was an interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. This study is important as the findings contribute to the education system within the central Texas area as it uncovered the level of knowledge specific special education teachers in self-contained classrooms have and determined if educators are implementing the best evidence-based practices, such as applied behavior analysis methods into the classroom. 144 special education K-5th teachers from 12 counties, 81 school districts, and 337 school campuses, of which 87 school campuses have a self-contained special education classroom within the central Texas area, completed the applied behavior analysis survey. The 144 educators were divided between four treatment groups and consisted of 36 teachers with traditional certifications and 36 teachers with non-traditional certifications, as well as 36 veteran teachers, and 36 new teachers. The results of the two-way analysis of variance for the interaction between experience level and type of certification indicate a difference between the two groups. It can be concluded that new special education teachers require more training in applied behavior analysis. Future research could focus on understanding the effectiveness of applied behavior analysis strategies and supporting special education teachers in fully implementing these techniques for the benefit of students with autism spectrum disorder.

Keywords: applied behavior analysis, autism spectrum disorder, evidence-based practices, free appropriate public education, Individuals with Disabilities Education Act, operant conditioning theory, three-term contingency

Dedication

I would like to dedicate this manuscript to my beloved children, Laylah, and Sebastian. Laylah has always been my cherished angel for many reasons, but her role as a loving and caring sibling to her younger brother, Sebastian, is perhaps the most significant one. It is because of Sebastian that I embarked on this journey, as I aimed to become his advocate and be equipped with the knowledge needed to ensure he is provided with the best education possible. I would also like to express my heartfelt gratitude to God. This journey has been incredibly challenging, but with divine guidance, knowledge, and determination, I have been able to overcome all obstacles. I would not have achieved what I have today without the support of our Lord and it is because of Him that I will continue to support all children, regardless of their abilities.

Acknowledgments

Dr. Susan Stanley

Dr. Kathy Keafer

Dr. Michelle Barthlow

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List of Abbreviations

Applied Behavior Analysis (ABA)

Autism Spectrum Disorder (ASD)

Alternative Teacher Preparation (ATP)

Education for All Handicapped Children Act (EAHCA)

Evidence-Based Practices (EBP)

Education for all Handicapped Children Act of 1975 (EHA)

Every Student Succeeds Act (ESSA)

Free Appropriate Public Education (FAPE)

Individuals with Disabilities Education Act (IDEA)

Individualized Education Program (IEP)

Least Restrictive Environment (LRE)

Teacher Preparation Programs (TPP)

CHAPTER ONE: INTRODUCTION

Overview

The purpose of this quantitative, causal-comparative study is to determine if there is a difference in understanding of applied behavior analysis between traditional and non-traditional certified special education teachers and between new and veteran teachers. This study will also aim to identify if there is an interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. Chapter one provides a background for the topics of applied behavior analysis. Included in the background is an overview of the theoretical framework for this study, Burrhus Frederic Skinner's (1937) operant conditioning theory and three-term contingency. The problem statement examines the scope of the recent literature on this topic. The overall purpose of this study is followed by the significance of the current study. Lastly, the research questions are introduced, and definitions pertinent to this study are included.

Background

Applied behavior analysis (ABA) therapy is the only scientifically verified treatment that effectively educates individuals with autism spectrum disorder (ASD) (Graham, 2021). ABA is the scientific study of behavior and intervention that utilizes a variety of naturalistic and structured approaches. This method has been used for decades to enhance overall outcomes, as well as results for children with support needs, such as autism (Choi et al., 2022; Leaf et al., 2020; Greenberg & Chung, 2019; Pennington, 2022). ABA aims to identify the function of an unwanted behavior and includes a series of procedures that can be utilized to assist children who have challenged behaviors. The practice has proven effective in eliminating and replacing difficult behaviors, as well as in developing communication, social, and functional skills (Choi et

al., 2022; Max & Lambright, 2021; Pitts et al., 2019). The ABA process includes pinpointing the environmental factors that impact an individual's behavior, such as adaptive, academic, challenging, and language skills. Once these factors have been identified, interventions will then be set in place to target those elements, which will result in illustrating that the improvements gained from the individual behavior were due to the interventions (Stevenson & Correa, 2019). ABA also incorporates various approaches and strategies that are grounded in the principles of behavior, including antecedent-based interventions, functional behavior assessments, and differential reinforcement, in order to reshape and drastically improve the developmental path of younger children who have been diagnosed with ASD (Yingling et al., 2022). ABA's overall purpose is to provide a foundation, embedded in empirical evidence, in order to guide the usage of scientific practice that will ultimately lead to a child becoming more independent in all areas of life (Max & Lambright, 2021).

The interventions based on the principles of applied behavior analysis are exceedingly successful in correcting or replacing the deficits linked to autism spectrum disorder (Choi et al., 2022; Greenberg & Chung, 2019 & Lerman et al., 2004). Research has consistently illustrated the effectiveness of applied behavioral methods and how this therapy can lower unwanted behavior, improving communication and desired behavior (Graham, 2021). Furthermore, with over 7.2 million or 15% of children receiving special education services in the United States (National Center for Education Statistics, 2022), it is essential for special education teachers to obtain the necessary knowledge to educate all children, especially those diagnosed with ASD. In doing so, these children will be able to gain the necessary communication skills to experience autonomy, as well as have their basic needs met (Max & Lambright, 2021). Nonetheless, ABA

can be implemented within the classroom to enhance the outcome for students with ASD or other special needs (Pennington, 2022).

Historical Overview

The word *autism* comes from the Greek word *autos* meaning 'self' and *ismos*, indicating a 'state' or 'action'. The term was first established by Swiss psychiatrist Paul Bleuler (Kuhn, 2004; Munno et al., 2022). During the early 1900s, Bleuler used the word *autism* to describe his schizophrenia patients, who he believed were deliberately trying to escape the reality of dealing with difficult thought processes, exhibited self-centered characteristics, or were socially withdrawn (Munno et al., 2022). In 1924, Grunya Efimovna Sukhareva, a Russian doctor, was visiting with a 12-year-old boy who was noted as being highly intelligent yet was not interested in toys and seemed unconcerned about being in the surroundings of others. However, Sukhareva observed that the boy was rather introverted and preferred to absorb himself in philosophical discussions, ultimately reporting that he had an autistic liking into himself (Macoun et al., 2022). Sukhareva furthered her research with five more children, all boys with autistic tendencies, that included behavior such as social isolation, some sort of unique characteristic or talent, and a strong desire to want to be in their own world. In 2013, it was with Sukhareva's observations and expertise that was then translated and is now regarded as a precise and systematic description of the DSM-5 criteria for autism spectrum disorder (Macoun et al., 2022).

During the 1960s, autism research saw a drastic increase in its development, and in 1961, Ferster and DeMyer published an article narrating various behavior principles, such as illuminating unwanted problem behaviors in two children with autism (Munno et al., 2022). Several other notable individuals, such as Risley and Wolf (1964), suggested using principles, such as operant conditioning, in a naturalistic setting and even training parents and teachers to

treat tantrums and echolalia in children with autistic behaviors (Wolf et al.,1964). In the late 1960s, Donald M. Baer, an American psychologist, produced several articles depicting particular principles of ABA (Munno et al., 2022). Stevenson & Correa (2019) discussed the seven dimensions of ABA: applied, behavioral, analytic, technological, conceptually systematic, effective, and generality, which were first stated by Bear, Wolf, and Risley (1968) in their works. The first two dimensions, applied and behavioral, encompass specific behaviors that will enhance an individual's life by equitably defining and directly measuring the target behavior. The success of the intervention can be measured through the analytic and technological dimensions, which encompass demonstrating the positive effects on individuals through experimental procedures. Additionally, replicating the procedure with specific details is vital for ensuring consistency. Conceptually systematic elements include interpretations and interventions to remain consistent with principles of behaviors, such as positive reinforcement. The effective dimension refers to the intervention that improves the specific behavior, and the generality dimension is used to indicate when an improvement has a lasting impact, as well as can be applied to other environments and affect other behaviors. As a result of Bear, Wolf, and Risley's work on the seven dimensions of ABA, a plethora of interventions have been created, ranging from prompting strategies, functional communication, discrete trial teaching; to even more extensive treatments, like the Lovaas model, including early start Denver model, and verbal behavior programs (Stevenson & Correa, 2019). Nonetheless, it was Ivar Lovaas who examined the effects of ABA in children with autism and whose research would radically alter the standardization of ABA treatments (Leaf et al., 2020 & Munno et al., 2022).

Towards the end of the 1970s, the concept of autism came to be better understood, and decades of previous misconceptions and false information started to deteriorate (Munno et al.,

2022). By the 1980s, there was a surge in popularity of cognitive approaches in psychology, which lead to a growing interest in cognitive causes of autism. Subsequently, by the 1990s and 2000s, autism awareness increased, and more individuals became informed about autism. Despite all the research and technology that surrounds us today, unfortunately, there has still yet to be a single factor proven to cause autism. What is known is that ASD is a complex neurodevelopmental disorder that presents during the first three years of a child's life and is characterized by impairments in communication, restricted interest, repetitive behaviors, and socialization issues due to interference with the natural development of the brain in areas that control these characteristics (Khaleel, 2019 & Yu et al., 2020). Other conditions, such as behavioral and emotional problems, difficulties sleeping and eating, sensory sensitivities, as well as intellectual and learning challenges, can also be present in a child who has been diagnosed with ASD (Yu et al., 2020).

Overall, ASD is a confusing and debated condition due to the various ways it presents itself, including its unique characteristics and interplay with other disorders. Identifying the underlying causes of ASD has proven to be a difficult task, including, leading to several theories being proposed, such as the theory of the mind, vaccines, genetics, psychological, before, during, and after birth, and viruses and infectious diseases (Khaleel, 2019).

Society-at-Large

Today, individuals with ASD have a chance of a much brighter and more successful future than they did years ago, both in and outside the classroom (Lord et al., 2018). More work still needs to be conducted, and research needs to continue to thoroughly understand ASD and what treatments are most effective (Lord et al., 2018). Since the 1980s, treatments, such as ABA and its scientific approach have been extremely effective in teaching individuals with ASD basic

life and self-help skills and have supplied the increasing growth of social and language functions in children with ASD (Leaf et al., 2020; Lord et al., 2018; Yu et al., 2020). The ABA techniques developed by Ivar Lovaas are not only popular today in treating children with ASD but have significant data to support their great success across a wide range of contexts, as well as ages (Munno et al., 2022).

ABA educational methods are often highly requested by families of children with autism due to their proven effectiveness. The methods utilized in ABA have resulted in more significant improvements in a child's language, cognitive, and adaptive scores, daily living and intelligence skills, and social and adaptive behavior (Stevenson & Correa, 2019). Studies analyzing the efficacy of ABA have also shown significant and long-lasting improvements, as well as changes in their everyday functioning skills that were sustained over time (Leaf al., 2020; Stevenson & Correa, 2019). Moreover, it has been proven that when a school's curricula are carefully analyzed and correctly incorporated with the methods of ABA as pedagogy, a child's overall behavior and performance will drastically improve (Greenberg & Chung, 2019 & Nally et al., 2020).

Theoretical Background

The theoretical framework of this research is based on Burrhus Frederic Skinner or B.F. Skinner's (1937) operant conditioning theory. Operant conditioning can be defined as a method of learning where behaviors are altered by either reinforcement or punishment (Skinner, 1963). When a consequence, such as reinforcement or punishment, follows a behavior, the behavior is likely to change. This leads to learning, as the behavior becomes associated with its consequences. Skinner argued that behaviors with reinforcing consequences are more likely to be repeated. Reinforcement can take the form of either positive or negative consequences, but both

types aim to strengthen behavior (Leeder, 2022). This particular theory will help better understand the knowledge, as well as the perspectives special education teachers have concerning ABA, which incorporates operant conditioning in addition to the implementation of reducing unwanted behaviors followed by reinforcements (Staddon & Cerutti, 2003). Skinner's operant conditioning theory fulfills the framework for special education teachers' understanding of applied behavior analysis and the benefits it can render when provided to children with ASD (Staddon & Cerutti, 2003). Overall, the challenging behaviors children with special needs, especially children with ASD, acquire have considerably decreased when the principles of Skinner's operant learning or conditioning are implemented (Schlinger, 2021).

Problem Statement

Over the years, the number of children with ASD who receive special education services under the Individuals with Disabilities Education Act (IDEA) has continued to increase (Stevenson & Correa, 2019 & Walker et al., 2019). During the 2017-2018 school year, over 710,000 students diagnosed with autism and aged between 3 and 21 years old received IDEA Part B services (Walker et al., 2019). Students with ASD who receive special education services often require intensive and individualized support in order to address their unique needs (Walker et al., 2019). Additionally, many children with ASD receive their classroom instruction within a self-contained classroom (Spencer, 2013). Therefore, the knowledge an educator needs to properly educate and correct unwanted behaviors in a child with ASD can be quite extensive, and unfortunately many teachers have voiced their concerns by stating they feel underprepared when having to address challenging behaviors within the classroom (Max & Lambright, 2021). The Committee on Educational Interventions for Children with Autism (2001) stated the importance of teachers being familiar with and implementing best practices, such as methods of ABA in the

classroom for children with ASD (2001). In addition, interventions based on ABA have been proven to be successful in decreasing obstacles to a student's learning by teaching prerequisite skills while minimizing difficult behaviors (Pitts et al., 2019). Despite the fact that ABA has been around for decades, many educators and family members may encounter difficulties acquiring the materials needed to fully understand its methods and framework (Pennington, 2022). Moreover, there is still a gap in the knowledge that educators possess in regard to ABA and its importance in educating children with ASD (Dhawan, 2021; Lerman et al., 2004, Smyth et al., 2019). With ASD on the rise, there is even more of a dire need for educators in mainstream classes, as well as in special education, to possess competence in evidence-based educational interventions, such as ABA, so that they are fully prepared to address children with ASD adequately (Dhawan, 2021; Fennell & Dillenburger, 2018; Kingsdorf & Pancocha, 2022, & Pennington, 2022). The problem is the need for additional research concerning special education teachers' ABA knowledge in comparison to their type of teaching certification and years of teaching experience. This research is necessary to determine whether teachers correctly implement ABA methods and frameworks within self-contained K-5th classrooms so that more children with ASD can be integrated back into the inclusion classroom.

Purpose Statement

The purpose of this quantitative, causal-comparative study is to determine if there is a difference in understanding of applied behavior analysis from the survey test between traditional and non-traditional certified special education teachers and between new and veteran teachers. This study will also aim to identify if there is an interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. The objective of the research is to examine the variations in scores achieved by special education teachers who

participated in the survey, including analyzing the independent variables. There are two independent variables within the research study, certification type and career stages.

In education, a veteran teacher is typically defined has someone who has a specific amount of experience, although the exact length of experience required for this designation is debated. According to Day & Gu (2009), teachers with eight years of experience can be considered veterans. Additionally, Lowe et al. (2019) suggest that a teacher with significant experience and expertise, regardless of the specific years, can be regarded as a veteran. For the purpose of this study, a veteran teacher will be defined as someone who has completed at least three academic years in the classroom.

The certification type is composed of two groups, traditional and non-traditional certified special education teachers. A traditional certificate teacher preparation program (TPP) refers to an undergraduate who starts the program with little to no teaching experience. Upon completion of the program, the individual will have gained a specific amount of teaching experience, usually resulting in a bachelor's degree (Van Overschelde & Wiggins, 2020). A non-traditional certificate, also known as an alternative teacher preparation (ATP) program, is defined as having an accelerated curriculum and is designed to cater primarily to teachers who may be currently teaching, however, possess a bachelor's degree that is not in education (Van Overschelde & Wiggins, 2020; West & Frey-Clark, 2019). The dependent variable will consist of the scores obtained from the survey which will be provided by the special education teachers. The dependent variable is the understanding of ABA, which is a therapeutic intervention for children with autism spectrum disorder and incorporates principles of behavioral theory, learning theory, and positive reinforcement to achieve behavioral goals and can lead to improved functional status, behavior, and communication (Choi et al., 2022). The survey (Alotaibi, 2015) for special

education teachers will be utilized to collect data from indicating questions pertaining to the teacher's knowledge and perspectives on applied behavior analysis methods or framework.

Significance of the Study

There has been a growing emphasis on establishing evidence-based practices (EBPs) to address the unique needs, such as behavior, especially for school-aged students with ASD (Wong et al., 2015). Although EBPs have been identified, there is a gap between what is known about EBPs and implementing those practices in classrooms (Lang et al., 2010). This gap between what an educator knows and their implementation of EBP's could be the result of elements, such as teachers receiving limited support, as well as lack of instruction in incorporating EBPs (Walker et al., 2020). Research has also proven that educators focus mainly on practical factors and their own personal beliefs as to what they feel works best for the students rather than on the efficacy of the actual intervention.

ABA is extensively approved and advocated by the United States Department of Education and mandates the usage of evidence-based practices for children who receive special education services (Max & Lambright, 2021). ABA was first legally established in the IDEA of 1997 which mandated that in the situation where a child exhibits behavior where it hinders or obstructs his or her learning or that of others, all educators, as well as professionals, must consider appropriate strategies, encompassing positive behavioral interventions, supports based on ABA, such as evidence based practices, in order to fully address that behavior (IDEA, 1997). Soon after, The IDEA of 2004 was established with many of the same regulations as IDEA 1997. IDEA 2004 remains one of the most impactful pieces of legislation from the federal government pertaining to students with disabilities within the United States school system (Kramarczuk Voulgarides et al., 2021; Prince & Gothberg, 2019). The provisions described in IDEA (2004)

include services for students who exhibit challenging behaviors in a public school environment (Prince & Gothberg, 2019). For example, for a child who displays behavior which impedes their learning or that of other individuals around them, the Individualized Education Program (IEP) team would then consider utilizing positive behavior interventions, as well as supports and other methods or strategies to address the unwanted behavior.

Since autism is one of the disabilities that falls under the IDEA 2004, students who are diagnosed with autism are usually assessed and enrolled in their school's special education program (Stevenson & Correa, 2019; Itkonen et al., 2022). Once a student meets the eligibility criteria established by IDEA 2004, it is the responsibility of the school district to develop and execute a special education program that provides Free Appropriate Public Education (FAPE) (Itkonen et al., 2022; Stevenson & Correa, 2019). The right to a FAPE mandate that each student's special education program must be provided to them at no cost to the family, comply with the standards put forth by the state educational agency, including preschool, elementary, or secondary education, and be tailored to meet the student's IEP (Itkonen et al., 2022; Prince et al., 2020; Stevenson & Correa, 2019). The elements of the FAPE mandate have remained intact since the enactment of the Education for All Handicapped Children Act (EAHCA) was passed in 1975; however, additional requirements have been implemented through revisions over the years, such as the renaming of the EAHCA to the Individuals with Disabilities Education Act (IDEA 1990) (Itkonen et al., 2022; Stevenson & Correa, 2019). With the reauthorization of IDEA in 1990, autism was included as a category. In 2004, IDEA 2004 required IEP teams to implement best-practices supported by research to the extent practicable into the special education student's education and related services.

Although several Supreme Court cases have been issued, there are still disagreements and disputes regarding the FAPE mandate, as it is the most common cause of litigation in special education (Stevenson & Correa, 2019). Furthermore, this increase is particularly noticeable in the percentage of FAPE/Least Restrictive Environment (LRE) cases concerning students with autism. Despite students with autism making up only 3.7% of students in special education, they account for nearly 45% of all the FAPE/LRE cases. In addition, these disagreements often occur due to the families' seeking services that are grounded on the principles of ABA (Stevenson & Correa, 2019). The United States Department of Education also states that a child with a disability must be educated in the least restrictive environment, including being placed within the same classroom as their non-disabled peers to the maximum extent possible in order to ensure that a child with a disability is receiving a FAPE (Stevenson & Correa, 2019). Therefore, in order for students with ASD to be educated in the least restrictive environment, it is imperative self-contained special education teachers implement high-quality evidence-based practices, such as ABA principles, so that these children can improve their language, academic curriculum, and social skills, as well as reduce maladaptive behaviors (Fischer et al., 2019 & Pitts et al., 2019).

ABA methods have been highly documented over the years as having the strongest evidence based, as well as having provided exceedingly compelling evidence that ABA can and should be utilized to better improve cognitive abilities, social and emotional skills, as well as language skills in children with ABA (Fennell & Dillenburger, 2018; Liao et al., 2022; Stevenson & Correa, 2019). It is imperative for K-5th special education teachers who teach in the self-contained classroom to be equipped with the proper knowledge and skills to implement ABA methodologies in the classroom, so that students will be able to move from the more restrictive location to the general education setting. Unfortunately, students are frequently left in

their more restrictive location long after they no longer require the highly specialized and individualized services to progress academically (Hunsaker, 2018). That said, this study will provide insight into the degree of knowledge and familiarity that special education teachers within self-contained classrooms demonstrate in ABA methodologies and their implementation of these practices within their classrooms.

Research Question

RQ1: Is there a difference in the understanding of applied behavior analysis among special education teachers with differing certification types based on career stage?

Definitions

1. *Applied Behavior Analysis (ABA)* – Applied Behavior Analysis is a therapeutic intervention for children with autism spectrum disorder that uses principles of behavioral theory, learning theory, and positive reinforcement to achieve behavioral goals and that can improve functional status, behavior, and communication (Choi et al., 2022).
2. *Autism Spectrum Disorder (ASD)* – Autism spectrum disorder is a developmental disorder characterized by impairments in social skills, behavior, and communication (Choi et al., 2022).
3. *Evidence-Based Practices (EBP)* – Evidence-based practices, or EBP, is a framework created by professionals detailing the necessary decision-making in which practitioners, or educators, combine the leading available evidence with the individual's context in order to furnish the most effective services for individuals (Slocum et al., 2014).

4. *Free Appropriate Public Education (FAPE)*- Free Appropriate Public Education is the foundation of the Individuals with Disabilities Education Act and serves as the United States special education law. FAPE focuses on the significance of special education and other related services geared towards meeting the child's unique needs, as well as prepares the student for additional education, employment, and independent living. (Jameson et al., 2020 & Zirkel, 2021).
5. *Individualized Education Plan (IEP)*- An Individualized Education Plan or program is federally required for parents, educators, school administrators, and other faculty and staff members, and if applicable, students to effectively collaborate on creating instruction, accommodation, as well as services for students with special needs (Reich, 2010). The Individuals with Disabilities Education Act (IDEA) supports the IEP and ensures that students with disabilities are eligible for a Free Appropriate Public Education, including public schools must provide these individuals with specific disabilities instruction and services that are tailored to meet their unique needs, as well as should be provided at no expense to the child and their family.
6. *Individuals with Disabilities Education Act (IDEA)*- The Individuals with Disabilities Education Act states that each qualifying child who has been diagnosed with a disability is entitled to a Free Appropriate Public Education. IDEA (34 CFR §300.17) is proclaimed as an educational program which is individualized to shape the distinct needs of a child who has a disability or qualifying for special education services. The program is required to meet the child's unique needs, as well as afford access to the general education curriculum, in addition to meeting the grade-level standards of the state in which the child resides (Jameson et al., 2020).

7. *Operant Conditioning Theory*- Operant Conditioning Theory is the study of reversible behavior maintained by reinforcement schedules and is behavior controlled by its consequences (Staddon & Cerutti, 2003).
8. *Self-Contained Classroom*- A self-contained classroom is a type of educational placement that is typically separated from general education classrooms and is where a special education teacher is responsible for teaching all academic subjects to students (Spencer, 2021). Self-contained classrooms are considered to be near the middle of a continuum of placement options in terms of restrictiveness, and classroom sizes are generally smaller than general education classrooms due to students' intensive or multiple support needs, as well as the possibility for a highly structured behavioral or education program. Lastly, the concept of self-contained classrooms is generated from the Individuals with Disabilities Education Act, yet there is no federal definition of the term, and it is not mentioned in the law (Spencer, 2021).
9. *Three-Term Contingency*- Behavior analysis's major objective is to manage and anticipate operant behavior. The three-term contingency is a commonly emphasized feature of operant response, as it includes identifying the occasion for the response, which identifies the response itself, and the consequential reinforcement of the response (Bouton & Balleine, 2019). If a behavior analysis aims to enhance or decrease the strength of a specific operant, it must modify, as well as identify its antecedents or consequences and adjust them accordingly.

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature was conducted to explore special education teachers' knowledge and perspectives on applied behavior analysis (ABA) therapy and ABA's effectiveness when implemented in self-contained classrooms that accommodate grades K-5th children with autism spectrum disorder (ASD) within the Central Texas public school system. This chapter provides an examination of the research on this topic. The theories pertinent to teachers' knowledge and perspective on applied behavior analysis will be discussed in the first section, followed by a review of recent literature on applied behavior analysis therapy and the different types of classrooms within the school environment. Then, the literature surrounding autism spectrum disorder and understanding the benefits of implementations and the effects of applied behavior analysis can prevail when incorporated in self-contained classrooms that accommodate children with autism. Thus, incorporating ABA in self-contained classrooms that educate children with autism can lead to a greater understanding of the benefits and effects of implementing interventions, which will then contribute to advancing literature surrounding ASD and comprehending the advantages of ABA interventions. Finally, a gap in the literature is identified, indicating the need for additional research concerning teachers' knowledge and perspectives on ABA as well as the benefits of this therapy for students with Autism in self-contained classrooms in the Central Texas public school system.

Theoretical Framework

The theoretical framework for this study is based on B.F. Skinner's operant conditioning theory (1937) and the three-term contingency, which is the foundation of operant conditioning. With extensive research, Skinner believed that animals interacted with their surroundings both

voluntarily and actively and, as a result, he referred to active behaviors as operants; from then, operant conditioning was established (Redmon et al., 2001; Ruan & Wu, 2013). Operant conditioning, also known as *operant learning*, is a vital form of psychological learning in which animals and humans learn to connect and identify their behaviors with consequences (Ruan & Wu, 2013). Nonetheless, this theory provides insights to the knowledge and perspectives special education teachers have regarding ABA, which includes operant conditioning, as well as using reinforcements to reverse and condition behaviors (Staddon & Cerutti, 2003). B.F. Skinner's operant conditioning theory (1937) supplies the framework for special education teachers' understanding of ABA and the benefits it can bring when utilized within self-contained classrooms that house children with ASD (Gitimoghaddam et el., 2022; Kingsdorf & Pancocha, 2022).

The theory of operant conditioning was first formulated by B.F. Skinner in 1937 after he became intrigued by Ivan Pavlov's classical conditioning theory and started experimenting with behaviors and their influence on the environment (Skinner, 1938). Skinner discovered that operant conditioning transpires when the frequency of behavior alters based on the consequences of the behavior, such as the use of reinforcement or punishment. Therefore, learning takes place when the behavior of an individual is either rewarded or punished, creating an association between behavior and the outcomes. According to Skinner (1937), behaviors that result in positive consequences are more likely to occur again. Nevertheless, both positive or negative reinforcement can be utilized to strengthen, as well as encourage a desirable behavior (Leeder, 2022). B.F. Skinner's breakthrough and explanation of operant conditioning had a tremendous impact on society's understanding of changes in behavior that occur in children, as well as the treatment of behavior disorders in younger children (Schlinger, 2021). Therefore, conducting

research with Skinner's operant conditioning theory is critical so that educators can gain a more in-depth understanding of how to treat behavior disorders in children with ASD (Gitimoghaddam et al., 2022; Kingsdorf & Pancocha, 2022).

Edward Thorndike, an American psychologist (1898), was the first individual to state the law of effect in 1898 from his experiments with various mammals all located in puzzle boxes; however, it was B.F. Skinner who discovered that the rate of replying in regard to a dependent variable was, in fact, reliant on to a mixture of investigational manipulation (Schlinger, 2021). From this discovery, B.F. Skinner learned how the law of effect, now known as the law of reinforcement, operates, as well as under what conditions. As a result of his findings, Skinner uncovered other laws of operant learning. Based on this newfound information Skinner believed that one the goals of education should be not to subdue behaviors, but rather to construct behavior repertoires and that reinforcements should be emphasized (Schlinger, 2021).

B.F. Skinner's operant conditioning (1937) provides, more than demonstrates, a functional relationship between behavior and consequence; this development learning also exhibits functional relations between individual behavior and certain antecedent conditions (Cooper et al., 2019). This separate operant is known as the three-term contingency and involves the control, as well as prediction of human behavior (Cooper et al., 2019). The three-term contingency consists of what is known as the antecedent stimulus, behavior, and consequence and is often referred to as the ABCs of behavior analysis. The three-term contingency is frequently used to evaluate the relationship between a learner and their environment (Cooper et al., 2019; Reichle et al., 2021). According to Kienzler et al. (2023), behavior and consequence play significant roles that follow a specific relational structure, such as adding a positive

outcome with a behavior to reinforce the likelihood of the behavior reoccurring. The consequences one receives will influence the probability of the behavior reoccurring.

Operant conditioning theory was one Skinner's most eminent theories, and from his further examination of Pavlov's reinforcement concept, he was able to establish a theory that has drastically altered the notable advances in the fields of psychology and philosophy, neuroscience, and in the education, treatment, and care of children, especially on the treatment of behavioral disorders in children (Saracho & Evans, 2021). Skinner laid the foundation for further theoretical and experimental research for future generations to continue to expand on his operant conditioning theory (Saracho & Evans, 2021; Schlinger, 2021).

Although B.F. Skinner is not the founder of applied behavior analysis, he is considered the father and first formulated the principles used to study behavior that evolved into the discipline of applied behavior analysis (Alberto et al., 2021; Schlinger, 2021). Before the development of applied behavior analysis, very few, if any, therapies existed, and children with various learning disabilities and special needs, such as ASD, were left without any meaningful and effective therapies to assist with their specific needs (ODonohue & Ferguson, 2001). Moreover, individuals did not expect the tremendous influence that the utilization of applied behavior analysis and its principles would have in the field of education, as well as in the field of American psychology (Alberto et al., 2021). Applied behavior analysis (ABA) is based on B.F. Skinner's science of operant learning and has been substantially utilized to treat behavior disorders in children with special needs (Schlinger, 2021). The variety of behaviors among these children has been drastically improved using the principles of B.F. Skinner's operant learning, or conditioning.

The methods of applied behavior analysis are critical for all teachers, especially special education teachers educating children with ASD, to fully comprehend. Implementing these methods into self-contained classrooms can improve and provide students with ASD the many skills needed to be taught alongside their neurotypical peers. Overall, applied behavior analysis can assist children and provide them with the necessary knowledge to master academic and functional skills (Alberto et al., 2021). In doing so, educators can manage their student's behavior more effectively and place more emphasis on the learning within the classroom, and therefore, maintain a safe, positive, and successful learning environment that will result in making a monumental difference in each child's life.

Related Literature

Autism spectrum disorder (ASD) is one of the most widespread heterogeneous. neurodevelopmental disorders to affect children across the globe (Dhawn, 2021& Gomez-Mari et al., 2021). Unfortunately, the rates at which children are being diagnosed are steadily increasing worldwide and do not show any signs of slowing down. Public schools are the primary location where children with ASD, a pervasive developmental disorder, receive the majority of their intervention services. However, the implementation of evidence-based practices varies in each school (Locke et al., 2019). According to studies, it has been found that individual attitudes, as well as organizational characteristics, like implementation leadership and climate, may impact the implementation of EBPs, yet additional research is recommended in order to better comprehend the full effects of these limitations. Thus, it is imperative for individuals, especially educators, to thoroughly understand the most effective, as well as scientifically validated intervention approaches for children with ASD (Dhawn, 2021). Applied behavior analysis is a

proven approach that aids in the treatment of behavior challenges and behavior deficits in children with ASD (Louie et al., 2021).

The origins of behavioral intervention can be attributed to the groundbreaking work of several individuals, including Ivan Pavlov, John B. Watson, Rosa-lie Rayner, Mary Cover Jones, Edward Thorndike, Joseph Wolpe, Burrhus Frederic Skinner, Barbara Etzel, Sidney Bijou, and Judy Favell. Together their contributions, among many others, have led to the development and establishment of ABA, which was further advanced in the seminal article Baer et al. in 1968. While there were many previous examples of ABA prior to Baer and his colleagues, the establishment and publication of the *Journal of Applied Behavior Analysis* is commonly referred to as the birth of ABA (Leaf et al., 2020). Within the aforementioned article, Baer et al. (1968) described several dimensions of ABA: applied, behavioral, analytic, technological, conceptually systematic, effective, and generality.

Research has consistently identified the effectiveness of ABA strategies and their methods in reducing and eliminating unwanted behavior in children with ASD, in addition to improving communication, learning, and proper social behavior (Choi et al., 2022; Dhawn, 2021). Dhawn (2021) and Smyth (2022) specified that the treatment of ABA can be highly effective for children with ASD by scientifically enhancing their overall outcomes, such as improving their behaviors, language, including cognitive skills. The second theme evident throughout the readings is the lack of understanding, knowledge, acceptance, and the numerous misconceptions that exist due to the lack of training among educators in ABA.

Studies have also identified a group of methods called evidence-based practices (EBPs) that are proven to have significant improvements on outcomes for children with autism. These methods are influenced by the knowledge and expertise of medical professionals while also

considering the preferences, choices, and cultural backgrounds of the individuals being treated. Evidence-based practices for children with ASD that have been proven to improve core systems are visual schedules, pivotal response training, and discrete trial training. However, despite the ample evidence supporting these practices, less than 10% of school-based programs for children with autism are utilizing these practices. The successful implementation of EBPs in schools is difficult due to a number of complexities, as well as resource-intensive instructional strategies required for children with autism (Locke et al., 2019). There is a common disconnect between research and practical application. This disconnect may be contributed to the varied obstacles, such as limited knowledge, inadequate specialized training, and resource limitations (Gevarter et al., 2022). Locke et al. (2019) stated that even when utilized within schools, evidence-based practices are often not incorporated with fidelity, which may impact and even decrease their effectiveness in improving outcomes for these children with autism.

Most children with autism spectrum disorder prefer consistent schedules and routines and can even struggle with behavioral dysregulation when changes are presented. As a result, this can lead to disruptive behaviors when transitioning between classroom or school activities without the use of a timer, and this is likely to significantly impact a child's ability to function at school and even at home, the two environments where they spend the majority of their time (Azad et al., 2021). Evidence-based practices for improving the lives of children with autism have been identified in the literature and include strategies, such as environmental modification, consequent strategies, such as natural reinforcement, antecedent strategies that include prompting and modeling, and child-initiated teaching.

The Effectiveness of Applied Behavior Analysis

ABA, commonly the first recommended intervention for students with ASD, is composed of a number of interventions, such as verbal behavior training (VBT), discrete trial training (DTT), and pivotal response training (PRT) (Anderson, 2023). Rather than being a single intervention, ABA encompasses a range of methods and techniques, such as reinforcement, discrete trial training, and task analysis, that are aimed at teaching a range of skills, including adaptive and communication abilities to children with ASD. Dr. O. Ivar Lovaas is known to have played a drastic role in promoting and popularizing ABA, and his treatment model illustrated that around half of the children who received the therapy were difficult to differentiate from other children. However, ABA is a method utilized to modify behavior and relies heavily on the work of B.F. Skinner. ABA uses the principles of operant conditioning to shape the behavior of the individual, especially those with disabilities (Desnoyer & Liu et al., 2022). The interventionists that implement ABA principles believe that behaviors can be modified through a reward or punishment system based on compliance or the successful demonstration of the targeted skill.

The effectiveness of ABA intervention has been thoroughly researched through nine meta-analytic studies published in peer-reviewed journals. Meta-analyses are a research tool and are vital due to researchers being able to synthesize, as well as convert the results from various studies to a common metric. Furthermore, meta-analyses provide a better understanding of the topic being researched (Makrygianni et al., 2018). Despite each meta-analysis varying in its inclusion criteria, each study demonstrated the effectiveness of ABA intervention for ASD treatment.

ABA provides a robust set of evidence-based methods and strategies that have proven to be an extremely effective treatment for children with ASD. Such methods significantly enhance the overall outcomes for these children, as well as improving their lives (Alves et al., 2020; Choi et al., 2022; Dhawn, 2021; Leaf et al., 2020; Pennington, 2022; Robinson et al., 2019). ABA strategies encompass a variety of techniques to modify behavior. These strategies include both positive and negative reinforcement to increase a desired behavior, in addition to extinction, exclusion, over-correction, punishment, and cost of response to build a new or reduce unwanted behavior (Khaleel, 2019). ABA also employs variable ratios and fixed ratios in order to maintain a wanted behavior, including strategies to create or establish new behaviors. Data recording strategies are also implemented, including time intervals, repetition, and measuring how long the behavior lasts.

Pennington (2022) and Robinson et al. (2019) expressed that for more than 70 years, ABA procedures and principles specifically designed in behavioral technology focused on replacing or eliminating unwanted behaviors to enhance the overall quality of a child's life have been used. Moreover, evidence has also proven that early and rigorous ABA intervention will result in the greatest effect and optimal outcomes on children with ASD (Choi et al., 2022; Leaf et al., 2020). ABA's high success may be due to the personalized methods and strategies based on the child's specific needs that this method makes use of (Robinson et al., 2019). That said, there is an abundance of scientifically validated peer-reviewed evidence demonstrating how effective the treatment of ABA is in improving children with ASD's overall communication and learning skills, as well as their behavior (Anderson, 2023; Murphy et al., 2019; Smyth et al., 2019; Waters et al., 2020).

Educator's Lack of ABA Knowledge

The next theme apparent throughout the readings is that individuals, including educators, lack an overall understanding and knowledge of applied behavior analysis. Teachers in special education and inclusive schools often lack the knowledge and competencies to fully educate children with ASD, especially regarding what evidence-based practices are needed to adequately support these students in the classroom (Kossewska et al., 2021 & Martin et al., 2021). Even though ABA has been around for more than half a century, many individuals, such as special educators and family members, may encounter challenges accessing the all-inclusive framework (Pennington, 2022).

When educators lack the required support needed to address challenging behavior, it can hinder their capability to provide high-quality instruction. Consequently, this will thereby limit the learning opportunities for the rest of the students within the classroom (Pollack et al., 2023). As a result, when a student exhibits severe challenging behavior, this can put both the teacher and all students in possible danger. This may then lead to more disciplinary action, including a more restrictive educational placement that further limits the student's access to effective instruction and their ability to learn alongside their typically developing peers.

Unfortunately, there is still a lack of knowledge, training, accountability, and understanding, even at the national level and within countries that are well-developed (Dhawan, 2021; Smyth et al., 2019). Moreover, most educators obtain limited instruction and training in evidence-based practices, such as ABA, and lack experience in incorporating behavioral interventions that are critical in educating children with ASD (Pollack et al., 2023). With ASD diagnoses on the rise, educators, especially special education teachers, must have the ABA

knowledge needed to decide what approaches and methods work best for children with ASD (Dhawan, 2021; Pennington, 2022).

Recent studies have revealed that although school programs for children with autism may be adequate overall, the programs as a whole may lack focus on intervention that addresses vital areas for children with ASD (Odom et al., 2020). Antezana et al. (2017) stated that there is also a shortage of evidence-based practices when it comes to identifying and providing support to individuals with ASD. Additionally, many educators do not feel equipped to instruct children with ASD (Van Der Steen et al., 2020). While these teachers acknowledge the significance of the implementation of evidence-based practices for children with developmental disabilities, such as autism, are extremely critical, they often express the sense of feeling extremely unprepared (Knight et al., 2019 & Sam et al., 2021).

Autism Spectrum Disorder

Autism is a condition that can appear on a *spectrum*, meaning that individuals who are diagnosed are presented with different levels of ability, as well as disabilities. The concept of the *spectrum* was created when the ASD diagnosis was established by merging the Diagnostic and Statistical Manual of Mental Disorders, 4th edition or DSM-4 combining pervasive developmental disorder diagnosis: autism and Asperger's disorder, pervasive developmental disorder not otherwise specified, and childhood disintegrative disorder all into one definition (Hodges et al., 2020). This spectrum can range from an individual who is nonverbal to those with advanced language skills and includes those who struggle with social functioning and sensory issues, to those who simply appear odd, eccentric, and socially awkward. The diversity of issues can be difficult to understand for individuals who see the world through the lens of a *normal* or typical perception (Barua & Bharti, 2019).

Currently, as per the Diagnostic and Statistical Manual of Mental Disorders (DSM-V), ASD is categorized under neurodevelopmental disorders (Alves et al., 2020). Individuals with ASD may experience deficits in social and communication interaction, which can include both verbal and non-verbal language, socio-emotional reciprocity, among others. These individuals may also exhibit repetitive and stereotyped behaviors, along with restricted and fixed interest, which can include the repetition of words or phrases, known as *echolalia*, or simple motor stereotypes, among others. Lastly, the DSM-V categorizes these deficits based on different levels of severity, such as mild, moderate, or severe.

Unlike physical disabilities, autism has no physical markers, and it is sometimes challenging to tell if someone has autism just by looking at them. This can lead to even greater difficulty in understanding what an individual with ASD experiences as they may appear to 'look normal' but behave in a manner that is far different from the norm. Even a child with autism who demonstrates a high level of speech and is extremely fluent in their language abilities can still struggle with social understanding, in addition to encountering the same struggles as others with autism (Alves et al., 2020).

ASD can be found in all ethnicities, racial backgrounds, and even social, economic groups (Hodges et al., 2020). Additionally, autism continues to affect more children within the United States each year, with one in 68 children having the disorder in 2018, and by the year 2020, the number had increased to 1 out of every 59 with a further increase to 1 out of every 54 children in 2022 (Choi et al., 2022; Heinsfeld et al., 2017, Hodges et al., 2020). ASD is a heterogeneous neurodevelopmental disorder that is identified by deficits or impairments within social communication, behaviors that are classified as being repetitive and sensory, and may even have a very specific or restricted interest, as well as interfere with a child's everyday living

activities and environments (Bent et al., 2023, Choi et al., 2022; Gomez-Mari et al., 2021; Heinsfeld et al., 2018; Hodges et al., 2020; & Lord et al., 2020). Overall, ASD is a neurobiological disorder that can drastically affect a child's developing brain and is stated to, unfortunately, be inescapable (Hodges et al., 2020).

Educating Students with ASD

As the number of students diagnosed with ASD increases, there will be a much greater need for support within an educational setting for these individuals. While recent systematic reviews have effectively identified numerous evidence-based interventions for individuals with ASD, none have any specific focus addressing interventions in school settings. This is extremely important because educators encounter distinct challenges, as well as struggle with limited resources that continue to contribute to the gap between research and practice (Martin et al., 2021).

Between 1995 and 2014, the number of students aged 6-21 in the United States with a classification of ASD under the Individuals with Disabilities Education Act (IDEA) increased significantly from 29,076 to 473,279. Furthermore, over the last decade, there has been an 86% increase in the number of children with autism in elementary school who are receiving special education services (Sam et al., 2022). In 2017, 702,742 children and youth with autism were provided special education services, and if they started school at the age of 3 and had perfect attendance, each student would have spent 1,101,600 minutes of their lives in the public school system if they graduated by the age of 22. The extensive amount of time children with ASD spend in the public education system is second only to the time they spend with their families; thus, the public educational environment can greatly impact their learning and development and ultimately affect their overall quality of life.

With rising diagnosis rates, the number of students with ASD who require additional assistance to succeed in school will continue to rise, and schools should be prepared to meet the complex needs of these children. Children with ASD often require assistance in various aspects of their lives, such as social communication and interaction, restricted or repetitive patterns of behaviors, interests, and activities, including difficulties with expressive language, sensory interest and aversions, challenging behavior, and other accompanying disorders (Anderson et al., 2018 & Martin et al., 2021).

Anderson et al. and Martin et al. (2018, 2021) stated that despite the helpful advice and guidance on evidence-based interventions, there is still a significant disparity between research and current practices for children with ASD, particularly in school settings, even though approximately 91% of students with ASD attend public and private schools. Implementing interventions in a public-school environment can be more challenging compared to a clinical setting, as there are several factors, such as student-teacher ratios, staff training and supervision, and the complex nature of ASD itself that make implementation in schools difficult. As an illustration, most intervention studies require an extensive amount of time to train interventionists, or individuals who are typically members of the research team, followed by close monitoring to ensure fidelity of implementation, as well as any additional training that may be required. However, there is little to no time allocated to train educators in school-based interventions, and a lack of qualified individuals to help train teachers (Anderson et al., 2018 & Martin et al., 2021).

Most interventions for children with ASD aim at implementing on a 1:1 basis, where a professional is working with a single student at a time. Unfortunately, this approach is not feasible in public schools due to several reasons, such as cost; even though most children with

ASD are provided with 1:1 support to some degree, the services offered vary significantly between the public school and the student (Martin et al., 2021). As the prevalence of ASD continues to expand, individuals with ASD will require further support in educational settings. As such, there is a critical need for a body of research that outlines effective intervention approaches that educators can use to address the complex needs of students with ASD.

In 1975, the United States Congress made a significant decision that would assist children with disabilities so that they would be guaranteed the right to an education (Wright & Wright, 2021). The Education for All Handicapped Children Act of 1975 stated that all state and local education agencies be required to educate all children, even those that are handicapped. Congress has since renamed and amended this special education law, and in 2004, the Individuals with Disabilities Education Act was updated once again. In 2015, Congress reauthorized the Elementary and Secondary Education Act (ESEA), which was previously referred to as the No Child Left Behind Act. With the new education law, the Every Student Succeed Act, all children, including those with disabilities such as ASD, could now attend school and be educated alongside their peers.

The federal government requires public schools to provide free and appropriate education (Individuals with Disability Education Act 2004) with practices based on research evidence (Every Student Succeeds Act 2015) for students with disabilities such as autism (Odom et al. 2020 & Sam et al., 2022). Substantial increases in the number of children with autism who are attending public school, along with receiving special education services, are consistent with the accelerating occurrences of autism in recent years (Sam et al., 2022). When a child enrolls in a public school, it becomes the responsibility of the school to ensure that the child receives an acceptable educational program, preferably one of high quality. As of today, there is limited

information pertaining to the effectiveness of educational programs for elementary school students with autism. Unfortunately, the field of education has not remained consistent in the quality of education programs, despite state agencies developing measures that document required program features for children with autism. To date, there has been a lack of published evaluations detailing the quality of programs for school-aged children with autism (Sam et al., 2022).

Newly conducted studies reveal that although the general quality of school programs for children with ASD may be satisfactory, though certain features of these programs that aim at intervention in vital areas may be insufficient (Odom et al., 2020). Additionally, many educators lack the confidence to provide instruction that serves children with autism the best (Van Der Steen et al., 2020). Despite acknowledging the importance of implementing evidence-based practices for children with autism and other developmental disabilities, educators commonly express a lack of preparation (Knight et al., 2019; Sam et al., 2021).

There continues to be a growing concern between the identification and implementation of EBPs by special educators, especially when addressing the complex and diverse instructional needs of students with autism and/or intellectual disabilities. Moreover, special education teachers who educate students with autism and intellectual disabilities often resort to ineffective, untested, and even harmful instructional methods (Knight et al., 2019). Inclusive education requires the expertise of educational professionals, especially teachers. However, numerous studies indicate that professionals within a general education school setting do not feel they possess the necessary skills and knowledge needed to educate students with ASD and even feel uncertain or ill-equipped to fully include these students in the mainstream classrooms, as it seems to be a significant obstacle (Roberts & Webster, 2022 & Van Der Steen et al., 2020).

According to Kossewska et al. (2021), many studies have concluded that educators lack knowledge about autism and are not equipped with the required skills to successfully support children with autism in schools. Moreover, in recent years, there has been an increase in the number of children and young students with ASD diagnoses; therefore, there is a high probability that teachers will encounter students with ASD in their classroom, especially within a self-contained classroom. Consequently, all educators must receive the support and educational training needed to successfully educate children and young students with ASD to ensure that every child has the opportunity to succeed (Gomez-Mari et al., 2021).

One of the most critical aspects of running a structured and successful classroom occurs before a student even steps foot into the classroom (Alberto et al., 2021). Planning carefully will enable teachers to effectively educate all students, including ones with ASD, as well as assist them in obtaining the necessary skills and knowledge, even when unwanted and inappropriate academic or social behavior exists (Alberto et al., 2021). Educating students with ASD requires teachers to be knowledgeable and experienced with issues, such as social communication struggles, resistance to change, sensory sensitivities, and ritualistic behaviors so that they can manage, as well as address, unwanted behaviors so that effective education can occur (Kossewska et al., 2021, Morris et al., 2021 & Roberts & Webster, 2022). Moreover, educators must be well-versed in interventions that prove to be both effective for students with ASD and practical for implementation in the classroom setting (Martin et al., 2021). Therefore, it is incredibly important that educators receive the proper training and understanding of how to effectively improve children with ASD's educational outcomes to ensure lifelong learning opportunities, along with a high-quality education for students with special needs (Barua & Bharti, 2019, Cumming et al., 2021 & Gomez-Mari et al., 2021).

Benefits of Early Intervention for Children with ASD

Many experts agree that timely diagnosis and treatment are vital factors in enhancing the functional outcomes of children with autism spectrum disorder (Antezana et al., 2017 & Antill, 2020). According to researchers, early behavioral intervention is crucial for promoting positive results in life for children with ASD, and utilizing behavioral conditioning during these early stages of development will result in a strong foundation for learning retention (McGill & Robinson, 2021).

Being said, timing is critical when it comes to children diagnosed with ASD, and the earlier a child can start to gain the necessary skills to thrive in the classroom, the better their chances of long-term success and positive effects (Dhawan, 2021& Shahidullah et al., 2022). Additionally, when a child with ASD receives early intervention, they are more likely to be placed in a more inclusive school (Fuller & Kaiser, 2019). Since ASD is a lifelong developmental condition, early intervention for children with ASD is extremely vital so that the most advance development can be used, and the child can obtain the highest results possible, including the ability to communicate with other individuals (Bent et al., 2023; Dhawan, 2021; Landa, 2018; Louie et al., 2021).

Early intervention is intended to focus on an essential property of the brain, experience-dependent neuroplasticity (Landa, 2018). Neuroplasticity occurs when neuronal connections are assembled and established, where learning then happens due to a child's interactions with their environment. In understanding neuroplasticity, the importance of early intervention in children with ASD becomes momentous in order to address any deficits that may arise. Altogether, early intervention focuses on advancing and expanding a child with ASD's learning by escalating the benefits of experience-dependent neuroplasticity. Educating a child with ASD about daily

activities can lead to independence, in addition to improvement in one's overall quality of life that will continue across their lifespan; the correct steps must be taken to address areas of impairment so that improvement can occur in a child with ASD as early as possible (Dimian et al., 2020). Therefore, early intensive applied behavior analysis incorporates a variety of interventions that are designed to assist and positively affect the development and learning trajectory of young children with ASD (Hodgson et al., 2022; Rodgers et al., 2021: Smith et al., 2019; Wood et al., 2018).

The Individuals with Disabilities Education Act (IDEA 2004) in the United States federally mandates that early intervention services be affordable and be provided through Part C for children from birth to two years old and Part B for those who are three to 21 years old. According to the United States Department of Education (2020), around 89% of children aged 3 to 5 who receive services under IDEA obtain support in regular early childhood programs or a separate special education classroom setting. Based on the most current research, the intensity of early intervention is extremely important. The outcomes observed for children with ASD who received early intensive behavioral intervention before the age of 4 had better cognitive outcomes, adaptive behavior, lower autism systems, improved verbal language gains, and achieved average functioning compared to those who did not have access to early intervention. Providing access and high-quality early intervention services in a timely manner can drastically improve the quality of life for both the child and their families. It is imperative families are provided with a diagnosis of ASD as soon as possible so that early intensive treatment can occur (Dimian et al., 2020).

Applied Behavior Analysis

ABA intervention goes beyond aiding just individuals with autism, despite ABA first being developed to address behaviors associated with autistic behaviors. As of today, ABA intervention for both autism and intellectual disabilities has the most substantial evidence base (Anderson, 2023). Wong et al. (2021) declared that ABA is a type of therapy that strives to understand, as well as improve human behavior and has become increasingly popular when used with children with special education needs, such as autism spectrum disorder. Although there is well-documented evidence that ABA therapy is effective in improving behavior, social interaction, communication, self-help, academic skills, and play, not all children have equal access to this therapy. One of the main barriers to access to ABA therapy is the high cost; not all families are able to afford therapy outside of the school environment. Therefore, it is imperative ABA therapy is accessible to all students with special needs, as it is an important goal in inclusive education.

Due to the extensive amount of literature detailing ABA's effectiveness, ABA continues to expand across the globe to provide the best services for children with ASD and other learning differences (Kingsdorf & Pancocha, 2022). Given that there are no known medical cures for an individual with ASD, ABA is an extremely successful evidence-based practice approach to early intervention that aligns with the principles of operant conditioning (Landa, 2018). ABA is defined by Alberto et al. (2021) as being a structured application of principles that focus highly on behavior and are designed to improve socially significant behavior to the maximum extent possible (2021). ABA is a science of human behavior, and for over 70 years, the practices have been brought forth by deep-rooted behavioral principles. These principles include making observations about the environment, including antecedents to the behavior and consequences

following the behavior, as well as positive reinforcement, which is then utilized to enhance behavior outcomes. Data collection is then used to recognize the intervention that worked best for that child (Dhawan, 2021; Loiacono & Allen, 2008; Pasco, 2018).

ABA approaches were produced by Ole Ivar Lovaas and were obtained from operant conditioning and learning theory techniques taken from the works of B.F. Skinner so that children with ASD could be provided with imperative treatment (Gitimoghaddam et al., 2022; Pasco, 2018). Gitimoghaddam et al. (2022) described ABA as using the psychological principles of learning theory in order to achieve necessary changes in unwanted behaviors, as well as social interactions in children with ASD. ABA has continued to make progress since the implementation of the core principles were created in the early Lovaas model and following the UCLA Young Autism Project over 60 years ago. As of today, ABA has an array of extensive treatment models, methods, intervention practices, and teaching strategies that all focus on assisting a child at any functioning level who is diagnosed with ASD, deficits in language, problem behavior, social skills, daily living skills, and cognition. ABA programs often include teaching methods that concentrate on addressing behaviors through experimentation, measurement, and objective description. These methods encompass natural environment teaching, discrete trial teaching, task analysis, prompt fading, and pivotal response training, all with a focus on achieving task mastery and the implementation of behavioral principles (Whiting & Muirhead, 2019).

One of the most significant models that serves as the base for ABA is the ABC model; antecedent, behavior, and consequence (Gitimoghaddam et el., 2022). The ABC model operates on both, or either, the antecedent and consequence of a child's behavior and is designed to

increase, decrease, or adjust the behavior, ensuring a tool that is conveyable and can target specific behaviors successfully.

The main goal of ABA's principles is to educate children with ASD so that the necessary skills and behaviors can be put into place by instantly rewarding them for the desired behavior until, eventually, they are able to perform the appropriate behavior independently (Pasco, 2018). Altogether, ABA consists of many principles that can be employed in different situations and is an evidence-based intervention that is highly proven to increase a child's overall functional well-being, communication, behavior, and cognitive skills (Choi et al., 2022; Dhawan, 2021). The ABA techniques include skills that can be more difficult for a child with ASD to understand or learn, and these skills get broken down into smaller components, followed by teaching those parts in conjunction with a reward system (Rodgers et al., 2021). The techniques also highlight stimulus discrimination, including learning and positive reinforcement, with the overall goal of moving a child with ASD to a more positive developmental trajectory at a much earlier age (Rodgers et al., 2021). With intense early ABA intervention, a child with ASD can have much greater results and will see long term improvements in multiple areas (Choi et al., 2022; Fuller & Kaiser, 2019).

Overall, there is an extensive amount of literature that provides evidence demonstrating how impactful ABA's methods are in drastically improving adaptive and language skills, including cognitive measures in children and youth with ASD (Gitimoghaddam et el., 2022). The well-documented amount of scientific evidence regarding ABA has constituted this method as the best practice for the treatment of children with ASD and, therefore, has led to the endorsement of not only the federal government of the United States but also the governments of other nations.

Applied Behavior Analysis and Children with ASD

Children with ASD can receive a number of treatments; however, one of the most effective, evidence-based treatments is ABA. This is due to ABA's framework that is based on the science of learning and behavior modification, with the aim to increase desired behaviors, as well as important skills, such as communication and language development (Arthur-Banning & Windbiel, 2022). ABA is also successful in enhancing an individual's memory, focus, and social skills, and often, with intense therapy, can lead to better social interactions.

Anderson (2023) stated that ABA is a method used to improve the quality of life of individuals by focusing on behavior. This is due to the fact that when events are manipulated in a specific manner, a direct impact will occur on the behavior that can be effective, replicated, and have lasting changes over time. Moreover, one of the core beliefs of ABA is that behavior is a direct response to the circumstances surrounding it, specifically, the events that occur immediately before and after the behavior. The interventions that evolve from the principles of applied behavior analysis are often the most cited evidence-based interventions created for the treatment of children diagnosed with ASD (Arthur-Banning & Windbiel, 2022; Gitimoghaddam et al., 2022 & Makrygianni et al., 2018). With more children being diagnosed with ASD each day, it is imperative an intervention approach such as ABA is embraced so that these children can develop the ability to better communicate socially and interact with others (Dhawan, 2021; Gitimoghaddam et al., 2022). Autism begins to appear when a child is around 2-3 years of age and continues throughout their entire life; thus, early intervention that includes ABA is indispensable so that therapists can develop a greater and deeper understanding of any deficits the child may have and work towards correcting or replacing these unwanted behaviors with more desired ones (Dhawan, 2021).

For decades, evidence has concluded that ABA is proven to teach children with ASD functions, such as language and social skills, including a steady accumulation of one's intelligence (Yu et al., 2020). ABA's principles of behavior are thoroughly executed to recognize variables within one's environment that impact important social behavior and are employed to expand on the child's practical and individualized interventions, making ABA the most effective approach in assisting children with ASD (Falletta & Lewon, 2023 & Yu et al., 2020). The methodology of ABA is extremely successful in educating a child with ASD on basic communication and self-help skills, social interaction, and daily living (Yu et al., 2020).

Individuals diagnosed with ASD and who are not able to receive intensive treatment often tend to have poor outcomes later in life, such as having few friends, obtaining stable employment, or being able to live independently (Fisher et al., 2020). Thus, the practice of ABA, a skill in applied and health psychology programs and a practice in psychology that is widely accepted in psychological science and evidence-based practice, should be presented to children with ASD, as ABA is proven to be effective and the therapy has illustrated significant results in multiple areas (Wong et al., 2021). Areas include feeding disorders, vocational skills, social functioning, independent living skills, academics, and challenging behaviors. Altogether, studies have repeatedly shown how ABA therapy is proven to be effective in supporting and aiding the progress and growth of children with special educational needs.

Applied Behavior Analysis in Schools

Public school systems are facing increasing challenges in aiming to meet the intensive needs for successful participation in school as more children are being diagnosed with autism spectrum disorder (Whiting & Muirhead, 2019). Antezana et al. (2017) indicated that the lack of ASD awareness is prevalent not only in communities across the United States but within public

school systems as well. Therefore, when a child first is identified as being on the autism spectrum through the school system, it is unlikely that they will receive services in a timely manner. As a result, while the school system plays a pivotal gateway to services and diagnosis for students, there is a high possibility that children who are first flagged for ASD in school are less likely to receive the support necessary for diagnosis or other services.

The most common method utilized to assist individuals with ASD in integrating into both school and society is through behavioral interventions. The early stages of research on ASD interventions emphasized comprehensive behavioral management rooted in the principles of behavior modification, such as applied behavior analysis (Wong et al., 2021). However, despite the fact that these interventions are well-established and proven to be successful when utilized continuously and individually for an extended period of time, insufficient resources have resulted in preventing ABA from being publicly funded within schools.

Extending ABA to schools where students with ASD require the most support would allow for evidence-based practices and techniques to be more readily available to these children (Kingsdorf & Pancocha, 2022). Kingsdorf & Pancocha (2022) also stated that, unfortunately, even with the massive growth of ABA throughout the nation, incorporating the science within classrooms, where children with ASD spend most of their time, is difficult. Applied Behavior Analysis is highly recognized and proven to be an extremely effective instructional approach to educating students with ASD (Loiacono & Allen, 2008). Through incorporating ABA into schools and classrooms, educators can better understand a student's behavior and learning difficulties (Pennington, 2022). With the evidence-based practices ABA contains, students with ASD can ultimately improve their overall lives both inside and outside the classroom. With ABA in schools, educators can eliminate undesirable behaviors that prevent students with ASD from

learning the necessary academic content (Robinson et al., 2019). The correlation between ABA and the education field stems from recent United States federal policies indicating the advantages of ABA in schools and requiring teachers to use positive behavior interventions that address and aid the needs of students with disabilities such as ASD (Shepley & Grishman-Brown, 2018).

For instance, IDEA authorized states to apply approaches such as the core principles of ABA, including monitoring a child's progress, decision-making based on data, prevention, and instruction, as well as combining intervention intensity with the specific needs of a student (Shepley & Grishman-Brown, 2018). School service needs for children with ASD within the United States are regulated within the IDEA Act, which also requires that all educators apply interventions, practices, and curricula that are research-based (Antezana et al., 2017 & Shepley & Grishman-Brown, 2018). Moreover, students receiving special education services in the United States must have an individualized education plan (IEP) that is developed by a team of individual professionals. Research has proven that a child's academic success is strongly correlated with the effectiveness of their IEP, which includes measurable learning, communication, and social goals that can be monitored and measured over time (Antezana et al., 2017).

All in all, schools must aim to reduce and eliminate unwanted behaviors and replace them with appropriate behaviors using high-quality, evidence-based practices, such as applied behavior analysis (Fischer et al., 2021). Managing a child’s behavior should be a priority for educators, including all faculty and staff within a school. Thus, ABA should be incorporated and moved beyond home-based programs and therapy offices and be fully implemented into the public education system (Kingsdorf & Panchocha, 2020).

Teachers' Knowledge & Perspective on ABA

One of the major goals of educating students with ASD should be to deliver effective instruction and to equip children with the necessary skills they need to not only be as self-sufficient as possible but to operate efficiently in their environment to the greatest extent possible (Merry, 2020 & Roberts & Webster, 2022). Ensuring educational justice for students with autism goes beyond just ensuring their safety, but also includes the goal of increasing their participation and independent function within their environment. Therefore, it is absolutely imperative to acknowledge that fairness norms should include everyone, even those individuals whose abilities may be different from the average.

Students with ASD are susceptible to falling behind academically, which can result in significant deficits in their academic achievement, a strained relationship with their teachers and peers, and even dropping out of school. It is essential to understand the needs of educational professionals so that the best possible support can be implemented. When teachers feel capable and well-prepared, this will positively affect their students and influence their progress. As stated before, with the increasing number of students with ASD, educators do not always feel that they are equipped with the specific expertise required to effectively educate their students (Van Der Steen et al., 2020).

Smyth et al. (2019) noted that despite the ample amount of evidence, ABA methodology is not generally utilized, accepted, accessed, or even promoted to assist children with ASD. The literature suggests that teachers do not have access to proper training in evidence-based practices or preparation for ABA and its framework, lacking the proper time and resources to implement these practices (Azad et al., 2021). Schools must aim to reduce and eliminate unwanted behaviors and replace them with appropriate behaviors using high-quality, evidence-based

practices, such as applied behavior analysis (Fischer et al., 2021). Managing a child's behavior should be a priority for educators, including all faculty and staff within a school. With increasing legislative demands on educators regarding how they require specific qualifications to work with students with ASD, it is more necessary than ever to ensure teachers are properly trained and equipped with the essential skills and knowledge to meet the unique needs of children with ASD (Khaleel, 2019). Thus, ABA should move beyond home-based programs and therapy offices and be fully implemented into the public education system (Kingsdorf & Panchocha, 2020).

With ABA being the most effective method for accommodating children with ASD, reporting that these individuals receive optimum classroom instruction when ABA is incorporated and utilized, it is essential teachers have the correct knowledge and perspective on what ABA is and everything that it entails (Bettini et al., 2019; Loiacono & Allen, 2008). This especially pertains to teachers within self-contained classrooms, as educators within these more restricted environments should have the skills and understanding of how to properly implement academic and behavioral practices with children diagnosed with ASD (Bettini et al., 2019). As more children continue to be diagnosed with ASD and receive the majority of their education within public schools, the federal government requires that educators gain the required knowledge and understanding of ABA so that they can successfully educate children with ASD (Loiacono & Allen, 2008).

Prioritizing the training and development of teachers' skills is more vital than ever, as it can lead to better life opportunities for children with ASD (Khaleel, 2019). The educational literature emphasizes the urgency of training educators who work with children with ASD on a continuous basis to ensure these individuals are equipped with the tools needed to assist their students in continuous growth and development. The method of applied behavior analysis is an

extremely successful method for modifying negative behaviors and promoting positive ones in children with ASD.

Overall, the literature surrounding autism spectrum disorder suggests that applied behavior analysis can prevail when incorporated in self-contained classrooms that accommodate children with autism. A gap exists in the literature concerning the lack of applied behavior analysis therapy and methods being utilized with students with ASD in K3 through 5th grade self-contained classrooms. ABA and the essential outcomes produced for children with autism spectrum disorder have been studied for many decades; however, slight, if any, research has been conducted where applied behavior analysis has been implemented by special education teachers in self-contained classrooms. By inspecting special education teachers' knowledge and perspective of applied behavior analysis in the Central Texas public school system, researchers can gain a greater understanding of how educators are incorporating ABA into their classrooms, including the benefits of this therapy, as well as the results that ABA can produce when properly implemented within K3 through 5th grade self-contained classes that accommodate children with ASD.

Summary

Goodall (2020) defined inclusion as a concept that involves the idea of belonging, feeling valued, and especially wanted as an individual by educators, not a place such as a mainstream classroom. Goodall's description of inclusion is rooted in the findings from several authors, and believes inclusion is a constant struggle and is a top priority for educational policy agencies in many countries. The concept of inclusion is frequently debated, and the interpretation often varies. There are several debates over the definition of this term, which has led to a lack of progress, as well as confusion, making the idea of inclusion extraneous, convoluted, and even

insignificant. The reason is that there are different interpretations of what inclusion truly entails by many individuals, such as educators, parents, and other stakeholders. In addition, definitions vary according to pedagogical, educational, cultural, and policy goals (Goodall, 2020).

The concept of inclusion involves a wide agenda that represents diversity among all learners, regardless of their disabilities, dispositions, or differences (Goodall, 2020). Goodall also suggested that inclusion in education could be a fundamental building block for establishing a more inclusive society and is significant for the economy, including politics. Altogether, it is of the essence to acknowledge that inclusion includes many complexities and should not be viewed as a static state. Despite the constant battle to determine a more concise definition of inclusion, the overall principles behind the concept should be driven by the rights and learning of the children, social justice, and equality.

Research has proven that children with autism are not receiving the adequate support they require and, as a result, they often struggle to participate successfully, as well as excel both in school and post-school settings (Roberts & Webster, 2022). More than 7.2 million or 15% of children receive special education services within the United States (*National Center for Education Statistics*, 2022); thus, special education teachers must gain the knowledge and skills needed to properly educate these children, especially those diagnosed with ASD. One highly effective way to teach children with autism spectrum disorder and other disorders is by implementing applied behavior analysis methods in the classroom (Graham, 2021). For more than 70 years, research has demonstrated how effective applied behavior analysis therapy and its methods are in educating individuals with autism spectrum disorder. Moreover, applied behavior analysis is the only scientifically verified treatment and intervention proven to be successful by

using a systematic approach that will increase the overall outcomes for children with autism spectrum disorder (Pennington, 2022).

Using the theory of operant conditioning (Skinner, 1937) to guide the study of this subject matter, the reviewed literature examines autism spectrum disorder, educating children with ASD, the benefits of early intervention, applied behavior analysis in children with ASD, applied behavior analysis in schools, and teachers' knowledge and perspectives on applied behavior analysis. A gap exists in the literature concerning the lack of applied behavior analysis therapy and methods being utilized between K3 through 5th grade self-contained classrooms that contain students with ASD. Applied behavior analysis and the essential outcomes it has produced for children with autism spectrum disorder have been studied for many decades; however, slight, if any, research has been conducted in cases where applied behavior analysis has been implemented by special education teachers inside self-contained classrooms. By inspecting special education teachers' knowledge and perspective of applied behavior analysis, researchers can gain a greater understanding of the benefits the therapy and its methods can produce when properly implemented within K3 through 5th grade self-contained classrooms that accommodate children with autism spectrum disorder within the Central Texas public school system.

CHAPTER THREE: METHODS

Overview

The purpose of this quantitative, causal-comparative study was to determine if there was a difference in understanding of applied behavior analysis between traditional and non-traditional certified special education teachers and between new and veteran teachers. In addition, the data will indicate if there is an interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. This chapter begins by introducing the design of the study, including full definitions of all variables. The research questions and null hypotheses follow. The participants and setting, instrumentation, procedures, and data analysis plans are also presented.

Design

A quantitative casual-comparative design study was used to examine special education teachers' familiarity with ABA in self-contained K-5 classrooms within the Central Texas region. When conducting causal-comparative research, groups of individuals were formed based on various levels of an independent variable to determine whether they differ on a dependent variable. The emphasis is on identifying cause-and-effect relationships between the variables in a nonexperimental investigation. The independent variable must be categorical, either nominal or ordinal scales, and specific statistical analysis methods can be used. The purpose was to comprehend the relationships between the variables within this study using this approach (Gall et al., 2007). This is significant within this study because it aids in the establishment of a cause-and-effect relationship between the variables being studied. Thus, by ensuring that the independent variable is categorical, this study effectively compared the understanding of applied behavior analysis between traditional and non-traditional certified special education teachers, as

well as between new and veteran teachers in order to determine if there was a difference. By doing so, the results of the impact of the independent variable on the dependent variable was determined.

Utilizing the casual-comparative design will be appropriate for this topic since the results gained are vital in determining if there is a difference in understanding of applied behavior analysis between traditional and non-traditional certified special education teachers, as well as between new and veteran teachers. In addition, the data will indicate if there is an interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. The results that will be obtained from this study are critical in determining the level of theoretical knowledge of special education teachers regarding applied behavior analysis interventions and techniques, as they can contribute to enhancing the theoretical content of ABA in the Texas school systems.

Testing the level of knowledge of teachers educating children with autism spectrum disorder (ASD) using the questionnaire survey is appropriate for the casual-comparative study since the results gained are vital in determining the extent of knowledge of educators pertaining to their understanding of applied behavior analysis strategies. Furthermore, the results can drastically enhance the literature on a widely under-researched topic (Mubarak, 2001).

The study examined the variation in survey scores, taking into account the variables, traditional and non-traditional certified special education teachers and between new and veteran teachers. This study also aimed to identify the interaction effect between experience level and type of certification when considering understanding of applied behavior analysis. There are two independent variables within the research study, certification type and career stages. The certification type is composed of two groups, traditional and non-traditional certified special

education teachers. A traditional certificate teacher preparation progam (TPP) is defined as an undergraduate who has no experience in the teaching field and typically results in a bachelor's degree (Van Overschelde & Wiggins, 2020). A non-traditional certificate, also known as an alternative teacher preparation (ATP) program is defined as having an accelerated curriculum and is designed to cater primarily to teachers who may be currently teaching, however, possess a bachelor's degree (Van Overschelde & Wiggins, 2020 & West & Frey-Clark, 2019). The dependent variable will consist of the scores obtained from the survey which will be provided by the special education teachers. The dependent variable is the understanding of ABA, which is a therapeutic intervention for children with autism spectrum disorder and incorporates principles of behavioral theory, learning theory, and positive reinforcement to achieve behavioral goals and can lead to improved functional status, behavior, and communication (Choi et al., 2022).

Research Question

RQ: Is there a difference in the understanding of applied behavior analysis among special education teachers with differing certification types based on career stage?

Hypotheses

The null hypotheses for this study are as follows:

$H_0$1: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between traditional and non-traditional teachers among special education teachers.

$H_0$2: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between new and veteran special education teachers.

$H_0$3: There is no significant interaction between experience level and type of certification on the understanding of applied behavior analysis, as measured by the applied behavior analysis survey among special education teachers.

Participants and Setting

The following section provides a detailed description of the population, the participants, the sampling technique, and the sample size used in this study. The setting provides more detailed information about the region within the state of Texas in which the study was conducted, encompassing 12 counties, including 81 school districts and 337 school campuses. In each district, there is at least one elementary campus that has a self-contained special education classroom.

Population

To achieve the goals of this research, a convenience sample of the target population, K-5th grade special education teachers who have a self-contained classroom within the 12 counties, 81 school districts, 337 campuses, and ten charter schools in the central Texas area of Region 12 ("About ESC Region 12", 2023) will be invited to participate in the study. After receiving their consent, these teachers will be provided the survey. The Central Texas region is a blend of both urban and rural areas. This area consists of 177, 617 students, of which 25, 075 are enrolled in as special education, 12,342 teachers, and 25,613 total staff. From the 177,617 students, 18.9% are African American, 36.6% are Hispanic, 35.6% are White, 0.4% are American Indian, 2.1% are Asian, 0.9% are Pacific Islander, 5.6% are two or more races.

Participants

For this study, participants will be selected using a convenience sample, which is a specific kind of non-probability sampling method (Saunders et al., 2018). The convenience

method relies on data collection from a group of people that is convenient and readily available to participate in a study (Saunders et al., 2018). The research will be conducted on four groups of at least 144 educators who will be divided based on four factors - their certification type (traditional and non-traditional) and their years of teaching experience (new and veteran). The study will focus on K-5th teachers who will be teaching self-contained classrooms within the Central Texas region during the 2023-2024 academic year. The school districts within this area range from upper to lower income and are located in both rural and urban areas within the state of Texas ("About ESC Region 12," 2023).

The participants from this study came from 87 elementary schools within 81 different school districts and consisted of 144 educators divided between the four. According to Gall et al. (2007), 144 individuals is the required minimum for a two-way ANOVA; therefore, this study will consist of at least 144 special education teachers. The treatment group consisted of 36 teachers with traditional certifications and 36 teachers with non-traditional certifications, and 36 veteran teachers, and 36 new teachers. Prior to the special education teachers completing the survey, a short questionnaire using Survey Sparrow was presented, asking educators the type of teaching certificate, traditional or alternative, and years of teaching experience.

The word 'veteran' originates from the Latin word *veteranus,* which means 'old.' A veteran is an individual who has gained extensive experience in a particular field. When referring to teaching, veteran teachers are those who have experience and who have been in the profession for a considerable period of time. However, based on the literature, there is a lack of agreement regarding the specific length of experience required for a teacher to be identified as a 'veteran' (Day & Gu, 2009). According to Day & Gu (2009), teachers with eight years of experience can be defined as 'veterans.' A veteran teacher can also be described as having many years of

experience and is regarded as a definition that may be difficult to comprehend. Nevertheless, a teacher with significant experience may be considered a veteran due to their expertise as well as their capacity for self-reflection (Lowe et al., 2019). Therefore, a veteran teacher may be in their third- or thirtieth-year teaching (Lowe et al., 2019). For the purpose of this study, we will consider a veteran teacher as someone who completed at least three academic years in the classroom.

TPP's have primarily been created for undergraduate students who lack any teaching or work experience, and typically result in a bachelor's degree, although some programs may offer a teaching credential without a degree (Van Overschelde & Wiggins, 2020). In the mid-1990s, the need for more teachers grew due to a teacher shortage in school districts. As a result, the state of Texas came up with an alternative pathway for people to become teachers, adding an additional source of qualified educators. These alternative pathways were established as an addition to the traditional university-based teacher preparation programs.

Accelerated programs for alternative teacher preparation (ATP) programs are intended to primarily serve teachers who are currently in the classroom and who hold a bachelor's degree (Van Overschelde & Wiggins, 2020 & West & Frey-Clark, 2019). ATP programs are different from TTP programs in numerous ways. For example, ATP teachers have full access to teaching students with minimal supervision as they are the teacher of record and complete a paid internship, with the support of a ATP supervisor. TTP programs only provide pre-service teachers with limited access to teaching students as well as continuous supervision as they complete an unpaid student teaching position (Van Overschelde & Wiggins, 2020 & Whitford et al., 2018). TTPs are also limited by state law in terms of the curriculum they are permitted to provide, while ATPs are not.

Setting

The study will be conducted in a region within the state of Texas encompassing 12 counties, including 81 school districts and 337 school campuses of which at lease 87 school campuses have a self-contained elementary classroom. Additional data will be provided about the setting of each school once that information is obtained.

Instrumentation

A survey was utilized as the instrument for this study and is composed based on a behavior management survey conducted by (Randazzo, 2011), as well as modified survey items (Alotaibi, 2015) in order to word the ABA strategies in a manner that would be more comprehensible to educators and help address the research questions more effectively. The purpose of this instrument (refer to Appendix F for the applied behavior analysis survey) was to explore the perceptions of teachers of children with ASD regarding their extent of knowledge about ABA strategies, including the teachers' perceptions of their use and frequency of ABA strategies (Alotaibi, 2015).

In order to gather data for the present study, the survey created by (Alotaibi, 2015) and built on the foundation of (Randazzo, 2011) behavior management survey was implemented (refer to Appendix B for permission to use the survey test) for special education teachers working in self-contained classrooms, aligning with the study's objective. The instrument's development was created using behavior management survey as a foundation in order to evaluate the knowledge of Saudi Arabian teachers of students with ASD regarding ABA, including the obstacles that hinder the implementation of ABA strategies (Alotaibi, 2015). Alotaibi (2015) developed this survey instrument in hopes to better assist faculty members in special education departments at Saudi Arabian universities in developing effective training programs focused on

the use of ABA for both pre-service and in-service teachers. Ultimately, this survey instrument was developed to add to the knowledge and understanding of the field of special education (Alotaibi, 2015).

Dr. Alotaibi's (2015) survey, titled "Knowledge and Use of Applied Behavior Analysis Survey Among Teachers of Students with Autism Spectrum Disorders in Saudi Arabia," underwent various measures to ensure its validity. The survey's content validity was supported through a literature review, and the validity of the questions was examined using Rasch's analysis of item behavior model. Additionally, two faculty members from Washington State University with Ph.D. degrees in special education reviewed the instrument for item-construct appropriateness and examination of construct representativeness of the domain (Lamb, Annetta, Meldrum, & Vallett, 2012). The survey's reviewer agreement on relevance was analyzed using a measure of construct validity for both the individual items and sections. The construct validity coefficient score of approximately .70 is deemed appropriate, and the estimated coefficient score of the survey was .91, indicating satisfactory construct validity (Alotaibi, 2015). Dr. Alotaibi's (2015) survey constructs underwent revisions based on the results of a pilot study, particularly for questions with low reliability. The survey had a high reliability estimate of .91, determined using the Rasch Reliability. Part one of the survey added six new questions, while parts two, three, and four were modified to align with the participants' comprehension. The fifth part was included to identify the participants' training and resource needs. However, to fit the needs of this study, sections three through five were eliminated.

The applied behavior analysis survey used within this study was organized into two sections; demographics of the participants and the teacher’s knowledge of ABA strategies (Alotaibi, 2015). The teacher specializing in special education selected the option on the survey

that best aligned with their responses. The first section of the study collected the participants' demographic information such as their gender, experience, courses, training, and education. The participants' responses was scored based on the following criteria: gender responses were scored as 0 for female and 1 for male. Courses on behavior management, training on ABA during teaching career, and courses on ABA during teachers undergraduate or graduate education was scored as 0 for no and 1 for yes (Alotaibi, 2015). Alotaibi's (2015) survey initially included a question regarding the educational unit taught by participants, but with his approval and consent to modify the survey (refer to Appendix B), this question was removed to better fit the needs of the current research. The last section of the survey asked participants to rate their familiarity with sixteen ABA strategies that could be utilized within the classroom. A Likert scale with three response options was given for sixteen questions, and participants marked a box to indicate their level of ABA knowledge. The response options for knowledge level was: (1) Not knowledgeable, (2) Somewhat knowledgeable, or (3) Knowledgeable (Alotaibi, 2015). The combined possible score on the applied behavior analysis survey ranged from 16 to 48 points. A score of 16 points is the lowest possible points indicating that the educator was not knowledgeable in ABA, and a score of 48 points is the highest, concluding that the teacher was extremely knowledgeable in ABA. The applied behavior analysis survey was provided to special education teachers via email and the approximate time to complete the survey was 10 minutes. The instrument was scored by the researcher using the Survey Sparrow survey platform results section. Lastly, permission was granted to utilize Dr. Alotaibi's (2015) survey (see Appendix B for permission to use the instrument).

Procedures

To obtain the objectives of this study properly and effectively, a request for permission to

conduct the study was sent to the Internal Review Board (IRB) at Liberty University (see Appendix A for IRB approval). After receiving authorization from the IRB board, an email was then sent to every special education teacher who educates students in a self-contained classroom within the target area of 81 school districts. The email contained the consent form (refer to Appendix C) to gain approval for participation in the study, as well as outlining the purpose of the study. The email also informed the educators that if they choose to partake in this study their email addresses would not be linked to the electronic survey, including the data that will be collected from the test will remain confidential and anonymous. The email also indicated that the participant's involvement in the study is entirely voluntary, also stating that the participants have the option to withdraw from the survey at any time they feel uncomfortable or no longer wish to participate.

Once the educator provided their permission and consent to participate in the study, they received access to the electronic survey. Prior to accessing the question portion of the exam, the educator was requested to indicate their familiarity with or education in applied behavior analysis approaches and methods, as well as if they have any training in ABA. If the educator answered positively, they then proceed to take the survey at their earliest convenience. A follow-up email was also sent out each week as a friendly reminder for educators to complete the instrument, in addition to the test closing four weeks after the initial email. In addition, to increase the response rate, it was also stated that the educator could be provided a hard copy of the survey to each campus where the self-contained special education teacher is located.

Research has been consistent in identifying variability in speed and accuracy, as well as dispersing output along various statistical software packages, such as Statistical Package for Social Sciences (SPSS) (Hodges et al., 2022). It is imperative that statistical data being reported

from a study not have results that are misinterpreted or misreported since this would be considered inappropriate. Moreover, the usage of inappropriate statistical data will result in untrustworthy measurement, as well as endanger the validity of the results (Cook & Campbell, 1979; García-Pérez, 2012). Therefore, Statistical Package for the Social Sciences (SPSS) was utilized to code, enter, and analyze the relationship between the independent variables and the dependent variable resulting from the survey (Rahman & Muktadir, 2021). Survey Sparrow, a web-based program, was sent out to the educators, ensuring confidentiality, privacy, and anonymity. After educators took the secure survey, their data was immediately recorded, and the researcher then download the information into the SPSS. All information was then printed and stored in a secured, locked filing cabinet. Upon completion of the dissertation, all information will be shredded when the data is no longer needed.

Data Analysis

Researchers can decide to employ a simple analysis of variance, ANOVA, which is a "statistical procedure that compares the amount of between-groups variance in individuals' scores with the amount of within-groups variance, instead of conducting multiple tests" (Gall et al., 2007, p. 318). A two-way ANOVA comparing the scores of each group of independent variables and dependent variables was utilized to complete this study with a minimum sample size of 144 evenly divided between traditional and non-traditional certified special education teachers, new and veteran teachers. This study examined the knowledge of ABA among special education teachers in self-contained K-5th classrooms within the Central Texas area. The survey (Alotaibi, 2015) for special education teachers was implemented to collect data from indicating questions pertaining to the teacher's knowledge and perspectives on applied behavior analysis methods or

framework. The data was then collected from special education teachers using Survey Sparrow and analyzed to answer the research questions.

The collected data was visually screened for missing and inaccurate data points before entering into SPSS. Once entered into SPSS, the data was again screened for missing or inaccurate entries. A second party also checked the researcher's data collected from Survey Sparrow and SPSS data entry accuracy as well. To ensure the accuracy of the results obtained from the two-way ANOVA test, it is essential to take into account certain assumptions. Moreover, for assumptions to be valid when conducting tests on a two-way ANOVA, four specific conditions must be met. If these assumptions are not met, the results of the analysis may not be accurate. Therefore, it is important to carefully check these assumptions before conducting a two-way ANOVA.

The first assumption, normality, indicates that the residuals must be normally distributed for each combination of levels of the independent variables. This study evaluated the normality of five different combinations separately using the Shapiro Wilks test. The next assumption for the two-way ANOVA is homogeneity of variances also known homoscedasticity. Once the data was collected, I determined if there were any homogeneity of variances by viewing each combination of the levels of independent variables using the Levene's test. The assumptions of no significant (extreme) outliners was also checked using the box-and-whisker plots also known as boxplots. The independence of observations is the last assumption for a two-way ANOVA where one observation is not dependent on another. The inferential statistics that will be utilized in the collection of this study's data analysis is statistical significance – $p < .05$; F *statistic* > F critical, and to identify differences between groups.

Once the necessary data was gathered, statistical techniques was employed to analyze it (Creswell & Guetterman, 2018). The analyses utilized within quantitative research include breaking down the data into smaller sections in order to answer the research questions, including interpretating the overall results despite the original predictions or previous studies (Creswell & Guetterman, 2018). The findings was then clarified by specifying the reason, as well as describing how the results from the study were concluded. Lastly, descriptive statistics of mean and standard deviation were reported for the dependent variable on all groups of the two independent variables. The null hypothesis will be rejected at the 95% confidence level and the effect size was reported using partial eta square (ηp2).

CHAPTER FOUR: FINDINGS

Overview

The goal of this study was to investigate whether there exists a variance in the comprehension of applied behavior analysis between certified special education teachers with traditional and non-traditional backgrounds, as well as between new and veteran teachers. Data was collected to determine if there was an interaction effect between the type of certification and experience level that may impact the understanding of applied behavior analysis. This quantitative, causal-comparative research has provided insight into the mentioned variables and their effects on the perception of applied behavior analysis. Chapter four begins by reiterating the research question and null hypotheses, followed by the results obtained from this study which are presented thereafter.

Research Question

RQ1: Is there a difference in the understanding of applied behavior analysis among special education teachers with differing certification types based on career stage?

Null Hypotheses

$H_0$1: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between traditional and non-traditional teachers among special education teachers.

$H_0$2: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between new and veteran special education teachers.

$H_0$3: There is no significant interaction between experience level and type of certification on the understanding of applied behavior analysis, as measured by the applied behavior analysis survey among special education teachers.

Descriptive Statistics

The descriptive statistics obtained for the dependent variable understanding of ABA among new and veteran teachers with a non-traditional certification and traditional certification in special education can be found in Table 1. The analysis of the final data included 144 participants. The average understanding of ABA for newly certified special education teachers who were non-traditionally certified was 5.94% higher (M = 39.69) than the average for traditionally certified teachers, which was (M = 33.75). The mean for veteran teachers' understanding of ABA was slightly higher at (M = 36) compared to non-traditionally certified teachers' mean. The average total for new teachers differed by 6.32% from that of veteran teachers, with veteran teachers having a higher average. Overall, the non-traditionally certified special education teachers had a higher mean at (M = 41.38), 2.79% higher than traditionally certified teachers.

The standard deviations for understanding of ABA for new teachers was a total of 6.47% with the traditional certified special education teachers being 2.64% higher. The understanding of ABA for veteran teachers had a total of 4.46% in standard deviations with the traditional certified special education teachers being 3.34% higher. Altogether, the total standard deviation for non-traditional and traditional certified special education teachers are 6.38% with traditional certified teachers being at 7.69%, which is 3.34% higher than the standard deviations of the non-traditional teachers.

Table 1

Descriptive statistics (dependent, understanding of ABA)

Career Stage	Type of Certification	*n*	*M*	*SD*
New Teachers	Non-Traditional Certified Special Education Teacher	36	39.69	4.315
	Traditional Certified Special Education Teacher	36	33.75	6.950
	Total	72	36.72	6.477
Veteran Teachers	Non-Traditional Certified Special Education Teacher	36	42.86	3.841
	Traditional Certified Special Education Teacher	36	43.22	5.055
	Total	72	43.04	4.461
Total	Non-Traditional Certified Special Education Teacher	72	41.28	4.358
	Traditional Certified Special Education Teacher	72	38.49	7.691
	Total	144	39.88	6.385

Results

$H_0$1: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between traditional and non-traditional teachers among special education teachers.

$H_0$2: There is no significant difference in the understanding of applied behavior analysis, as measured by the applied behavior analysis survey, between new and veteran special education teachers.

$H_0$3: There is no significant interaction between experience level and type of certification on the understanding of applied behavior analysis, as measured by the applied behavior analysis survey among special education teachers.

Data Screening

In the data screening process, the researcher carefully examined each group's variables to locate any potential data entry errors or inconsistencies. Additionally, the box-and-whisker plots, also referred to as boxplots, were implemented to assist in identifying any outliers in the dependent variable. This approach allowed enabled the researcher to ensure the quality and integrity of the data before proceeding with the analysis.

Figure 1

Box and whisker plot (dependent, new teachers, non-traditional certification)

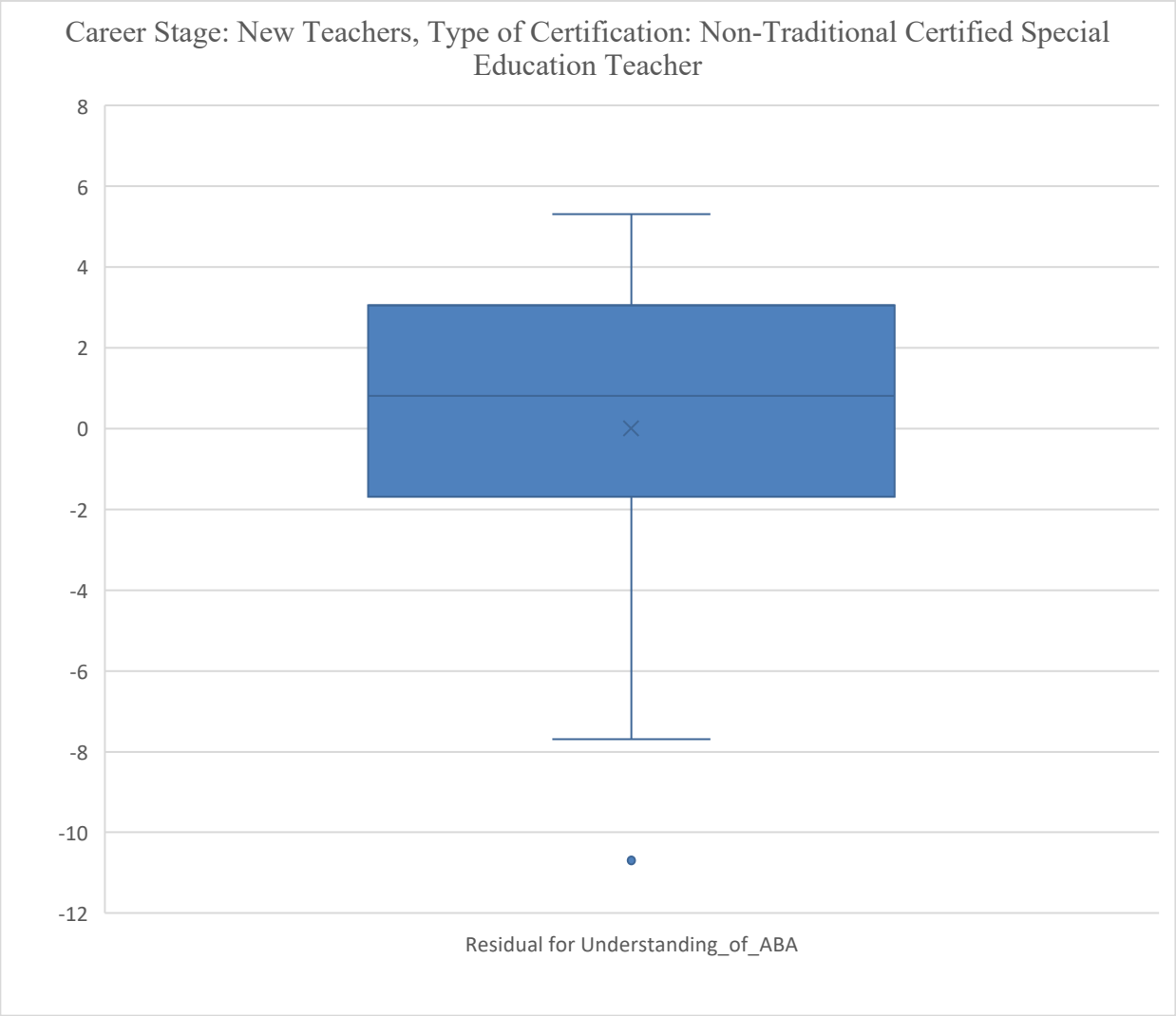


Figure 2

Box and whisker plot (dependent, new teachers, traditional certification)

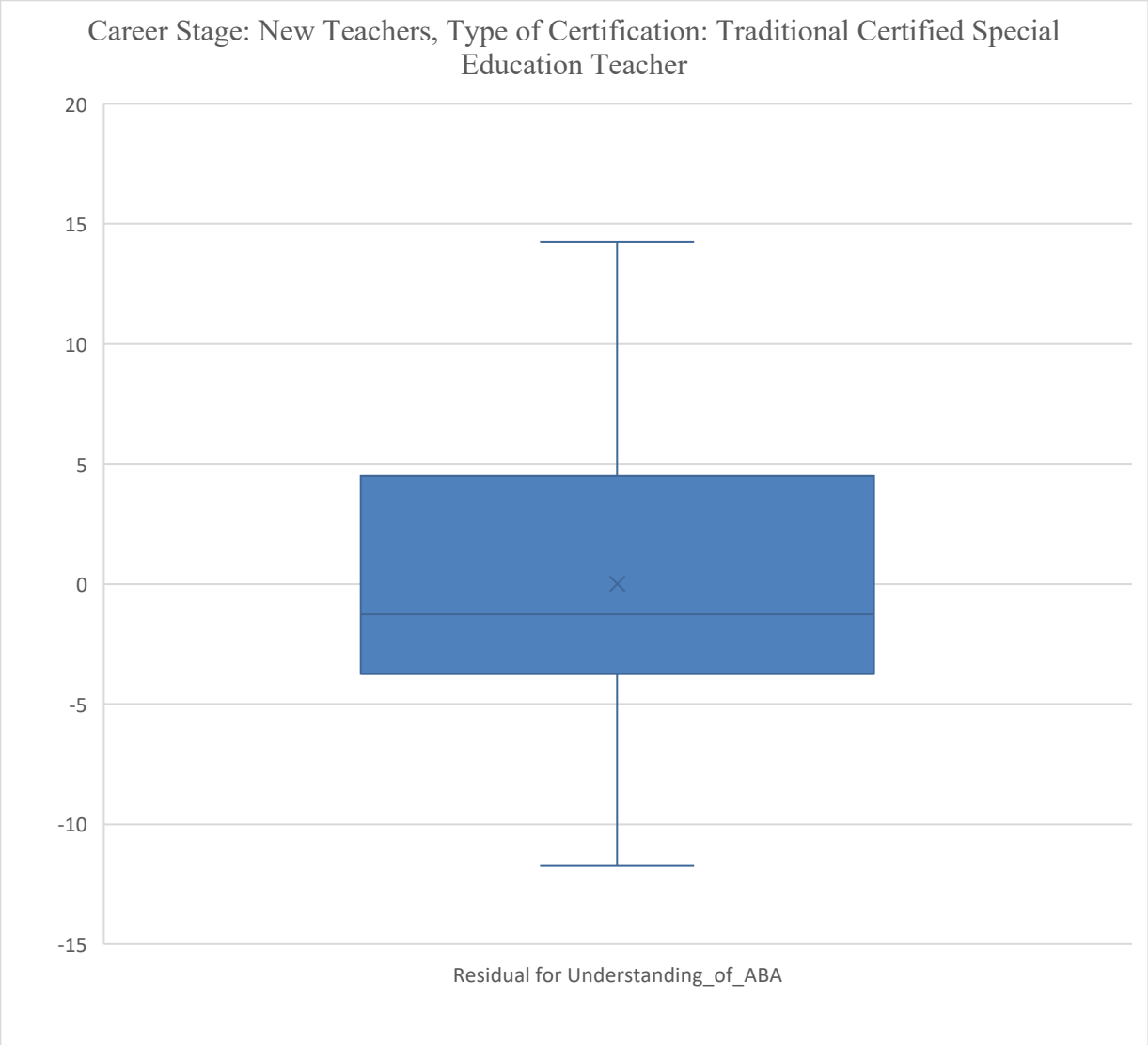


Figure 3

Box and whisker plot (dependent, veteran teachers, non-traditional certification)

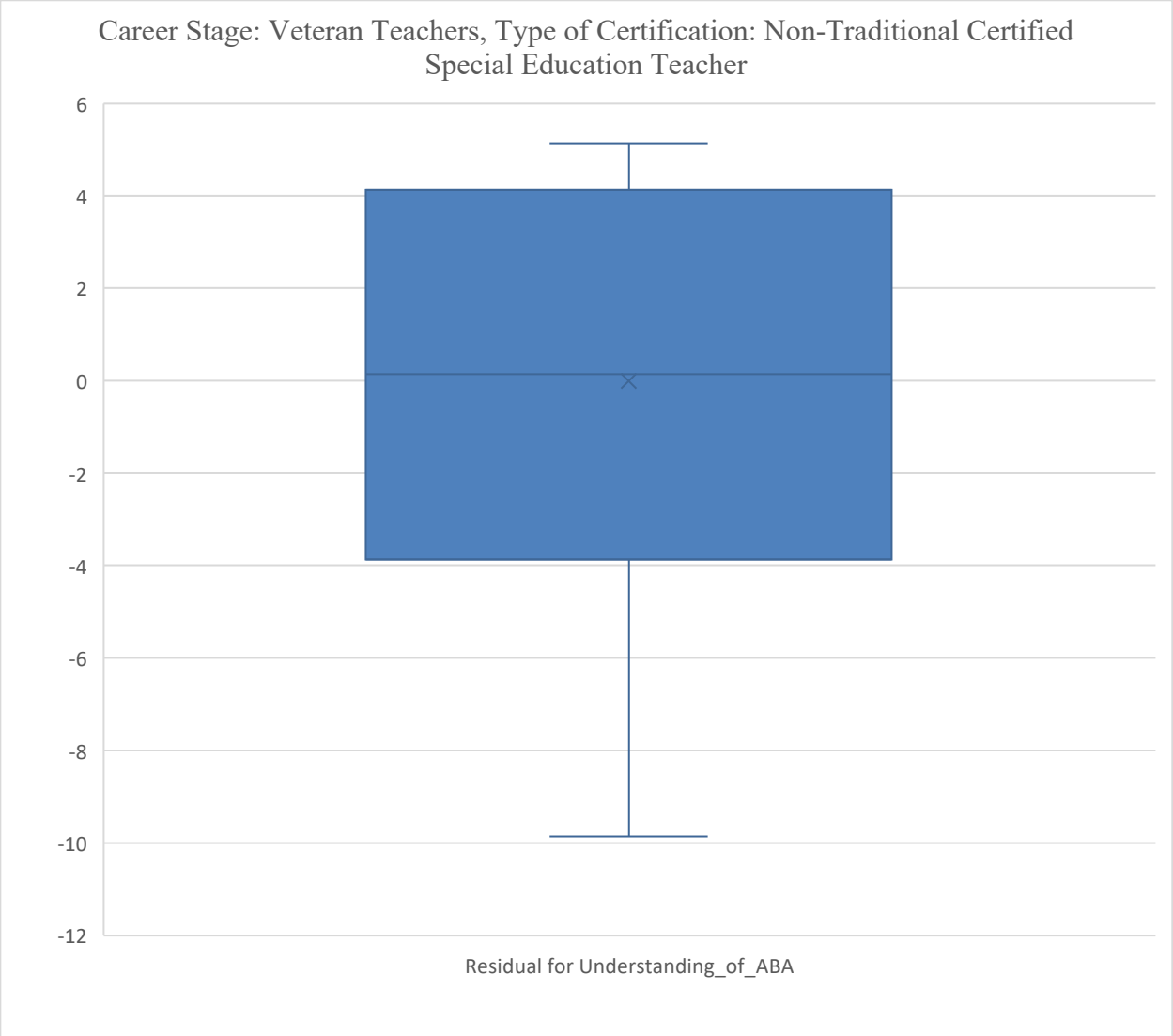
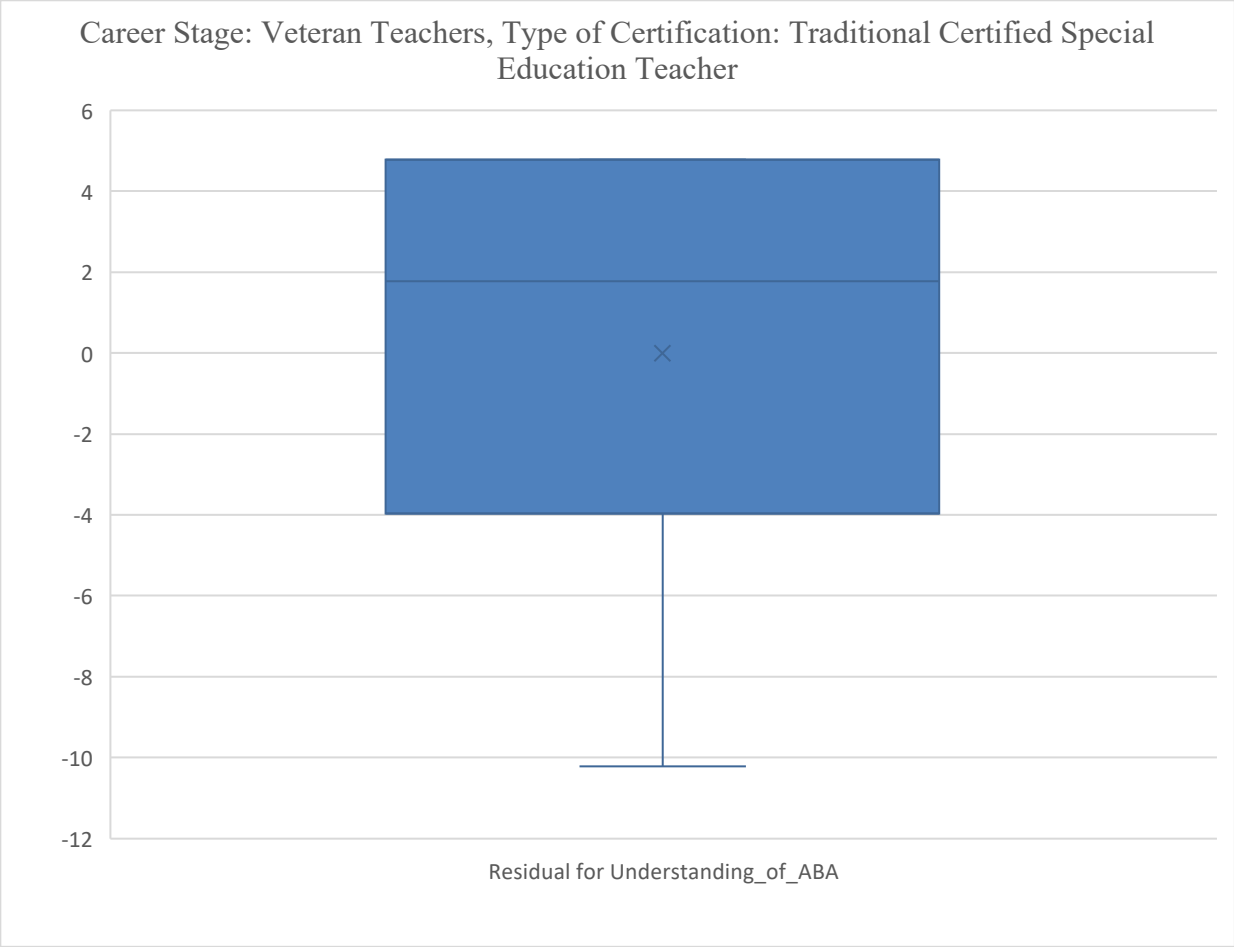


Figure 4

Box and whisker plot (dependent, veteran teachers, traditional certification)



Assumptions

A two-way Analysis of Variance (ANOVA) was used to test the null hypotheses. The assumption of independence of observations was met based on study design. There is no relationship between the observations in each group of the independent variable or between the groups themselves.

The assumption of no significant outliners was inspected using boxplots. Outliers are data points that do not follow the normal pattern and can negatively affect the two-way ANOVA by distorting the differences between the design cells (Laerd Statistics, n.d.). They can also generate

problems when generalizing the sample results to the population. Thus, Figures 1, 2, 3, and 4 show that there are no extreme outliers or asterisks within the four independent variables, indicating that there are no significant outliers present.

The assumption of normality states that the residuals must be normally distributed for each combination of levels of the independent variables. This study evaluated the normality of four different combinations separately using the Shapiro-Wilks test of normality. Under the Shapiro-Wilk column, there is a Sig column, which is where the significance value (i.e., *p*-value) is for the test for each group combination of the two independent variables. If the assumption of normality has not been violated, the Sig value will be greater than .05 (i.e., $p > .05$). According to the Table 2, the *p*-value for each row of Type of Certification, except for the Traditional Certified Special Education Teacher, has been violated since the Sig values are less than 0.5 (i.e., $p < .05$ level) and the data/residuals are not normally distributed for those group combinations. The decision to run the test regardless of some violation of the assumption of normality was made because ANOVAs are considered to be fairly robust to deviations from normality, meaning that this assumption can be slightly violated, yet still provide valid results (Laerd Statistics, n.d.). However, due to this violation, these results are unreliable and should be interpreted with caution

Table 2

Shapiro-Wilk test of Normality

Career Stage	Type of Certification		Shapiro-Wilk		
			Statistic	*df*	Sig.
New Teachers	Non-Traditional Certified Special Education Teacher	Residual for Understanding_of_ABA	.910	36	.006

	Traditional Certified Special Education Teacher	Residual for Understanding_of_ABA	.952	36	.117
Veteran Teachers	Non-Traditional Certified Special Education Teacher	Residual for Understanding_of_ABA	.904	36	.004
	Traditional Certified Special Education Teacher	Residual for Understanding_of_ABA	.845	36	<.001

The two-way ANOVA assumes that the variances of the dependent variable or residuals in all combinations of groups of the independent variables are equal. If this assumption is not met, this can impact the Type I error rate, resulting in incorrect statistical conclusions. For this study, the assumption of homogeneity of variances was tested using Levene's test of equality of variances (Laerd Statistics, n.d.). As seen in Table 3, the Sig column on the Levene's test of equality of variances illustrates the significance value, *p*-value of this study. The significance level of the mean and trimmed mean Sig columns have a *p*-value of < .05, which indicates that there are not equal variances and the assumption of homogeneity of variances was violated. The decision to run the test regardless of the violation of the assumption of homogeneity of variances was made because two-way ANOVA's are considered to be quite robust to some violations (Laerd Statistics, n.d.). However, given that both the assumption of normality and the assumption of homogeneity of variance were violated, the researcher attempted to transform the data.. If normality is achieved and the ration of the largest group variance to the smallest group variance is less than 1.5, the researcher can then proceed with running the two-way ANOVA as it is somewhat robust to variations in variance under these circumstances. Despite the additional attempt to transform the data after violating the assumptions of normality and homogeneity of variance, the results did not correct the problem as both assumptions continued to remain

violated.

Table 3

Levene's Test of Equality of Error Variances[a,b]

		Levene Statistic	*df1*	df2	Sig.
Understanding of ABA	Based on Mean	3.769	3	140	.012
	Based on Median	2.537	3	140	.059
	Based on Median and with adjusted df	2.537	3	104.415	.061
	Based on trimmed mean	3.591	3	140	.015

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Dependent variable: Understanding of ABA

b. Design: Intercept + Career_Stage + Type_of_Certification + Career_Stage * Type_of_Certification

Results for Null Hypotheses

The first hypothesis states that there is no significant difference in the understanding of ABA between traditional and non-traditional teachers among special education teachers. A two-way ANOVA was executed using the total score of the survey as the dependent variable. According to Table 4, the *p*-value for this interaction effect is .002, so the $p = .002$, which is less than .05 as this fulfills $p < .05$, indicating that there is difference between traditional and non-traditional special education teachers on the understanding of ABA, $F(1, 140) = 10.46$, $p = .002$, partial $\eta^2 = .070$. Therefore, the null hypothesis was rejected.

The second hypothesis indicated that there is no significant difference in the understanding of ABA between new and veteran special education teachers. In order to test this hypothesis, a two-way ANOVA was also conducted using the data collected from a survey where questions were asked about the teacher's knowledge of ABA. Table 4 demonstrates the *p*-value for this interaction effect is .001, so the $p = .001$, which is less than .05, as this fulfills $p < .05$, indicating that there is a difference between the understanding of ABA between new and

veteran special education teachers, F(1, 140) = 53.63, p = .001, partial η^2 = .277. The null hypothesis was therefore rejected.

A two-way ANOVA was also conducted to indicate whether or not there is a significant interaction between experience level and type of certification on the understanding of ABA, as measured by the survey instrument among special education teachers. Table 8 illustrates that there is an interaction effect between experience level and type of certification on the understanding of ABA among special education teachers. The Sig. column presents the significance value (i.e., p-value) of the interaction effect. According to Table 4, the p-value for this interaction effect is .001, so the p = .001, which is less than .05, as this fulfills $p < .05$, indicating that there is a statistically significant interaction effect between the experience level and type of certification on the understanding of ABA, F (1, 140) = 13.34, p = .001, partial η^2 = .087. See figure 5 for a plot graph of the interaction effect between experience level and type of certification on the understanding of ABA among special education teachers.

Table 4

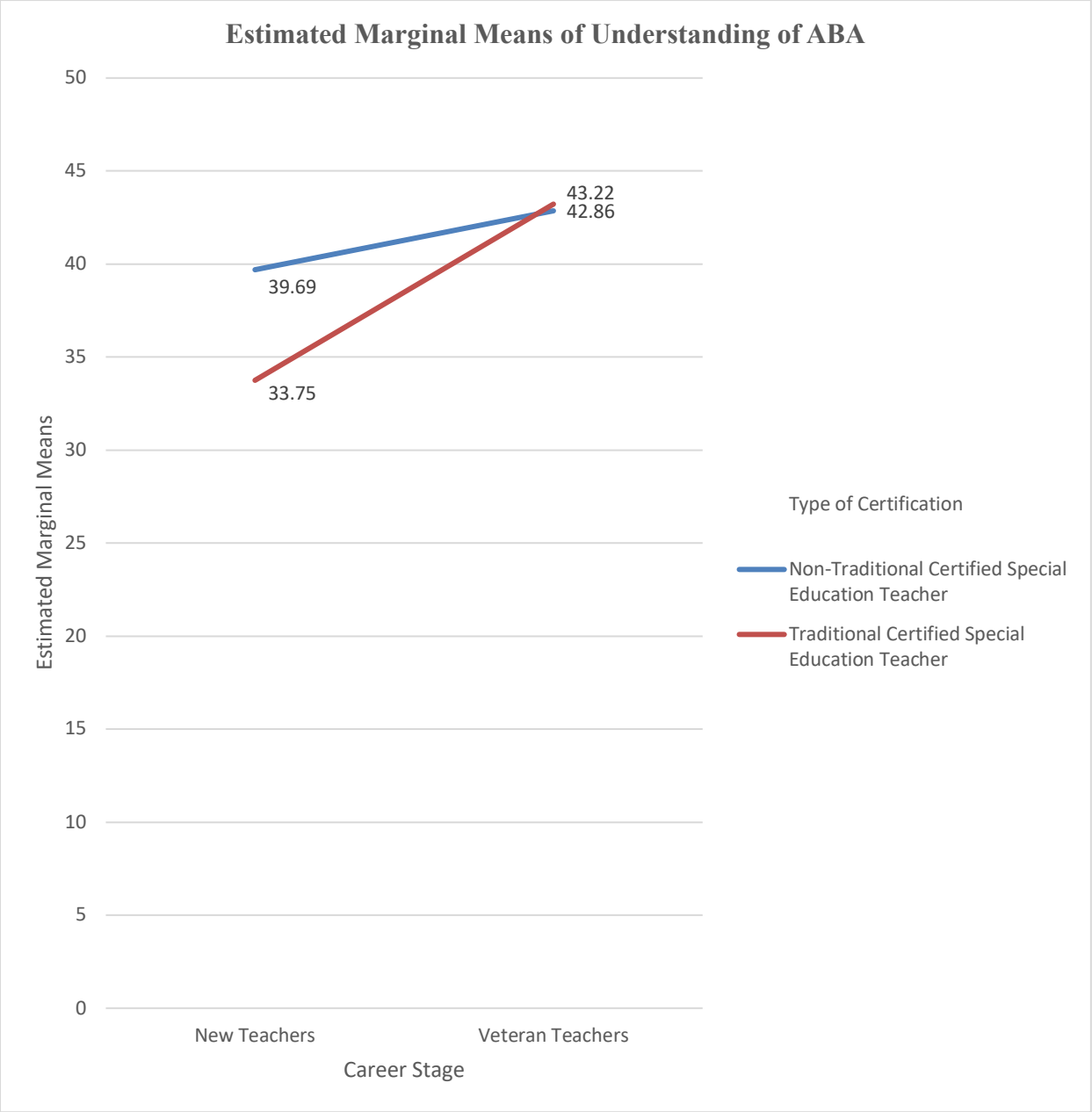
Test of between-subjects effects (dependent, understanding of ABA)

Source	Type III Sum of Squares	*df*	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2076.076[a]	3	692.025	25.816	<.001	.356
Intercept	229042.007	1	229042.007	8544.256	<.001	.984
Career_Stage	1437.674	1	1437.674	53.631	<.001	.277
Type_of_Certification	280.563	1	280.563	10.466	.002	.070
Career_Stage * Type_of_Certification	357.840	1	357.840	13.349	<.001	.087
Error	3752.917	140	26.807			
Total	234871.000	144				
Corrected Total	5828.993	143				

a. R Squared = .356 (Adjusted R Squared = .342)

Figure 5

Interaction effect between experience level and type of certification



CHAPTER FIVE: CONCLUSIONS

Overview

The aim of this research study was to determine whether there is any difference in the understanding of applied behavior analysis between certified special education teachers with traditional and non-traditional backgrounds, as well as between new and veteran teachers. The last chapter of the research study will discuss the findings of the study, including the implications, limitations, and recommendations for future research.

Discussion

Autism spectrum disorder (ASD) is a prevalent diverse neurodevelopmental disorder that affects children worldwide. Unfortunately, the number of children diagnosed with ASD is steadily increasing and illustrating no signs of slowing down (Dhawn, 2021& Gomez-Mari et al., 2021). Children with ASD receive most of their intervention services in public schools. However, the implementation of evidence-based practices, such ABA, varies across schools (Locke et al., 2019). The purpose of this study was to determine whether there is an interaction effect between the experience level and type of certification in relation to understanding applied behavior analysis. The following null hypotheses were explored:

$H_0$1: There is no significant difference in the understanding of applied behavior analysis between traditional and non-traditional teachers among special education teachers.

$H_0$2: There is no significant difference in the understanding of applied behavior analysis between new and veteran special education teachers.

$H_0$3: There is no significant interaction between experience level and type of certification on the understanding of applied behavior analysis, as measured by the survey instrument among special education teachers.

Null Hypothesis One

The results related to the first question show a difference in the understanding of ABA between traditional and non-traditional special education teachers. The null hypothesis was rejected, indicating the traditionally certified special education teachers scored higher on the survey, suggesting a better understanding of applied behavior analysis.

This is the first study to be conducted within the central Texas area on special education teacher's understanding of ABA. This study also provides significant insights into the critical factors, such as if special education teachers have been trained as well as their knowledge level in ABA. Moreover, this study is consistent with Alotaibi's (2015) results, as it highlights the importance of providing ABA training to teachers of students with ASD to manage and eliminate disruptive behaviors in the classroom, as experience appears to improve understanding.

The data collection methods also confirm that not all special education teachers instructing children with autism in a self-contained classroom have undergone ABA training, leading to a deficiency in knowledge and understanding of the methodology. Within the central Texas area, 182 out of 306 special education teachers were sent the survey. Of the 182 educators who responded, 26% reported that they had not received ABA training and therefore, could not participate in the study. Additionally, two campus administrators replied to my email stating that they have permanent substitutes in their five self-contained classrooms due to teacher vacancies. Lack of knowledge, accountability, training, and understanding continues to remain a problem at both the local and national levels, as well as in well-developed countries (Dhawan, 2021; Smyth et al., 2019). The literature also stated that most educators receive limited training, as well as instruction in evidence-based practices, such as ABA, and have little experience in incorporating behavioral interventions that are vital for educating children with ASD (Pollack et al.,

2023). Overall, teachers lack access to appropriate training in evidence-based practices and preparation for ABA and its framework, resulting in a lack of time, as well as resources to incorporate these practices (Azad et al., 2021).

Special education teachers who have not received adequate training in ABA may not possess the understanding and skills required to effectively educate children with autism in their classrooms. This lack of training may result in challenges in meeting the diverse needs of students with autism and implementing appropriate behavioral interventions to support their learning as well as development.

Null Hypothesis Two

The second question stated that there is no significant difference in ABA understanding between new and veteran special education teachers. However, the data revealed a disparity, leading to the rejection of the null hypothesis.

Professional experience pertains to any teacher preparation activities that take place within a school-based setting. It also requires educators to work directly with students, including the implementation of coursework. This initial experience can be overwhelming for new, or novice teachers, with 0-3 years of classroom experience and is often referred to as a reality shock. Special education novice teachers often find ABA training even more difficult because it involves managing different challenges presented by students with disabilities, such as autism. Thus, special education teachers need to practice adapted teaching methods, as well as interventions, in order to create the foundation for personal relationships with their students who demonstrate multidimensional needs and do not collaborate with interdisciplinary staff. That being said, to improve the effectiveness and quality of the professional experience, it is important

to address and understand the needs within teacher education programs (Gidalevich & Shalev, 2022).

The literature also indicates the drastic shift towards better service recruitment, including the retention of effective educators, especially teachers who are new to the classroom. This is due to novice teachers leaving the career field, the transition to pricey training, and the lack of support for their replacements. The literature consistently emphasizes the significant importance of shifting the focus of the teacher workforce from recruitment to retention. This shift is crucial as educational leaders, policymakers, and researchers seek to improve support for historically-underachieving groups of students, including children in special education. The goal is to provide these students with a more stable educational experience (Mathews et al., 2017).

Null Hypothesis Three

The third questions stated that there is no significant interaction between experience level and type of certification on the understanding of ABA among special education teachers. However, the null hypothesis was rejected due to the interaction between the two variables, experience level and type of certification. This interaction suggests a link between the responses of one group and the responses of the other.

The research has stated that professional development can assist teachers in enhancing their teaching skills, especially as special education teachers encounter difficulties in implementing special education policies for students with disabilities. Therefore, professional development has an impact on special education teachers which in turn affects teacher retention and the implementation of special education services (Woulfin & Johns, 2021). Recent research also states that many college and university teacher preparation programs are failing to

adequately prepare preservice teachers for the classroom, especially special education teachers (Crispel & Kasperski, 2021).

Establishing professional development opportunities for educators working with children with special education needs is a difficult task. Educators are often hired underequipped for positions in special education and early intervention settings. Moreover, most teacher training programs do not emphasize special education explicitly enough for teachers to feel confident and qualified in teaching children with disabilities. Even experienced educators might have difficulty in advancing their professional development, which includes changing practices they prefer or believe to be the best. This absence of preparation, as well as opposition to transforming certain practices already embedded in one's classroom, has resulted in a dire need for novices, as well as veteran educators, to obtain additional professional development opportunities (Francois, 2020).

Studies have also concluded that educators often lack the necessary knowledge, including skills pertaining to autism, to adequately support their students in school. Unfortunately, this is mainly due to the lack of training, as well as resources for special education teachers. Additionally, with the drastic increase in the number of students with autism, the probability that a teacher will encounter a child with ASD in their classroom, especially within a self-contained classroom, is extremely high (Kossewska et al. (2021).

The evidence and results presented attribute to the need for new teachers to possess more ABA knowledge when they enter the classroom. Novice teachers are less prepared than veteran teachers when it comes to implementing ABA techniques in the classroom due to their limited experience and exposure to practical applications. This is due to veteran teachers accumulating years of experience, including having had more opportunities to master their teaching methods, including their utilization of ABA techniques. In order to address this issue, novice teachers

would greatly benefit from more comprehensive training focused on ABA methods to deepen their understanding of ABA within the classroom. Future concerns can consist of ensuring that novice educators receive adequate support, including training as well as resources to effectively implement ABA in a diverse classroom setting, such as self-contained, as well as fostering a culture of ongoing learning.

Implications

In the United States, the number of children diagnosed with autism spectrum disorder (ASD) has increased to one in 36 students. Consequently, this has resulted in a rise in the number of students with autism being served in public schools, the primary service setting for children with ASD. Therefore, it has become imperative to include children with ASD in general education settings with their typically developing peers. Unfortunately, only around 30% of students with autism within the United States were served up to 80% of their day in a general education setting. Self-contained classrooms continue to remain a common placement for children with autism (Ahlers et al., 2023).

Since 1975, the law has stated that students with disabilities should be taught with their non-disabled peers to the greatest extent possible, as well as be provided with specialized interventions that support their individualized needs. However, despite this law being in place, the predominant method for placing children with disabilities has been to exclude them from being in a classroom with their neurotypical peers and set them in a separate classroom (Ahlers et al., 2023).

Self-contained classrooms typically have a lower student-teacher ratio, which means more individualized goals, as well as curricula, are implemented for each student based on their needs. Unfortunately, within these more restrictive classroom settings, students can drastically

vary in grade level or age within this setting (Ahlers et al., 2023). In the central Texas Region where the study was conducted, there were approximately 300 self-contained teachers in the ESC Region 12 area. Moreover, students with autism who, according to their IEP, needed a more restrictive classroom setting were placed in a classroom where the grade level ranged from kindergarten to 2nd or 3rd to fifth grades. However, some students were placed in a more restrictive classroom where the grade level was kindergarten to 5th grade. Despite the research and importance of ABA in supporting children with disabilities in their least restrictive environment, the state of Texas does not require a special education teacher to obtain any training in ABA. Thus, to meet the expectations of supporting students with disabilities in their least restrictive environment, accessing the general curriculum, and balancing their support needs (Ahlers et al., 2023), public schools should require special education teachers to receive training in ABA and have yearly certification requirements to ensure that they can include best practices, such as ABA into their classroom.

ABA has been used for over 50 years as an intervention method for individuals diagnosed with ASD. It has been clinically implemented, and its effectiveness has been empirically researched. The implementation of ABA is widely identified as an evidence-based practice and the most effective intervention for individuals with autism (Allen et al., 2024; Leaf et al., 2021). Thus, ABA and the individuals who provide it to children diagnosed with autism aim to enhance the quality of life for individuals with ASD (Mathur et al., 2024).

From infancy and into adulthood, an individual with autism, including their families, often encounter numerous challenges (Hume et al., 2021). Hence, it is increasingly essential to provide each child with the necessary ABA techniques. In doing so, it will not only enable them

to attend a classroom setting with their peers, but also provide them with the skills needed to thrive in society.

Conducting an ABA study that aims to gain a deeper understanding of the knowledge self-contained educators have in regard to ABA and its methods can have significant outcomes. For instance, this study has helped to identify some potential gaps in knowledge, including the areas of improvement required for special education teachers in order to provide more effective classroom instruction to their students with ASD. Additionally, this study has shown that less experienced teachers were found to have lower levels of knowledge, indicating a need for specialized training in ABA for novice special education teachers. As a result, having more knowledge in ABA will provide novice educators with the necessary knowledge to effectively educate children with disabilities such as ASD.

This study has contributed to the existing body of knowledge by expanding understanding, identifying the gaps in knowledge, as well as the areas of ABA knowledge and improvement needed for self-contained teachers within ESC Region 12's area. Lastly, this study has provided valuable insights for future research, including practice in the field of ABA and within the classroom settings in the state of Texas. Ultimately, the study's findings can help improve outcomes for individuals diagnosed with autism who attend classrooms with more restrictive settings.

Limitations

One of the primary limitations of this study is that the collected data may not accurately reflect the variables of interest. The data had failed assumptions, leading to limitations that can possibly affect the reliability and validity of the research findings, as well as their interpretation. The assumptions of normality and equality of variances were both violated. Therefore, the findings are suspect. Although ANOVA is robust to certain violations of these assumptions, this is true if the

sample size is large and the groups surveyed in the present study barely met the minimum sample size. Regrettably, these limitations can compromise the integrity of the research findings and can limit the study's ability to make valuable contributions to the body of knowledge.

The survey-based study through Survey Sparrow also has certain limitations, as it relies on participants to voluntarily provide information. The survey does not provide questions into the participants' actual implementation or understanding of ABA strategies and techniques within their classrooms. Although the study provides information regarding the educator's perceptions of knowledge and utilization, the survey does not confirm whether the strategies are being accurately and consistently incorporated by the teachers. Moreover, the results obtained do not necessarily reflect the self-contained teachers' true knowledge of ABA, as the information gathered is solely based on the participants' perceptions. It is also important to acknowledge that the selective utilization of the instrument may have implications for the comprehensiveness, including the depth of the study's outcomes. Therefore, it is necessary to consider these limitations when interpreting the results and drawing conclusions from this study.

Recommendations for Future Research

As this quantitative, causal-comparative research concerning the difference in understanding of applied behavior analysis between traditional and non-traditional certified special education teachers and between new and veteran teachers addresses a gap currently found within the research field, there are many recommendations for further study. Although the researcher has paved the way for further research into the understanding of applied behavior analysis among traditional and non-traditional certified special education teachers, as well as new and veteran teachers within the state of Texas, future research could focus on the following:

- Examining the level of knowledge that educators in self-contained classrooms possess about ABA strategies

- Exploring whether special education teachers within self-contained classrooms are utilizing ABA methods correctly in the classroom
- Conducting observational research to determine the accuracy of executing ABA strategies
- Identifying patterns or trends in the way educators in self-contained classrooms are utilizing ABA techniques within their classroom
- Illustrating more effective ways to integrate ABA techniques within these educators' classroom
- Understating the effectiveness of ABA strategies and help to identify areas where special education teachers may need additional support or training to fully implement these techniques for the benefit of students with ASD
- Analyzing the outcomes of these strategies can assist teachers to identify the most effective techniques and determine the need for additional support or training
- A public database on Special Education teachers within the state of Texas at each Education Service Center
- Information about how many students have a diagnosis of ASD within a self-contained classroom and what evidence-based curriculum is being implemented to eliminate or replace unwanted behavior
- Making this information and training accessible to parents, including all 20 Education Service Centers, collaborating with one another as well as providing support, including training for self-contained teachers

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APPENDIX A

IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

January 8, 2024

Delilah Fernandez
Susan Stanley

Re: IRB Exemption - IRB-FY23-24-847 DIFFERENCES IN SPECIAL EDUCATION TEACHERS' APPLIED BEHAVIOR ANALYSIS SCORES: A CAUSAL-COMPARATIVE STUDY

Dear Delilah Fernandez, Susan Stanley,

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

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

Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects;

For a PDF of your exemption letter, click on your study number in the My Studies card on your Cayuse dashboard. Next, click the Submissions bar beside the Study Details bar on the Study details page. Finally, click Initial under Submission Type and choose the Letters tab toward the bottom of the Submission Details page. Your information sheet and final versions of your study documents can also be found on the same page under the Attachments tab.

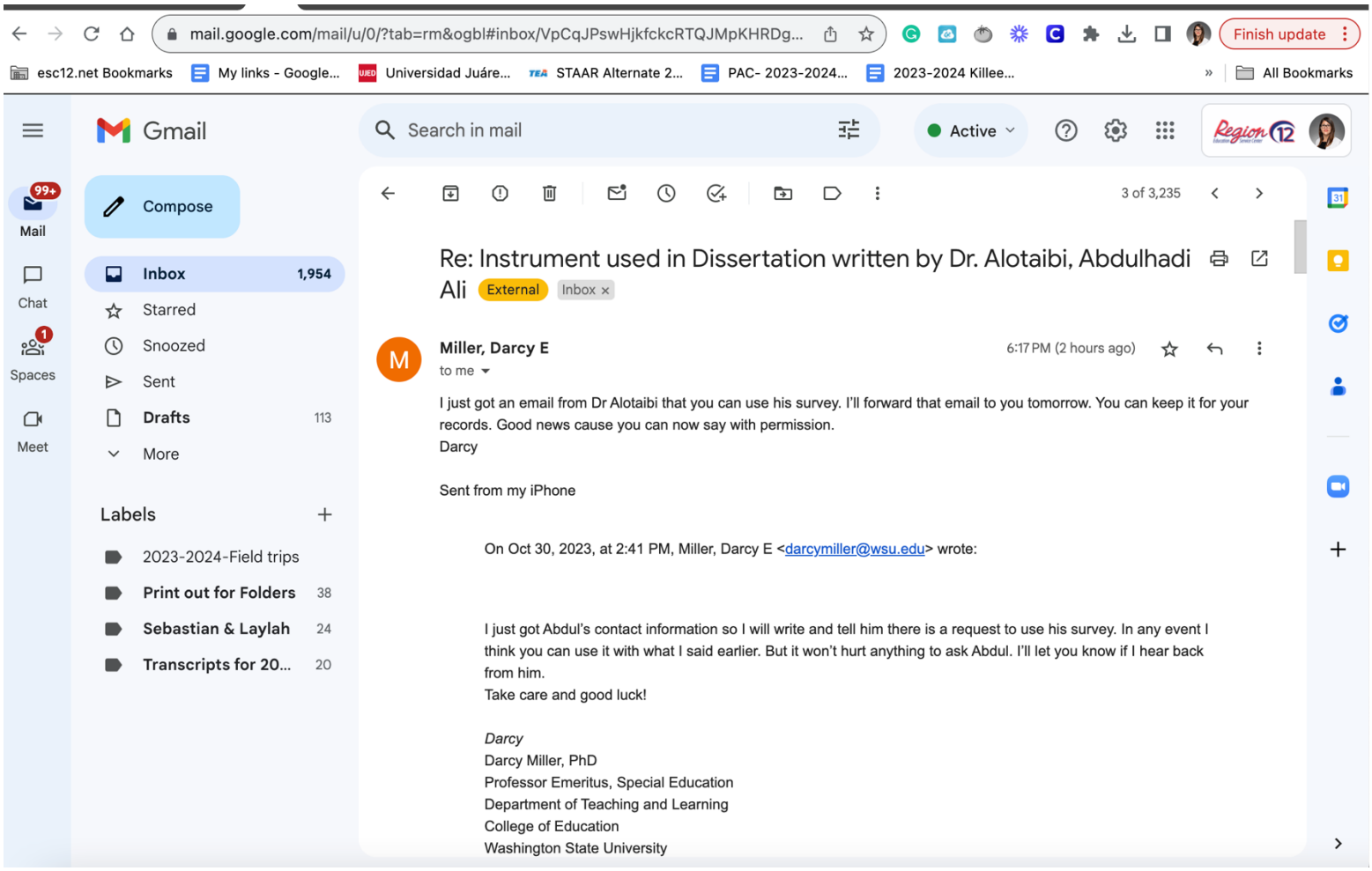
Please note that this exemption only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued exemption status. You may report these changes by completing a modification submission through your Cayuse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

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

Sincerely,
G. Michele Baker, PhD, CIP
Administrative Chair
Research Ethics Office

APPENDIX B

Permission to utilize Survey



APPENDIX C

Permission Request

Permission Request

November 10, 2023

Delilah Fernandez
Doctoral Candidate
School of Education
Liberty University

Dear Participant,

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctorates degree. The title of my research project is Differences in Special Education Teachers' Applied Behavior Analysis Scores: A Causal-Comparative Study and the purpose of my research is to investigate if differences exist in the comprehension of applied behavior analysis (ABA) among special education teachers with varying certifications at different career stages. The results will be shared in professional educational journals and reported to the Texas Education Agency and Education Service Centers to provide officials with insight into the level of ABA strategy knowledge among special education teachers of students with autism spectrum disorder (ASD).

I am writing to request your permission to conduct my research in your name.

Participants will be asked to complete the attached electronic survey. The data will be used to investigate if differences exist in the comprehension of ABA among special education teachers with varying certifications at different career stages. The results will be shared in professional educational journals and reported to the Texas Education Agency and Education Service Centers to provide officials with insight into the level of ABA strategy knowledge among special education teachers of students with ASD. Participants will be presented with study information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. To participate in the survey, it is necessary to click on the provided survey link, indicating that participants would like to take part in the study. A permission letter from Liberty University's Institutional Review Board document is also attached for your convenience.

Sincerely,

Delilah Fernandez

Delilah Fernandez
Doctoral Candidate

APPENDIX D

Recruitment Letter

November 10, 2023

Delilah Fernandez
Doctoral Candidate
School of Education
Liberty University

Dear Participant:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctorates degree. The purpose of my research is to research is to investigate if differences exist in the comprehension of applied behavior analysis (ABA) among special education teachers with varying certifications at different career stages and I am writing to invite eligible participants to join my study.

Participants must be 18 years of age or older and be special education educators with applied behavior analysis training teaching in a self-contained classroom within the state of Texas. Participants, if willing, will be asked to complete the attached electronic survey. The survey should take approximately 5-10 minutes to complete. Participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please [click here (https://dfernandezesc12.surveysparrow.com/s/Applied-Behavior-Analysis-ABA-Survey/tt-2ETSChQJN5Jtgi2rsdEK1X)] to complete the survey. Please feel free to contact me at 254-230-5118 for any further information.

A study information sheet is attached to this email. The document contains additional information about my research. Because participation is anonymous, you do not need to sign and return the document unless you would prefer to do so. After you have read the form, please click the [online link provided above] to proceed to the survey. Doing so will indicate that you have read the information and would like to take part in the survey.

Sincerely,

Delilah Fernandez

Delilah Fernandez
Doctoral Candidate
[redacted]

APPENDIX E

Study Information Sheet

Study Information Sheet

Title of the Project: Differences in Special Education Teachers' Applied Behavior Analysis Scores: A Causal-Comparative Study
Principal Investigator: Delilah Fernandez, Doctoral Candidate, School of Education, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study led by Delilah Fernandez, and you will find a detailed description of the study along with your role in it if you choose to participate in this form. However, in order to participate in this study, you would need to be a special education teacher 18 years of age or older with applied behavior analysis training teaching in a self-contained classroom within the state of Texas. Please take your time to read through this entire form, and do not hesitate to ask any questions before deciding whether to take part in this research (dfernandez22@liberty.edu).

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

The purpose of this study is to investigate if differences exist in the comprehension of applied behavior analysis (ABA) among special education teachers with varying certifications at different career stages. The results will be shared in professional educational journals and reported to the Texas Education Agency and Education Service Centers to provide officials with insight into the level of ABA strategy knowledge among special education teachers of students with autism spectrum disorder (ASD).

What will happen if you take part in this study?

If you agree to be in this study, you will be asked to do the following:

1. First task will be to open the survey link that will be emailed directly to you.
2. Answer both sections of the survey that will take roughly 10 minutes to complete.
3. Submit your responses and close your browser out completely.

How could you or others benefit from this study?

Participating in this study may not provide any direct benefits for you, but it can contribute to the enhancement of teacher training and educational programs for students with ASD in your region. The study is expected to improve educational programs for students with ASD by enhancing teacher training, assist special education faculty members in your area and universities in Texas in creating suitable training programs for ABA use by teachers of students with ASD, and expand the knowledge in the field of special education.

What risks might you experience from being in this study?

The potential risk associated with this study are minimal. Some participants may feel uncomfortable about sharing their knowledge, however, the risks for participating in this study are similar to what one would encounter in your everyday living.

How will personal information be protected?

The records of this study will be kept private. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be anonymous and will not disclose any identifying information about the participants, and their names will not be associated with the findings.
- Data will be stored on a password-locked computer. After three years, all electronic records associated with the study will be deleted, and all hardcopy records will be shredded.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

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

If at any time throughout the survey you decide you would like to withdraw from the study, please exit the survey and close your internet browser. Your responses will not be recorded or included in the study.

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

The researcher conducting this study is Delilah Fernandez. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her directly through email, [redacted]You may also contact the researcher's faculty sponsor, Dr. Susan K. Stanley, at [redacted]

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

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA, 24515; our phone number is 434-592-5530, and our email address is irb@liberty.edu.

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

APPENDIX F

Survey Questions

Survey Questions

Part 1
Demographic Information

1.Have you completed any training on applied behavior analysis strategies?
_____Yes _____No

2.How many years have you been teaching?
_____0-3____4-7____ 8-11 _____more than 12.

3.What is your gender: _____Male _____Female

4.What academic degree(s) have you obtained? (please check all that apply)

_____Bachelor's_____Master's_____Doctorate_____Other

5.Did you go through a traditional student teaching education program through a university?
_____Yes _____No

6.In your undergraduate or graduate education, did you take a course that focused primarily on behavior management related to children with autism?
_____Yes _____No

7.In your undergraduate or graduate education, did you take a course that focused primarily on applied behavior analysis? _____Yes _____No

8.Have you completed any training during your teaching career on applied behavior analysis strategies? _____Yes _____No

9.What is the total enrollment of students with autism in your school program or autism center?_____ 1-5 _____ 6-10_____11-15 _____ 16-20 _____more than 20

10.What is the age level of the students with autism that your program/center serves? Check all that apply.
_____ 3-5 _____ 5-7 _____ 7-9 _____ 9-12

11.Using a scale of 1 to 5, where 1 indicates mild cognitive impairment and 5 indicates severe cognitive impairment, rate the cognitive level of functioning of the students with autism that your program serves and you teach?

1	2	3	4	5
Mild Cognitive Impairment				Severe Cognitive Impairment

12. Using a scale of 1 to 5, where 1 indicates mild behavior problems and 5 indicates severe behavior problems, rate the behaviors of the students with autism that your program serves and you teach?

1	2	3	4	5
Mild Behavior Problems				Severe Behavior Problems

Part 2

Please rate the following strategies according to how knowledgeable you are about the strategies and the frequency with which you use them in your classroom.

On the left side of the questionnaire, please check (√) the box that best describes your level of knowledge of behavioral management strategies. Use this rating scale: (1) Not knowledgeable, (2) Somewhat knowledgeable, or (3) Knowledgeable.

1	2	3	**Strategies**
			(Positive Reinforcement – Social): I give students possible attention when the student demonstrates positive behavior.
			(Positive Reinforcement – preferred activity): I let students earn time on a preferred activity, such as computer time or game time, when he/she demonstrates positive behavior.
			(Positive Reinforcement - Token Economy): I have a system in which students can earn tickets, or points, or stars that can later be traded in for larger prizes, when he/she demonstrates positive behavior.
			(Positive Reinforcement- Food): I let students earn candy or food for demonstrating positive behavior.
			(Shaping): I continue to reward students as they achieve small steps toward the more complex/difficult positive behavior until they learn the complex/difficult behavior completely.
			(Behavior Contract): I let my students decide with me what behaviors they will work to achieve.
			(Behavior Contract): I let my students decide with me what rewards they will earn as they achieve their behavioral goals.
			(Modeling): I demonstrate the positive behavior(s) that I want students to learn and perform.
			(Prompting): I prompt/guide students all along the way (as needed) as they are learning positive behavior.
			(Fading):

			I slowly take away prompts/guidance as the student demonstrates more independently positive behavior.
			(Group Contingency): I reward the class when one student or a small group of students demonstrate positive behavior.
			(Extinction): I stop my actions if they contribute to a student's inappropriate behavior (For example is my attention seems to be rewarding a student's inappropriate behavior, I will withdraw my attention).
			(Punishment): I verbally reprimand students or take away privileges when their behaviors are inappropriate.
			(Differential Reinforcement): I reward students' positive behaviors and at the same I do not reward the students' inappropriate behavior (For example, I might praise a student for looking at the lesson or attending to the lesson while at the same time I would ignore the same student for kicking his/her desk).
			(Time Out): I temporarily separate any student (put them in a different area or setting) from the other students following inappropriate behaviors.
			(Overcorrection): I require that students practice positive behaviors if the student demonstrates inappropriate behavior (For example, if a student screams a request, such as "In want cookie!" I have the student practice giving the request in an appropriate way; or if a student kicks/shouts when he/she needs something, I have him/her practice how to get his/her needs met in an appropriate way).